

Invent to learn: Making, Tinkering and Engineering

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Conferenza nazionale e Premi eTwinning 2021



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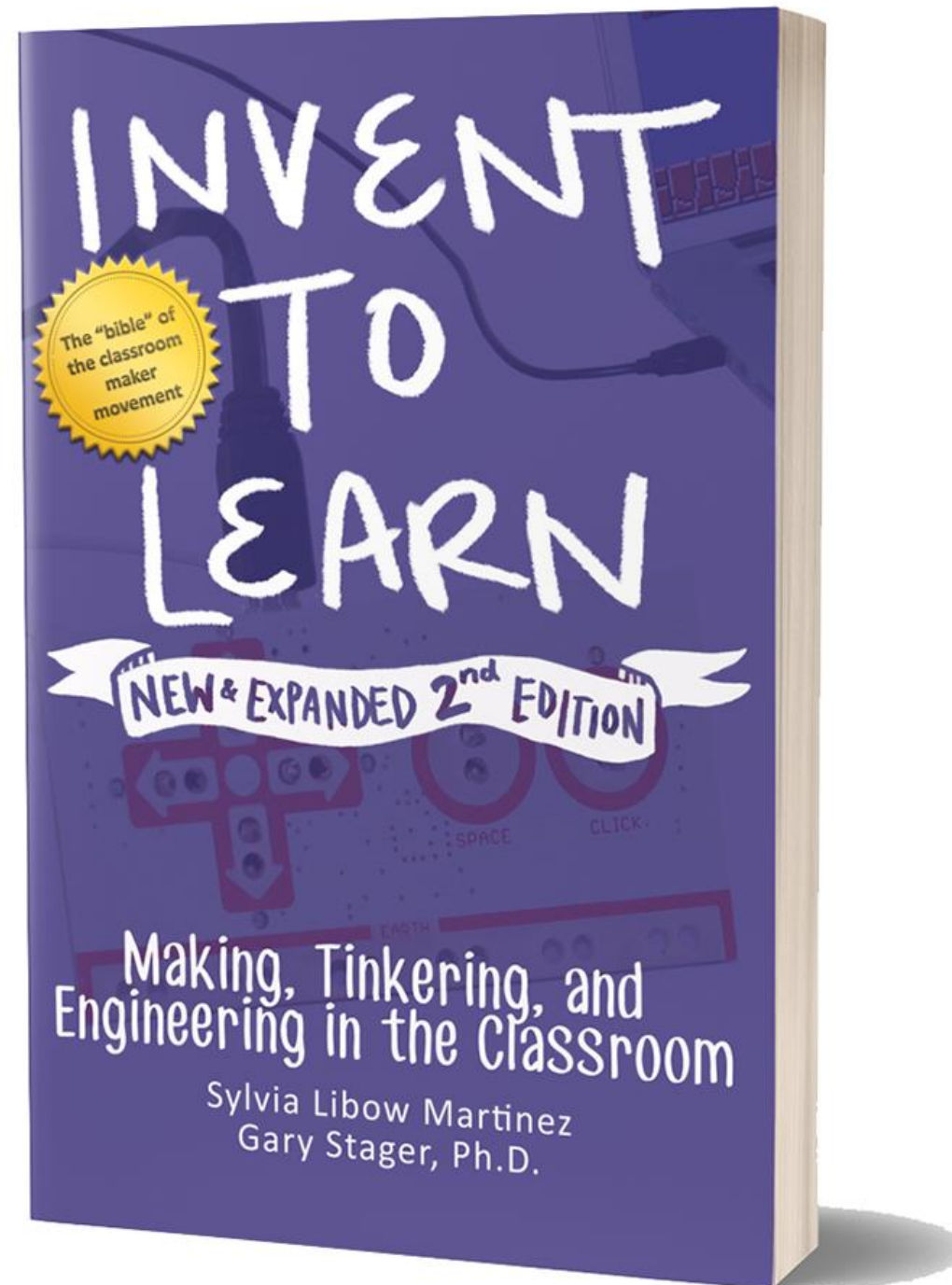


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Invent To Learn:

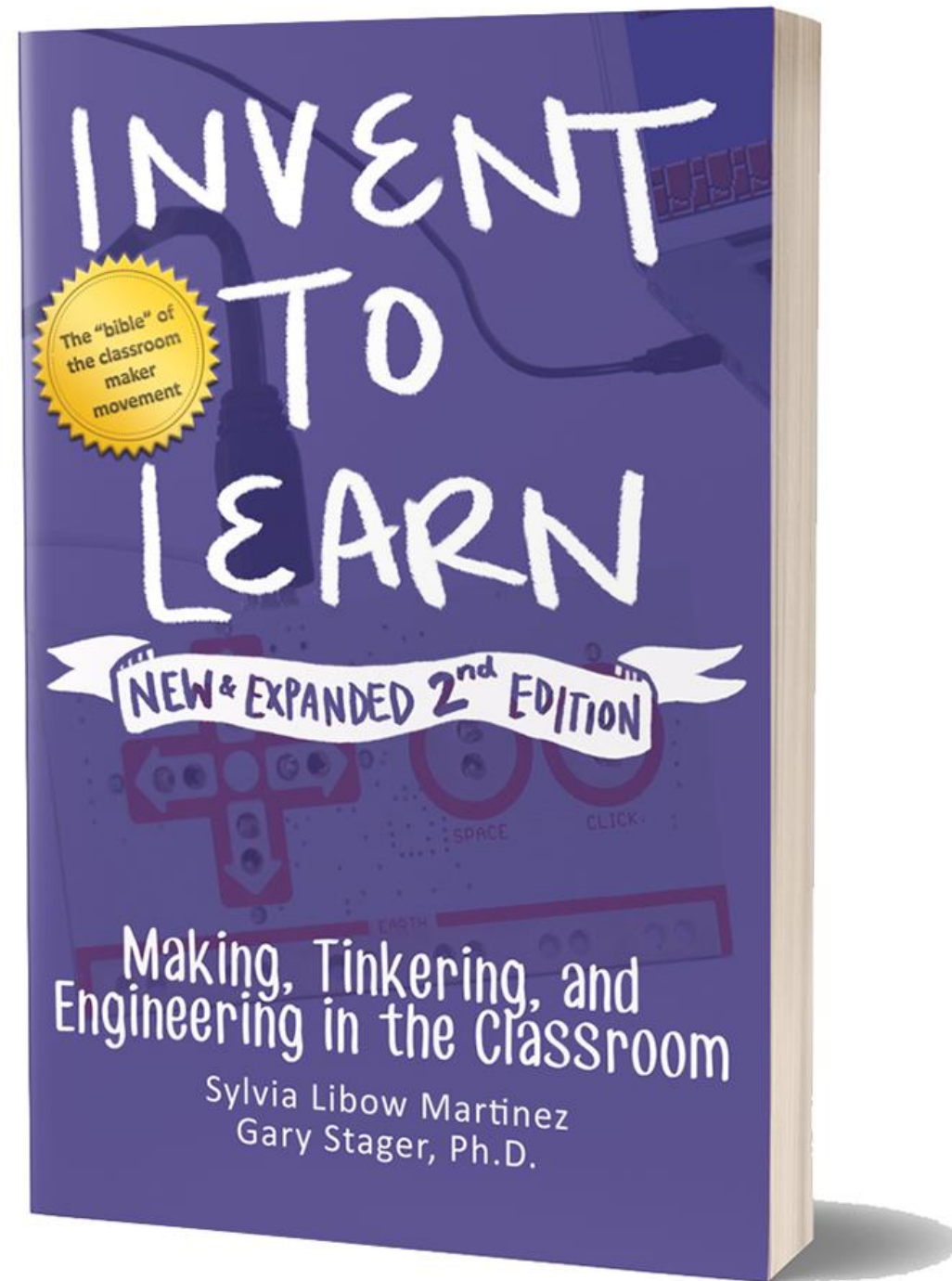
Making, Tinkering, and Engineering in the Classroom

www.InventToLearn.com



- 💡 Maker tools, materials, & tech
- 💡 Tinkering mindset
- 💡 Engineering design
- 💡 Make the case for “making” in the classroom

robotics e-textiles 3D printing micro:bit Scratch Raspberry Pi
programming electronics sensors laser cutters STEM/STEAM



