

Empowering Kids to Create with Technology - STEAM, Maker, & Design

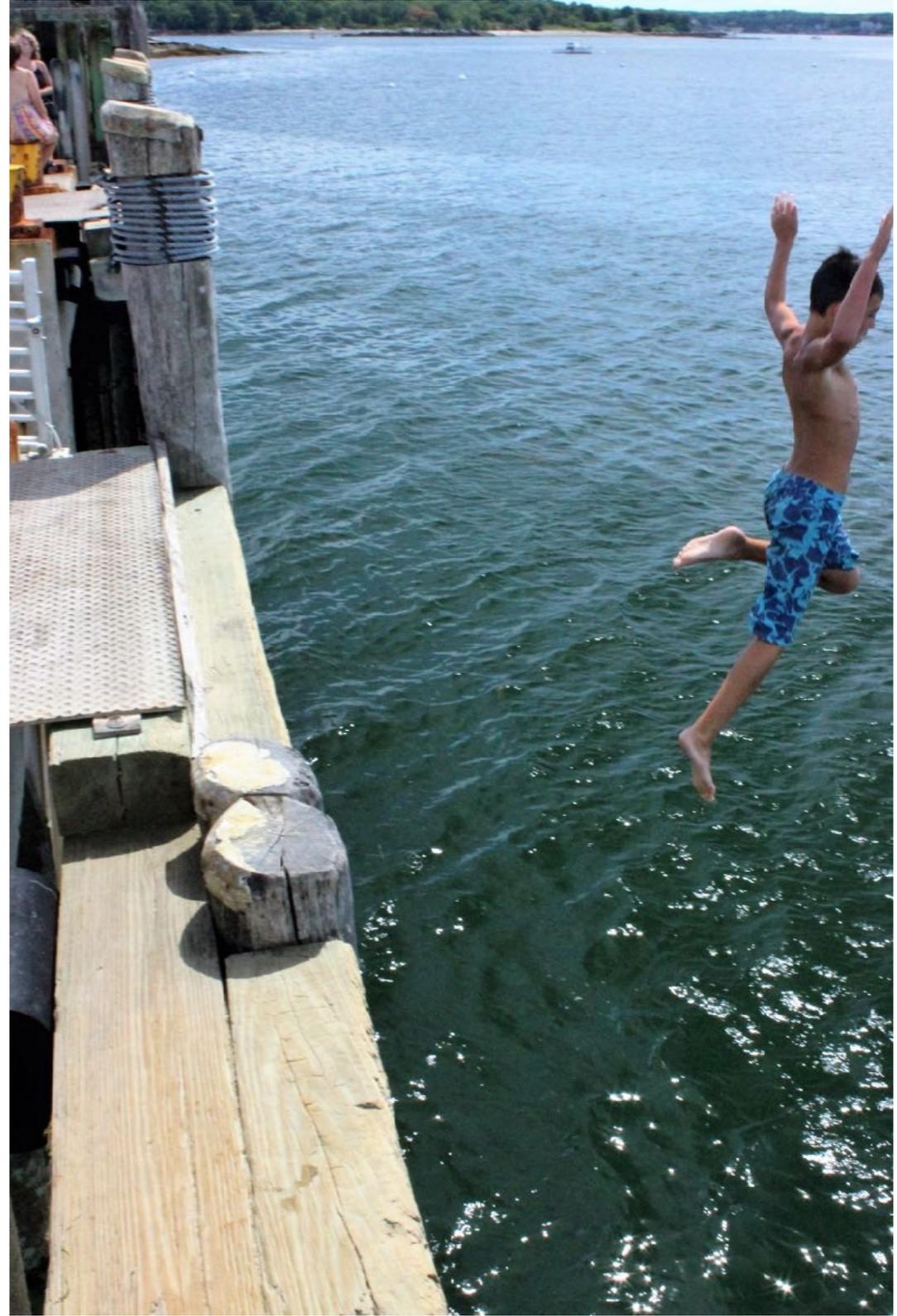
John Heffernan, Ph.D. 1/10/2018

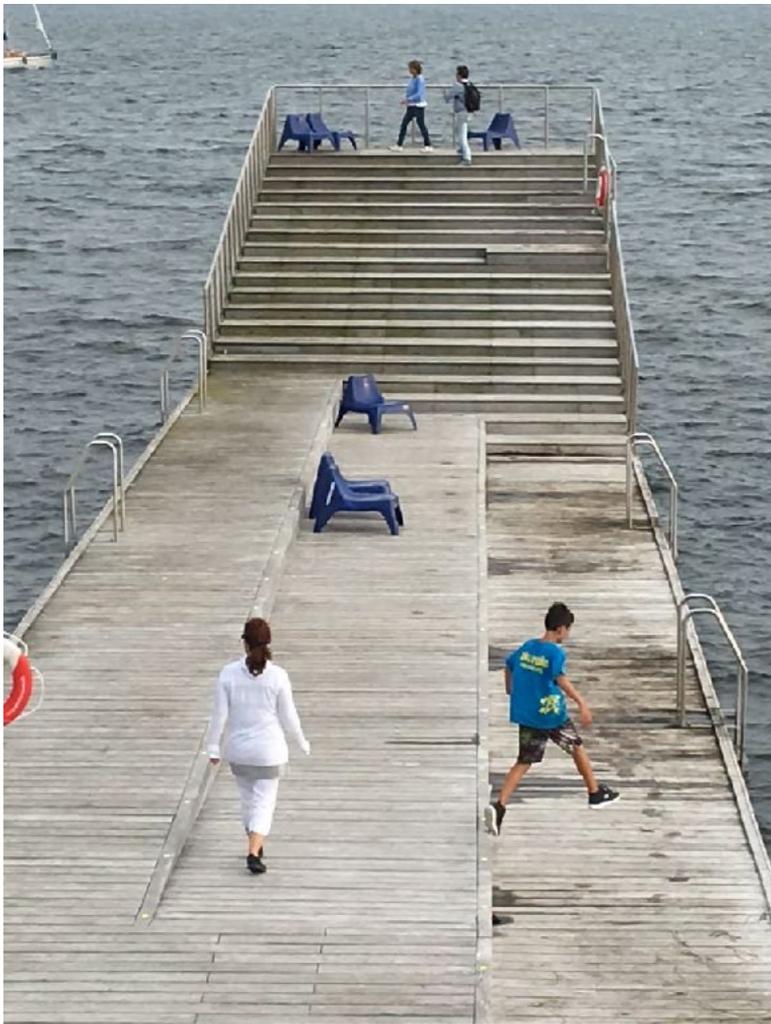
Slides at kidsengineer.com under Resources-> Presentations





- Empowering Kids to Create with Technology - STEAM, Maker, & Design (12:00-12:45)
- Explore materials (12:45-2:15)
- Plan project (2:15-3:00)





K Example



STEAM

- What is it exactly?
- Why is it valuable (or not)?
- What do we want students to do?
- Should not be grafting on some art to STEM (color your bridge)
- Should not be grafting some STEM onto art (LED example)
- Role of creative play and executive function