Mak



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s, & tech

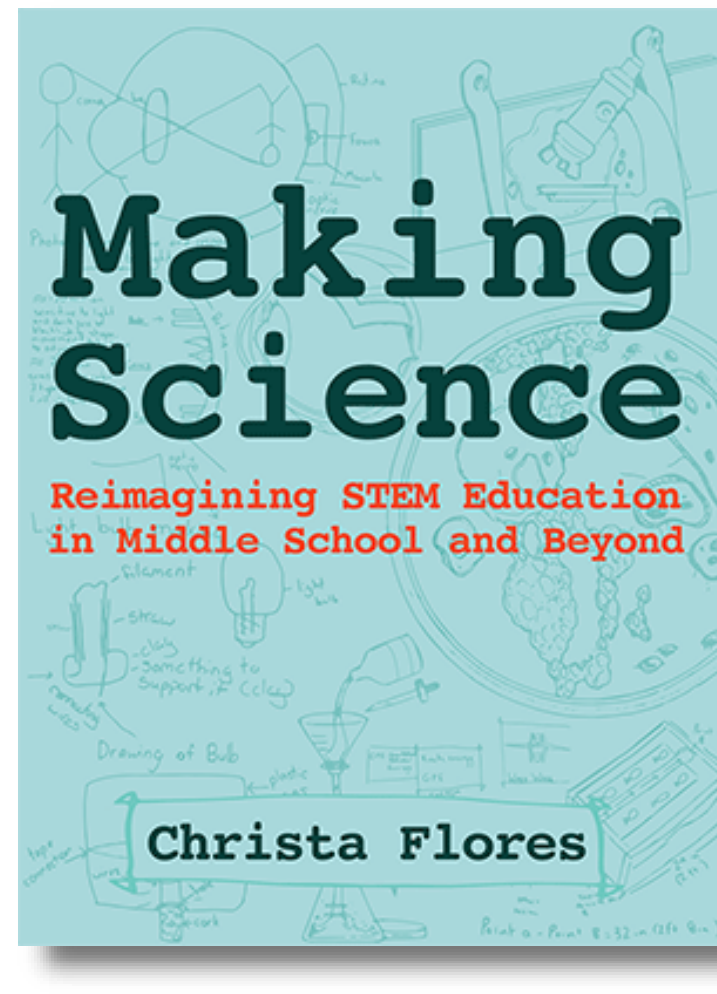
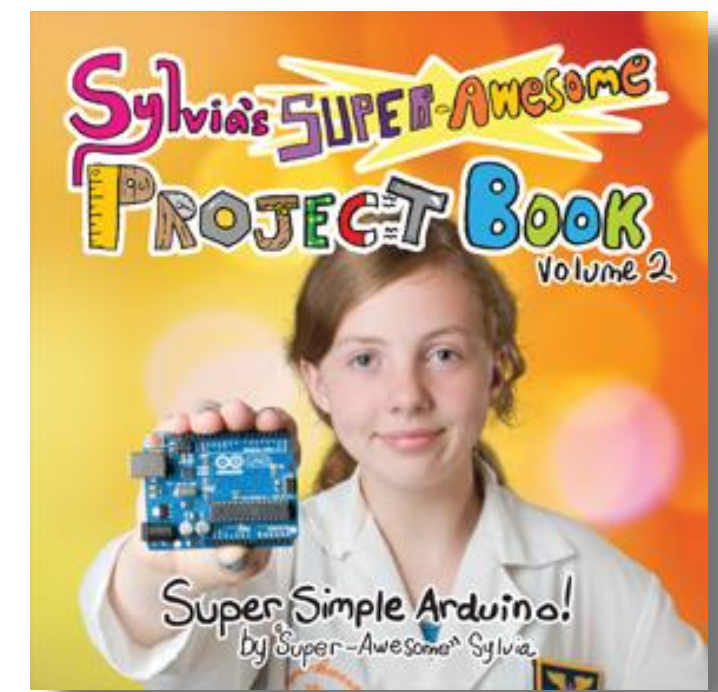
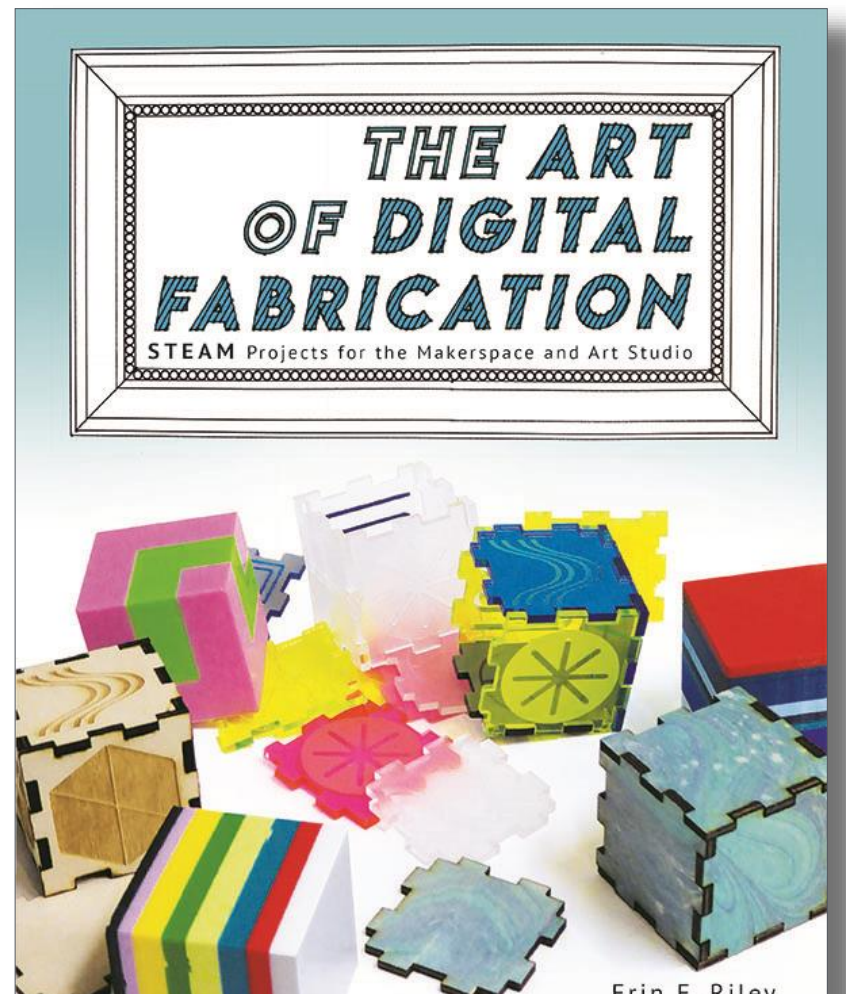