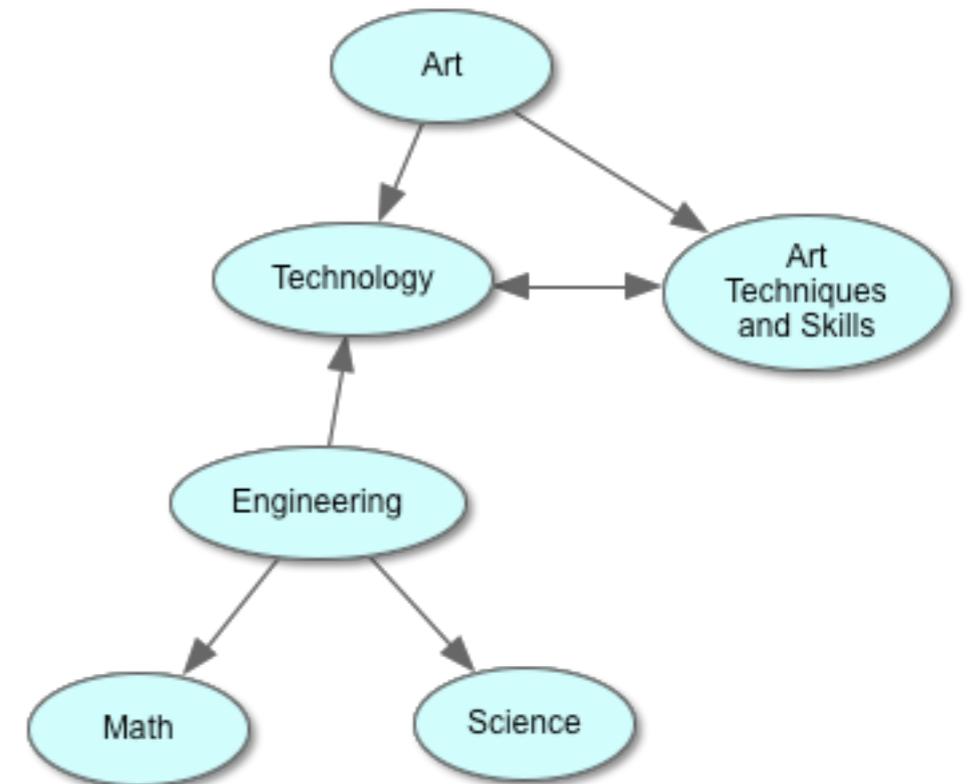
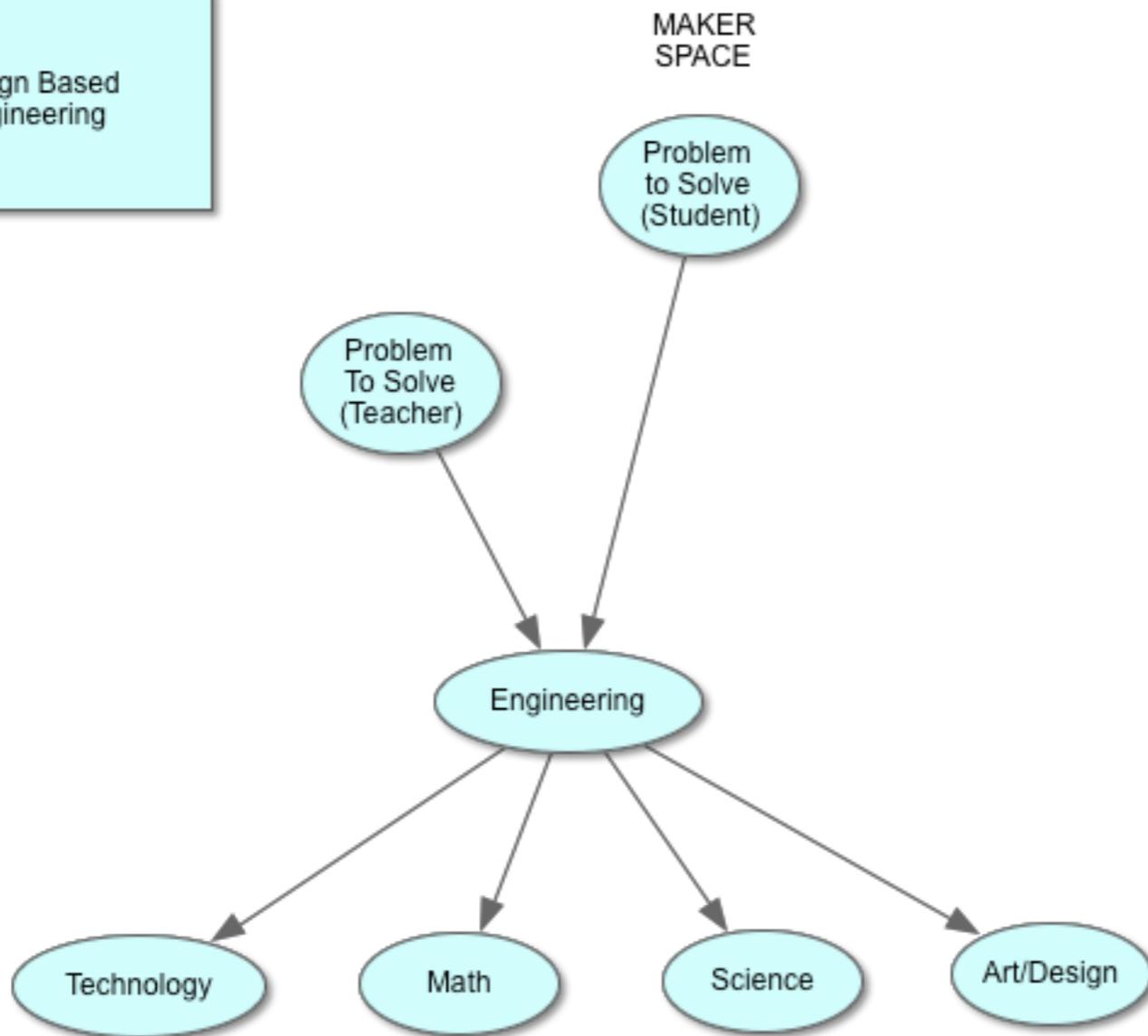


3D Printing

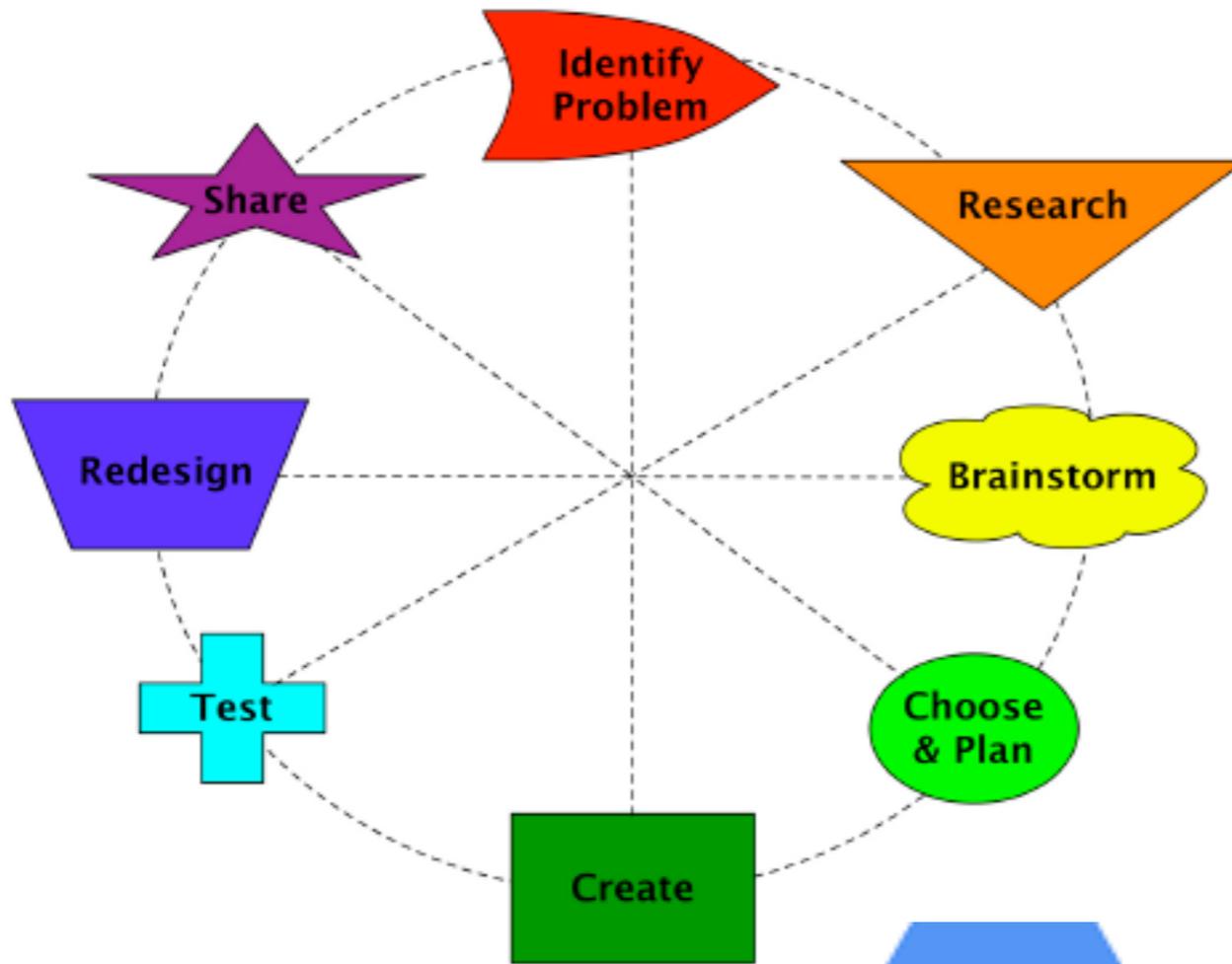
- Transformative technology but how to utilize in (elementary) schools?
- Fascination (wow) factor
- What, why, and what do we want students to do?
- Avoid - we have a 3D printer, what can we print out?
- Avoid - unclear objectives
- Students need to create and invent solutions to problems and transfer the knowledge they learned in their standards based curriculum. Otherwise, what is the point of that knowledge?