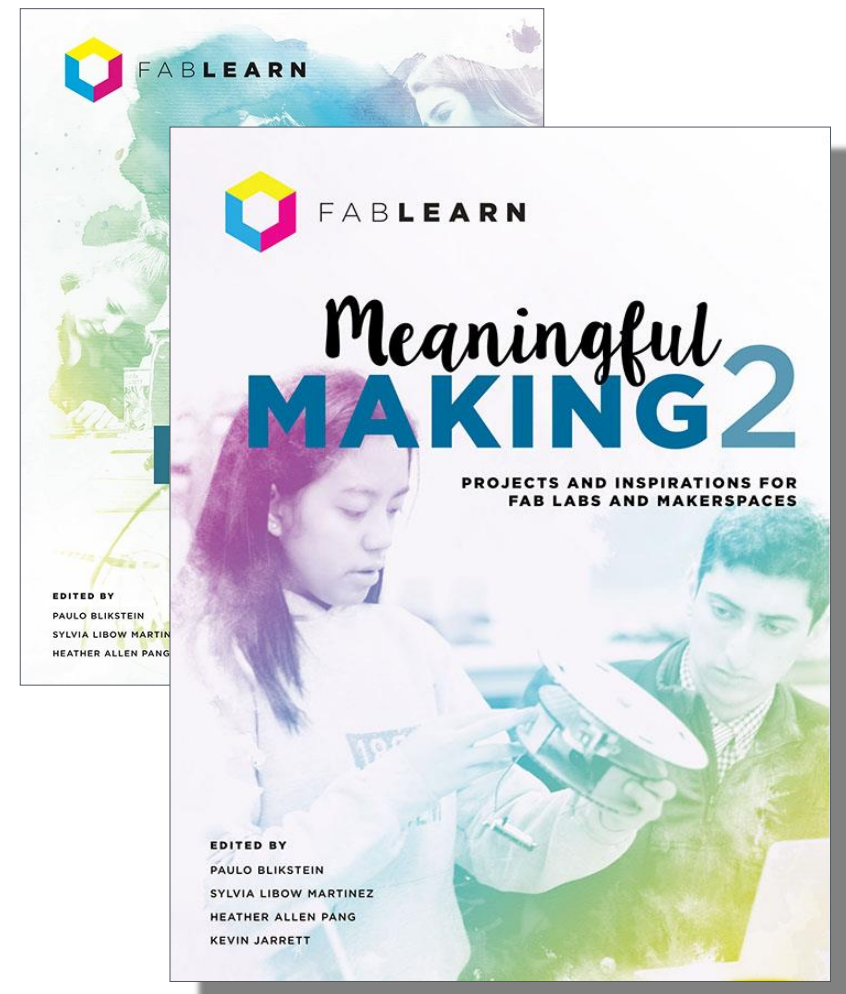
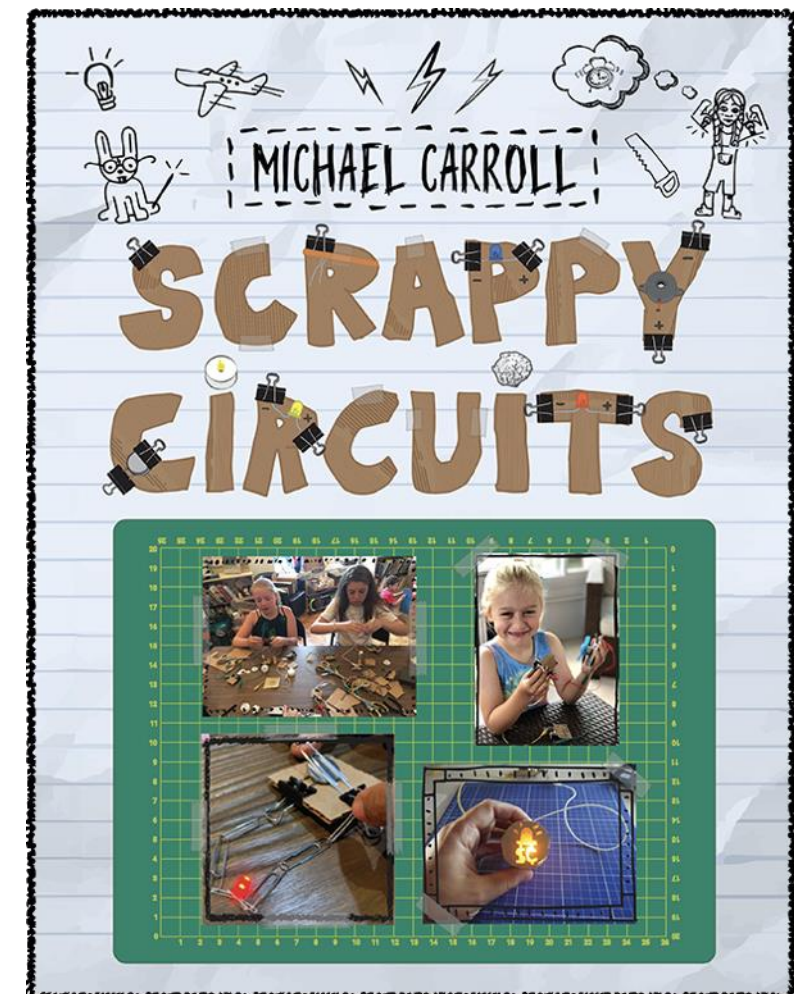
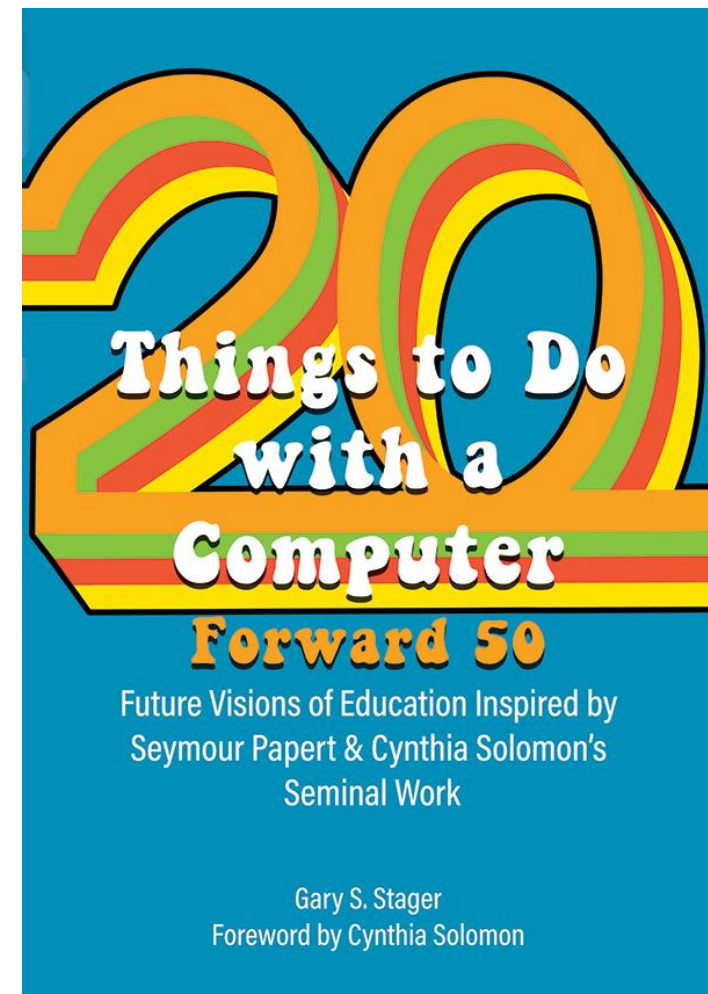
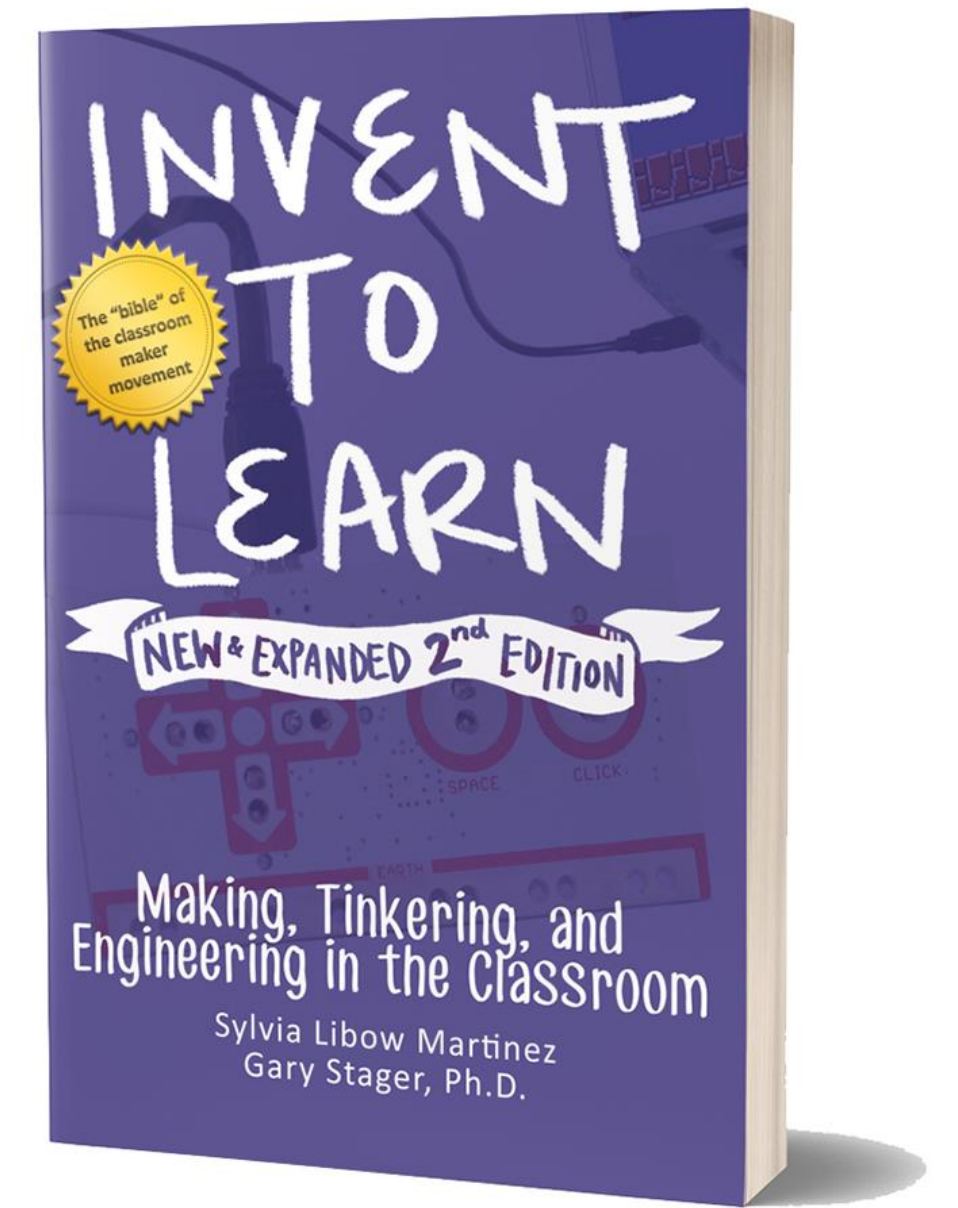
aking” in the