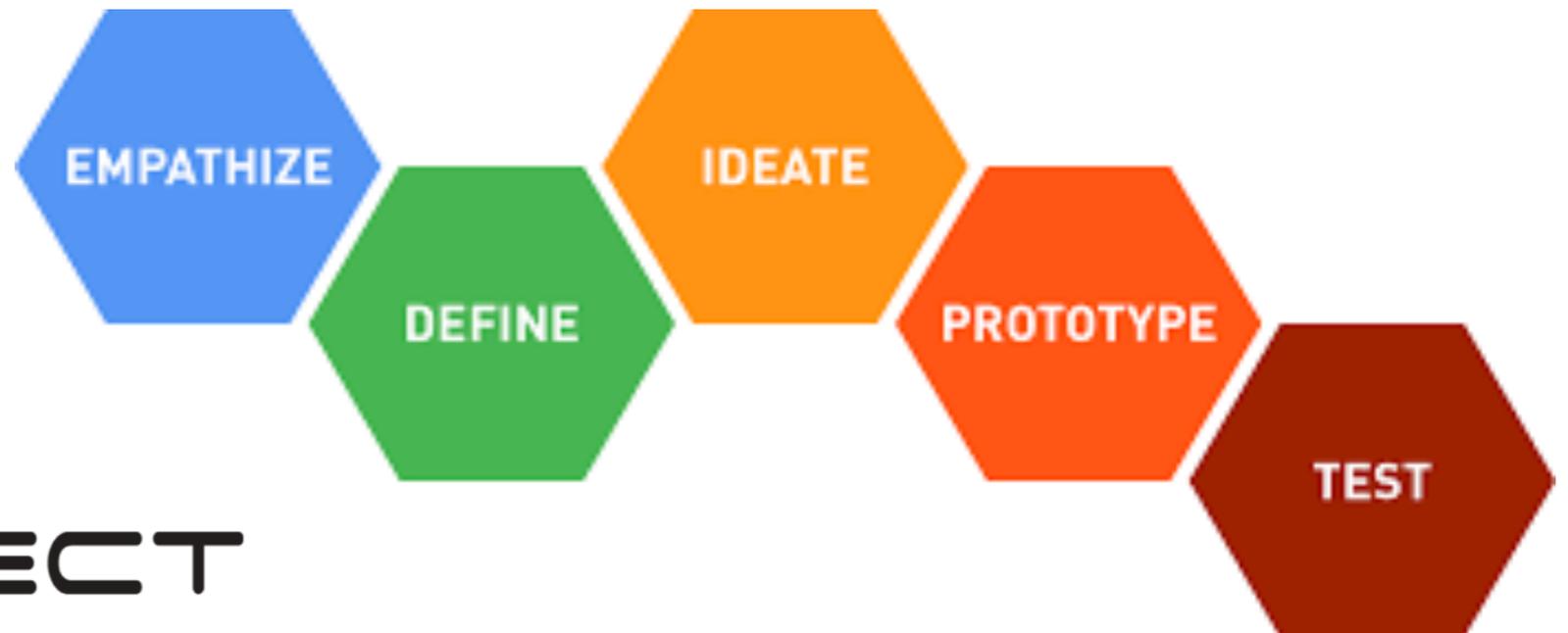
STEAM
Models



Design Thinking



Portsmore, 2011



ELEMENTARY 3D PRINTING

LESSONS LEARNED

- Not easy for elementary - have expert kids learn the process (see help file) - make a screencast (see next slide)

- 6th grade interest example

- SPED math example

- Create build list (photo)