robotics e-text
programming

Raspberry Pi
STEM/STEAM

Books from CMK Press cmkpress.com

Invent to Learn Guides





Maker Faire

The Greatest Show and Tell on Earth

Top Tools of the Maker Movement for Education

Computer controlled fabrication

1. Additive (3D printer)
2. Subtractive (mill, cutter)

Physical computing

3. Robotics
4. Microcontrollers (Arduino)
5. Microcomputers (RaspberryPi)
6. Wearable computing (LilyPad, Flora)

Programming

7. Block-based (Scratch, SNAP, good for robotics)
8. Text-based (C, Arduino, Python, Processing - good for computing, design)

New conductive materials

9. Conductive paint, glue, tape, thread
10. Graphite pencils

Inventive interface elements/kits

11. MaKey MaKey
12. Hummingbird

Electronics components

13. Displays & LEDs
14. Sensors (light, heat, motion)
15. Motors
16. Special purpose batteries

Traditional/hybrid materials

17. Squishy Circuits
18. Cardboard
19. LEGO

Shared content & community

20. Design warehouses (Thingiverse, MAKE, Sparkfun)
21. Community websites

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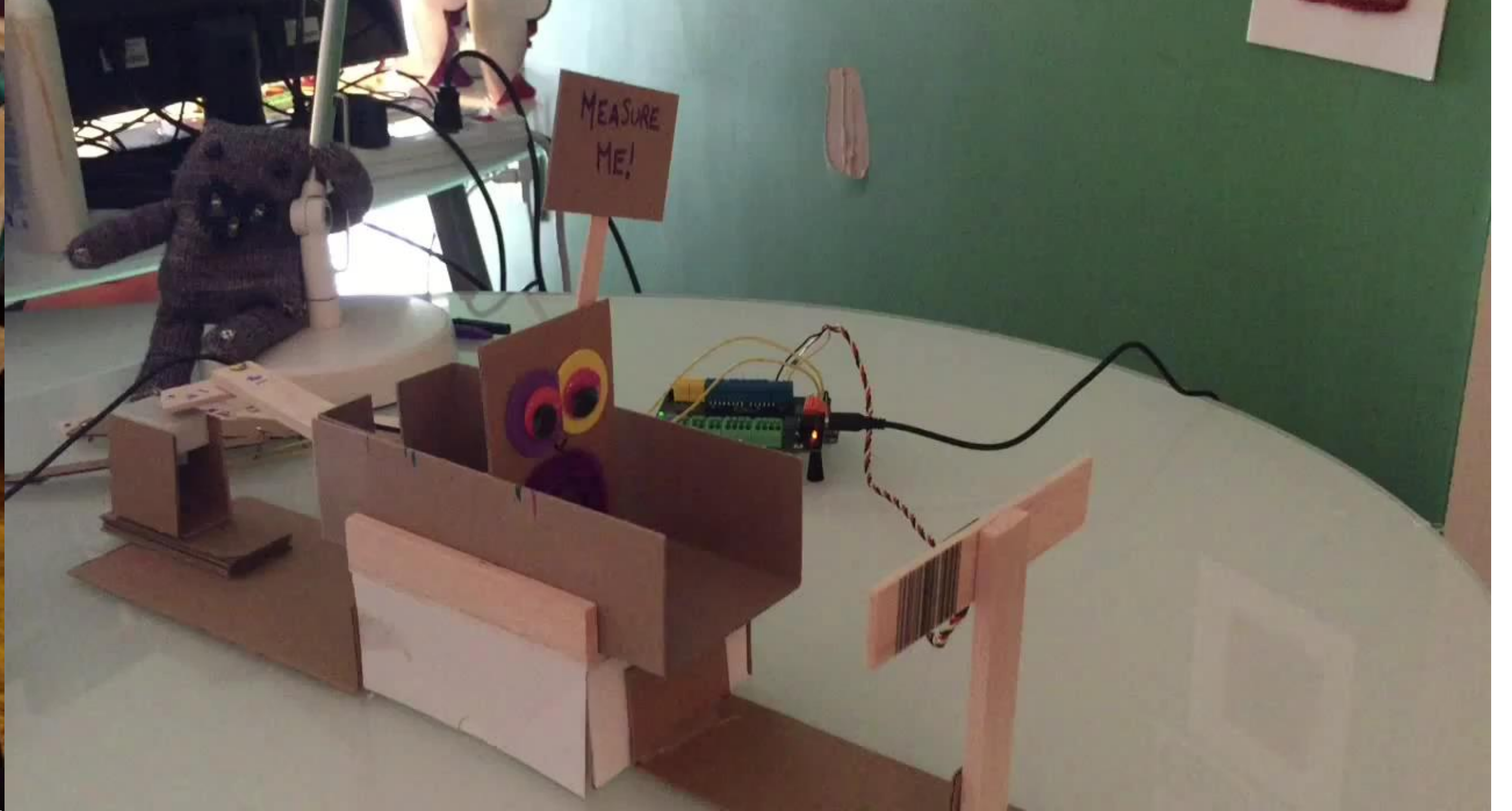
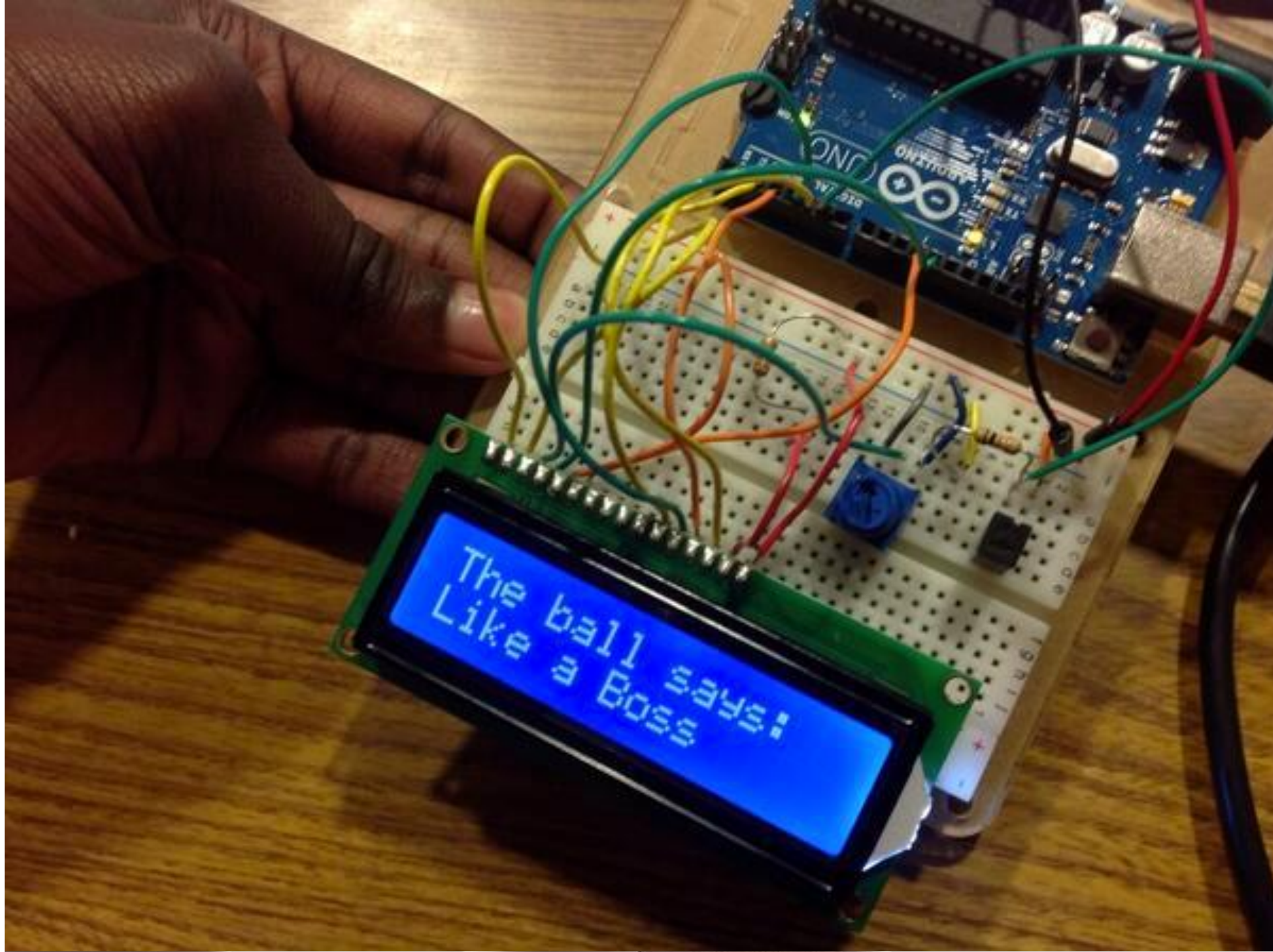
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The background features a vibrant blue sky with intricate, golden snowflake patterns scattered throughout. A large, solid black circle is centered on the page, serving as a frame for the text. The text is written in a clean, white, sans-serif font.

If you can use technology to
make things, you can make a
lot more interesting things.

And you can learn a lot
more by making them.

- Seymour Papert

Most “technology” in schools compares badly to clay or paint

Programming does not

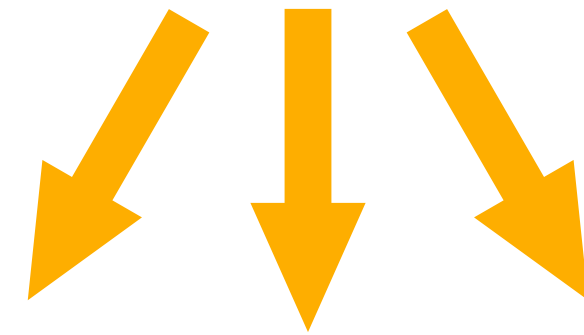


Big Ideas

Low threshold, high ceiling
Mathematical thinking
Computer Science
Engineering

Design
Creativity
Problem-solving
STEAM

Multiple Representations / Multiple Artifacts



Turtle Art

Print
Screen
Vinyl cut
Iron-on
3D print
Lasercut

Screen
Games
Animation
Storytelling



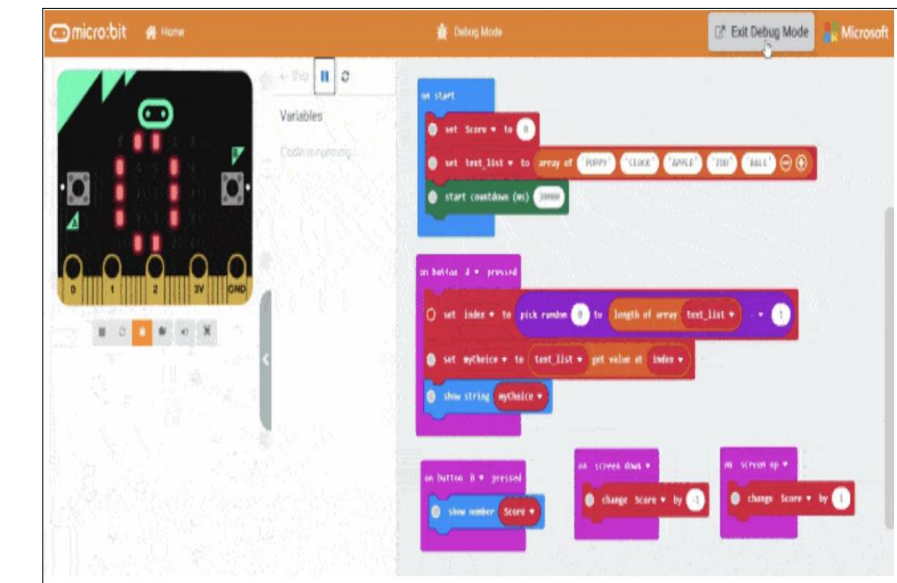
Scratch



Turtle Stitch

Embroidery

Physical
computing
E-textiles



MakeCode

Programming the World

In our image of a school computation laboratory, an important role is played by numerous "controller ports" which allow any student to plug any device into the computer... The laboratory will have a supply of motors, solenoids, relays, sense devices of various kinds, etc. Using them, the students will be able to invent and build an endless variety of cybernetic systems.

(Papert & Solomon, *Twenty Things to Do with a Computer*. 1971)





Invent to Learn

Wolish Science

STEAM

LBS

RMNP

FWP English Department

peace

INVENT TO LEARN CHILD AGED 2012



Program your own "Game Boy"

MakeCode Arcade





Zoldana

Inspired by Zoltar from the movie, *Big*





We can make things
with atoms, but we left
the bits behind again

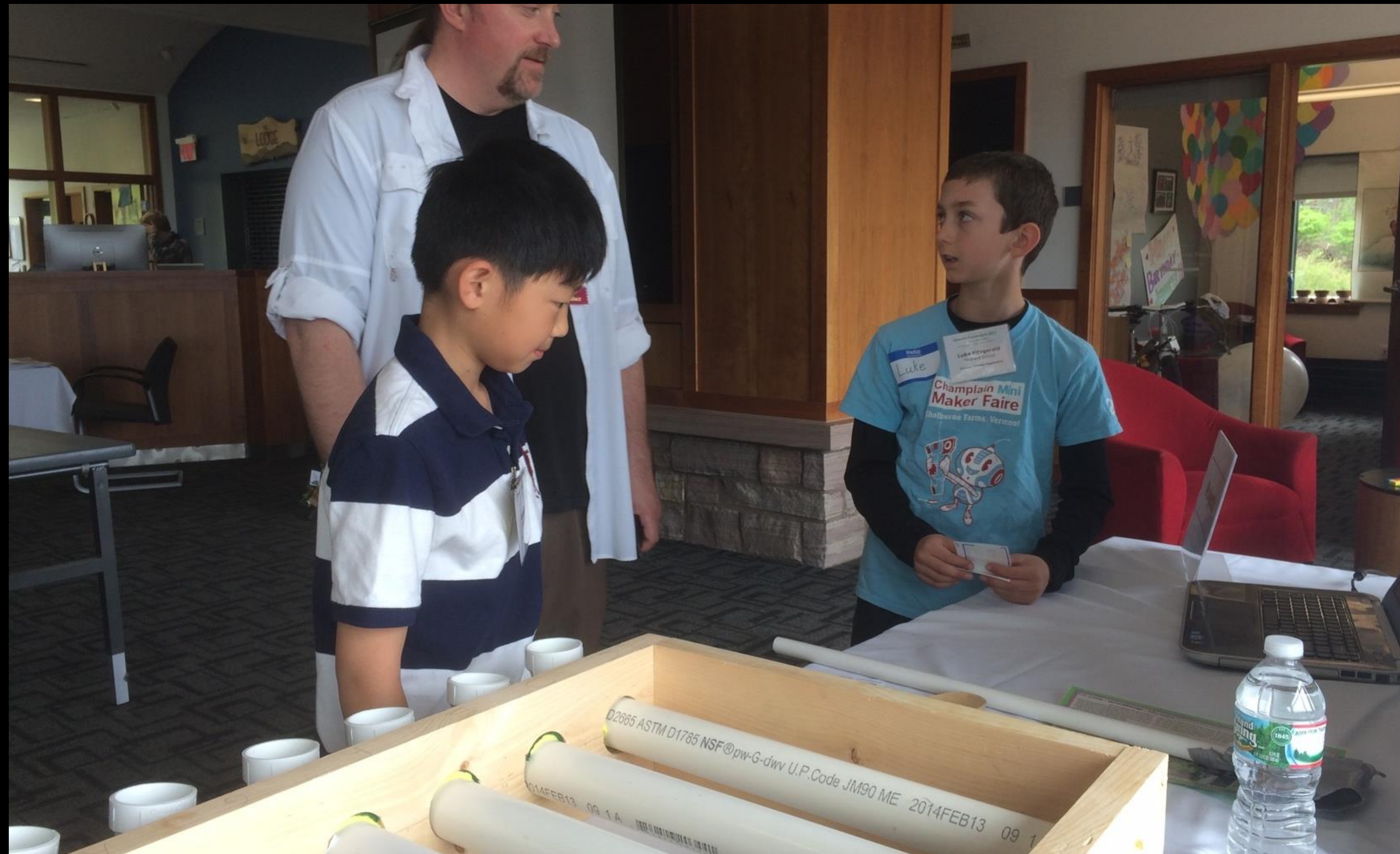
Programming is
the new liberal art

Gives children agency over
an increasingly complex
and technologically
sophisticated world.



Does the computer program the
child or the child program the
computer?

Seymour Papert - 1968



Computing supercharges the range, breadth, and depth of possible projects

What was good, is good!

Start with the question

How can schools create the
conditions for students to
become great at *something*?

When the same tools,
materials, techniques, and
processes are found **and**
required in the physics
laboratory, art studio, and
auto shop...

We have overvalued
learning with one's
head.

The future requires
learning with one's
heart, head, and hands.

Theo Started Kindergarten in September



Yumi Angela Shirashi is in Shanghai, China.

36m · 👤

Theo wanted to make a rocket as a thank you gift in return to a classmate who gave a dinosaur book to him as a parting gift. With a little encouragement, the whole endeavor turned out to be a "Theo designs and mass-prints commemorative rocket toy for all his classmates and teachers" rainy day project. [#parentingfun](#) [#proudparents](#) [#littleTheo](#)



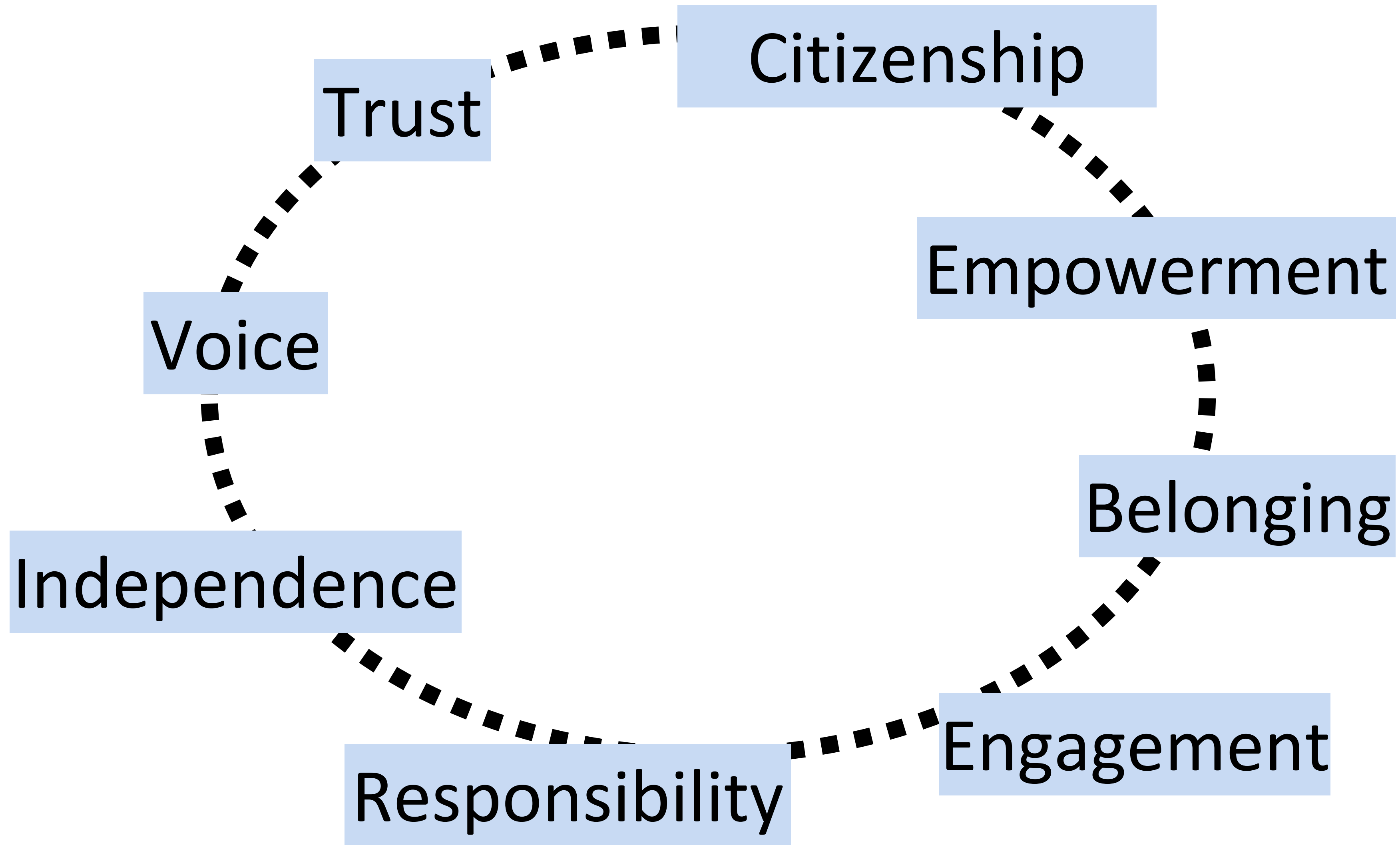


LESS US, MORE THEM!



"Everything is a lot more simple to make. I can do things really quickly now that I know how to look at stuff."

- Talon, 11 years old

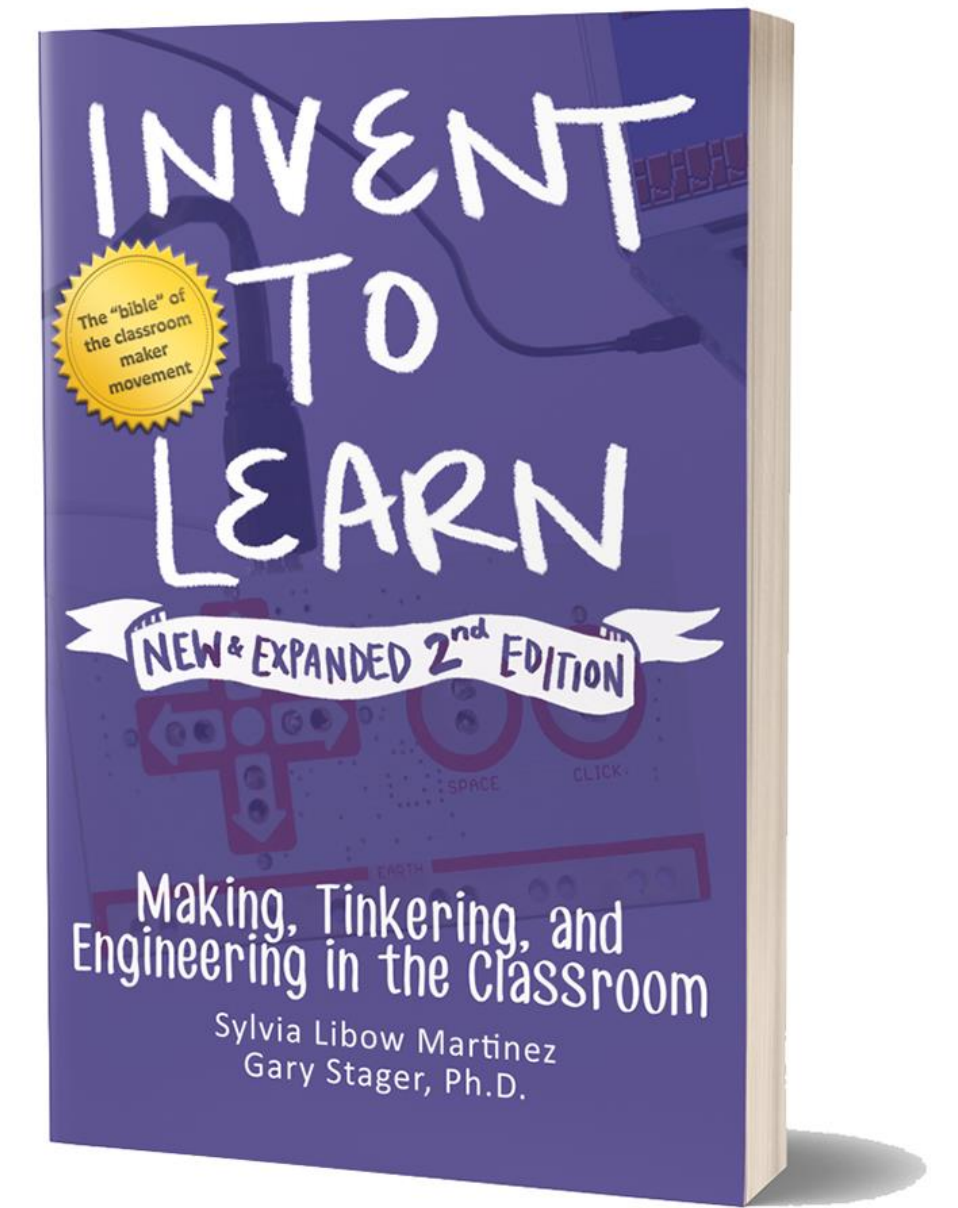




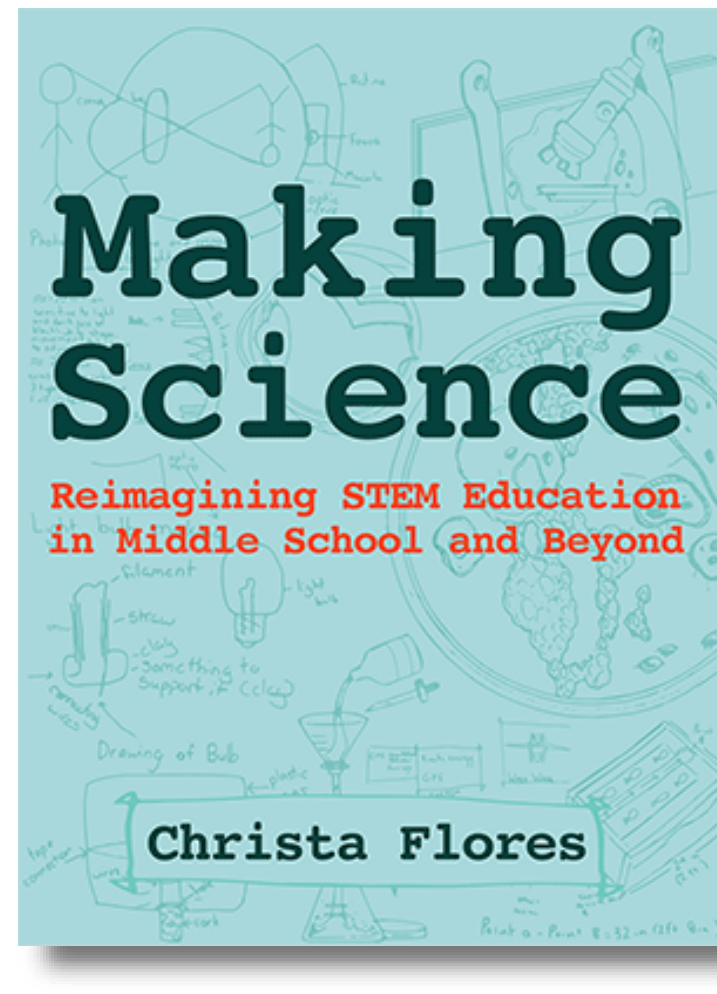
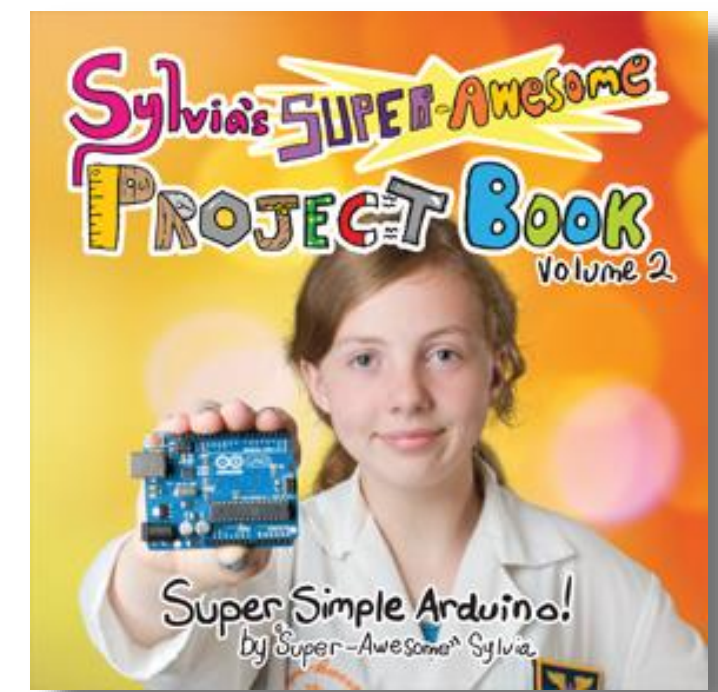
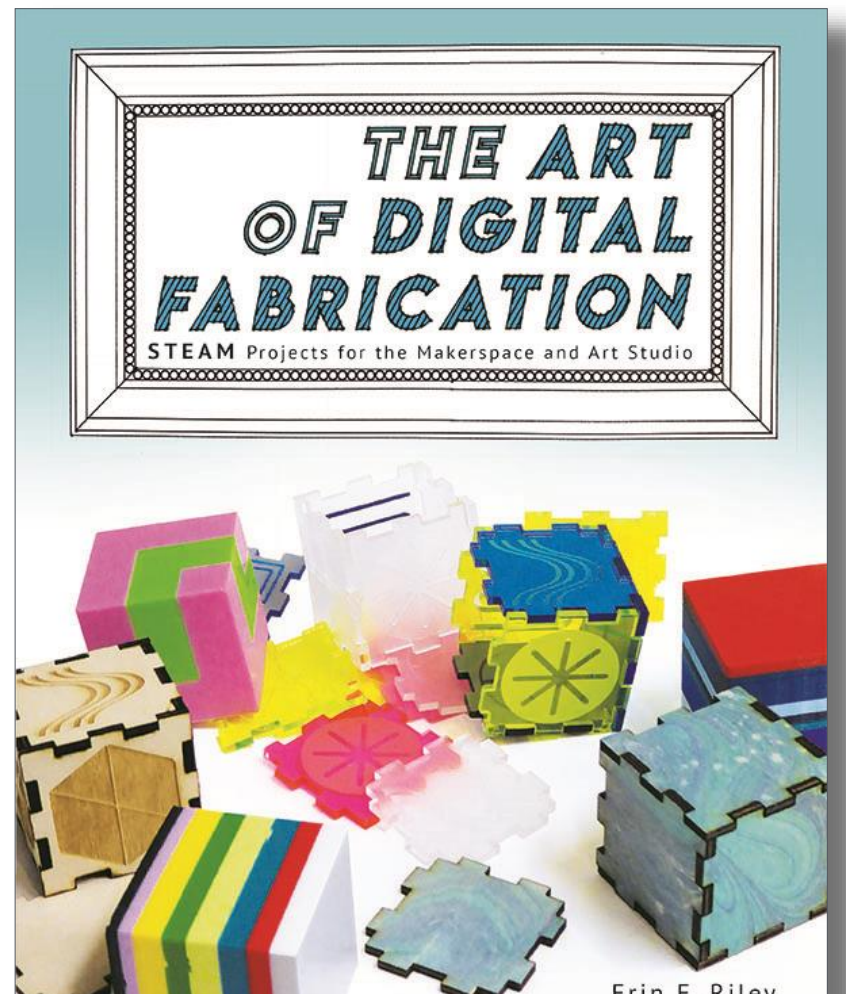
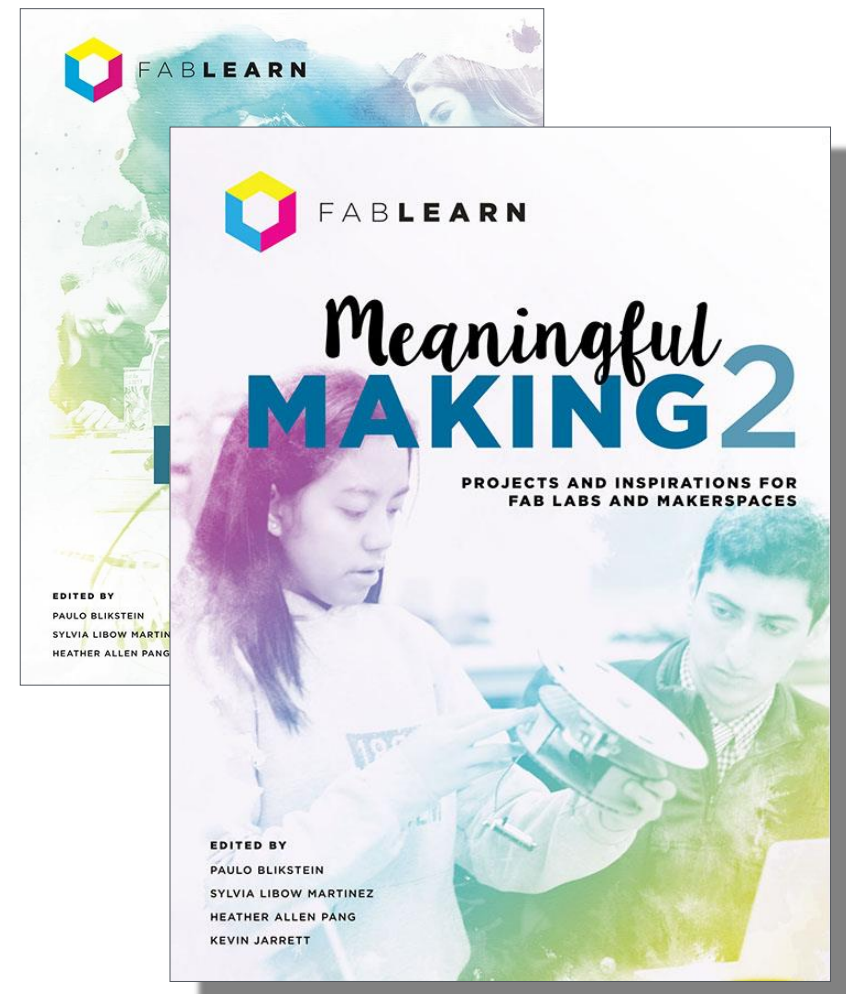
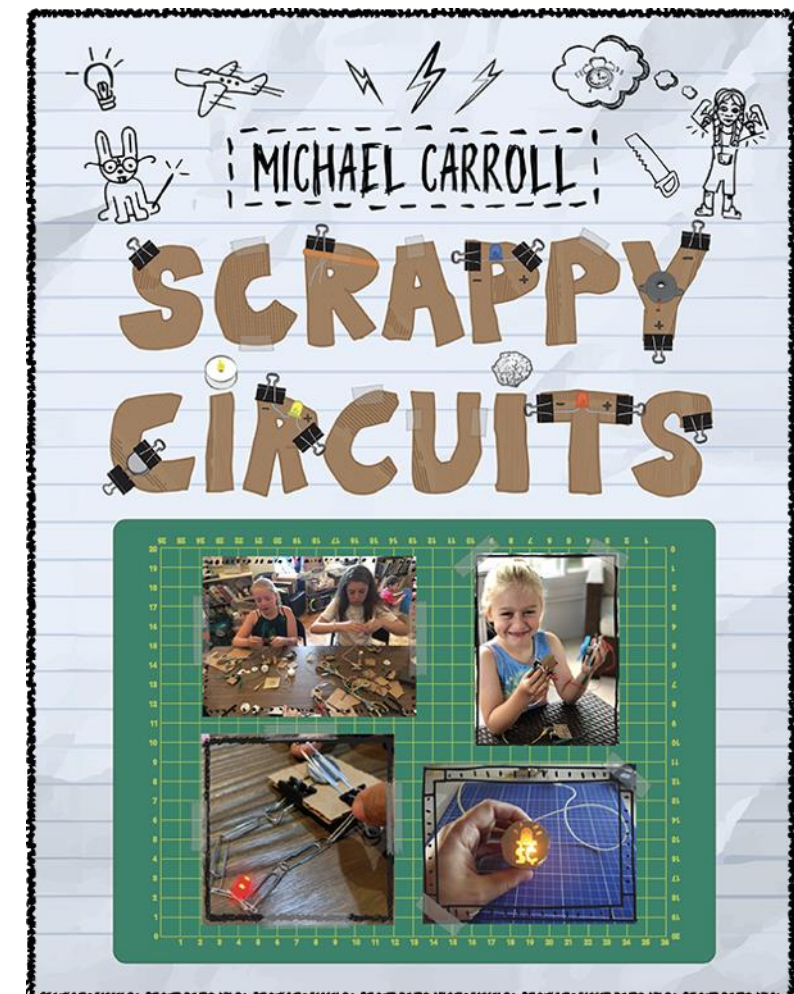
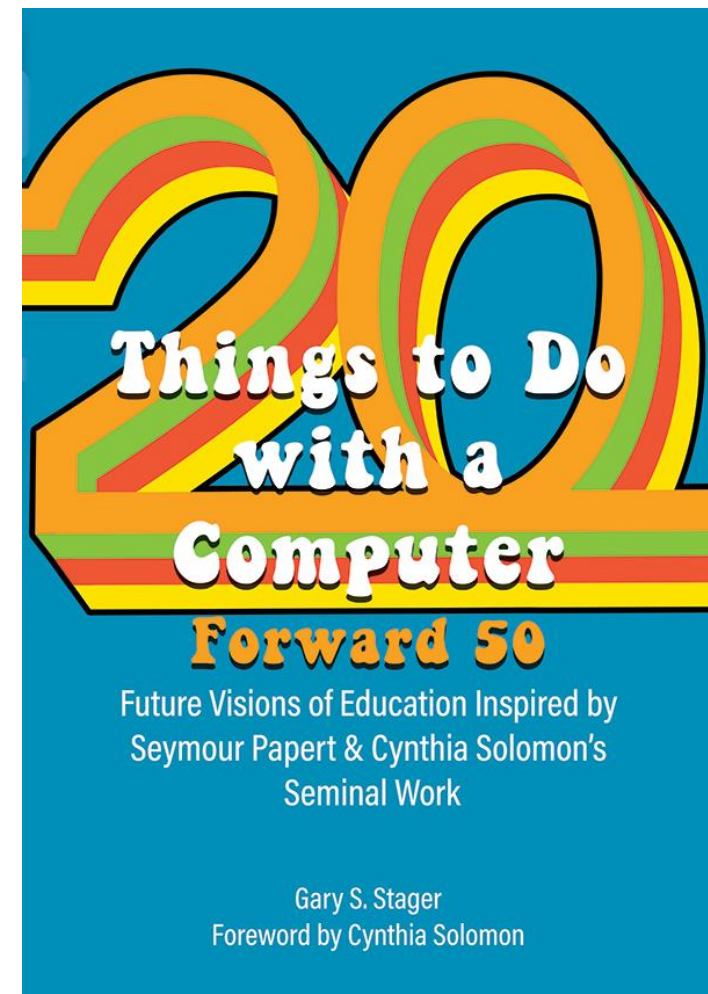
Empowered teachers are
empowered to be learners

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amazon.com





Thank you!
Grazie mille!

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Gary Stager

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