- Clone example

- Empowering with choice

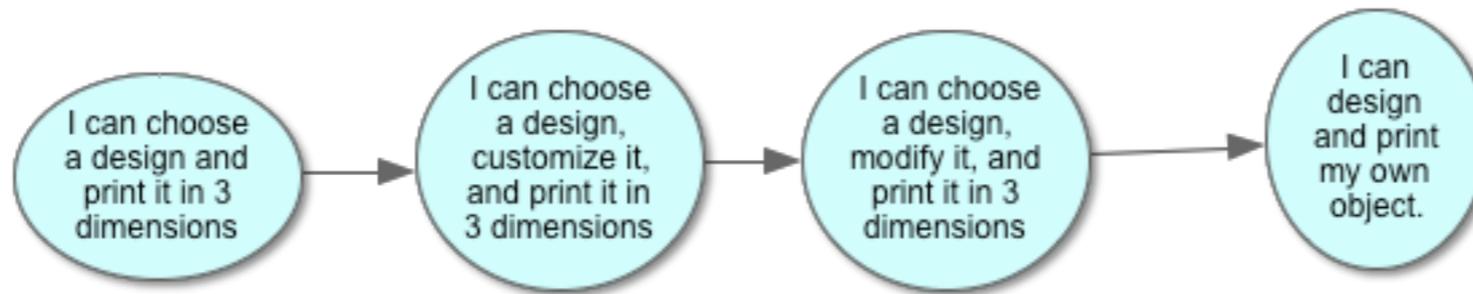


Who	Done?	Date?	Color
Kayden	✓	10/6/17	white
Matelynn	← ✓	10/6/17	Black
William	← ✓	10/6/17	
Kayden	← ✓	10/6/17	
Matelynn	← ✓	10/6/17	
Oscar	← ✓	10/6/17	
Hyden	← ✓	10/6/17	
Julia	← ✓	10/6/17	

3D Printing Directions - Full

1. Using one of the 2 computers closest to the 3D printer, start Safari.
2. Click on Links on top. Scroll down to Maker Space and then Thingiverse.
3. Using the Search box (magnifying glass), find a simple design to print. You may want to check the Customizable box to find a design that can be changed with your name, initials, or a word you choose.
4. If you want to customize, click on Open in Customizer. If not customizing, go to Step 8.
5. Customize the field(s) you want to change.
6. Click on Create Thing. Enter a name for your customized design.
7. Wait for your design to complete by going to the queue. Then click on You -> My Things and then your customized design.
8. Click on Download All Files. A folder will normally be created on the Desktop.
9. Start CURA to convert the 3D drawing to printing directions for the UM2.
10. Click on File -> Open File and look on the desktop for the file you want to slice and 3D print.
11. CURA will slice the file. Save it on the SD Memory Card or if that is in use, in the Folder 3D Printer Queue. Save file on SD card if you need to when it becomes available.
12. Eject SD card from desktop and insert it into printer. Select PRINT and then the file and Select to start!

3D Printing
Learning
Progression



3D Printing - Technology

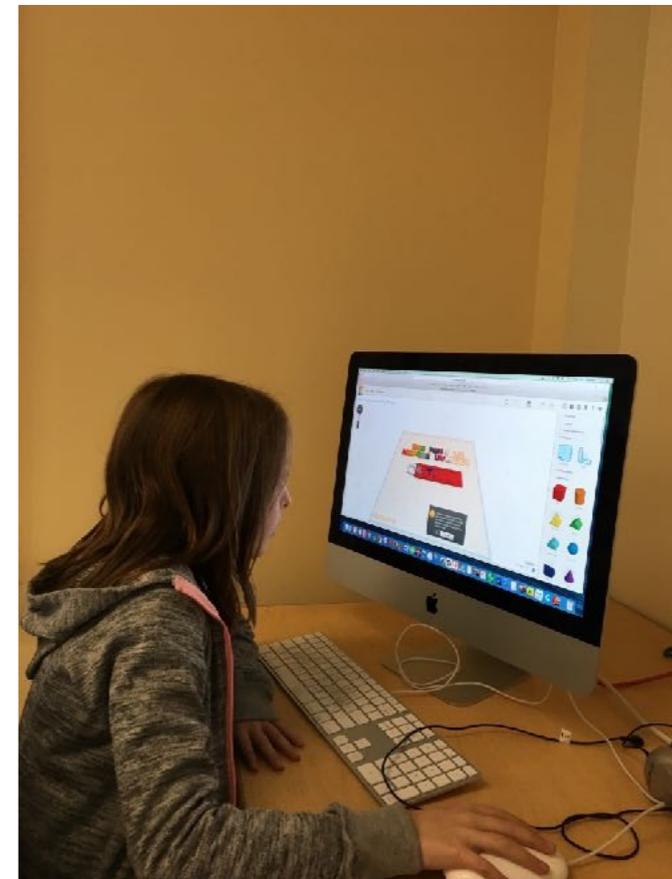
- Designs not sticking to plate
- Tip - cut off some from bottom
- Tip - use build options - build plate adhesion, support structures
- Tip - see how many have been printing out before
- Tip - avoid designs with minimal surface areas such as cars with only wheels touching
- Nozzle clogs - check support sites and YouTube
- USB issues - used SD cards
- Lots of software choices



3D Printing - Challenges and Next Steps



3D Scanning



TinkerCAD

Maker Space - Science Fair Support



MakerSpace

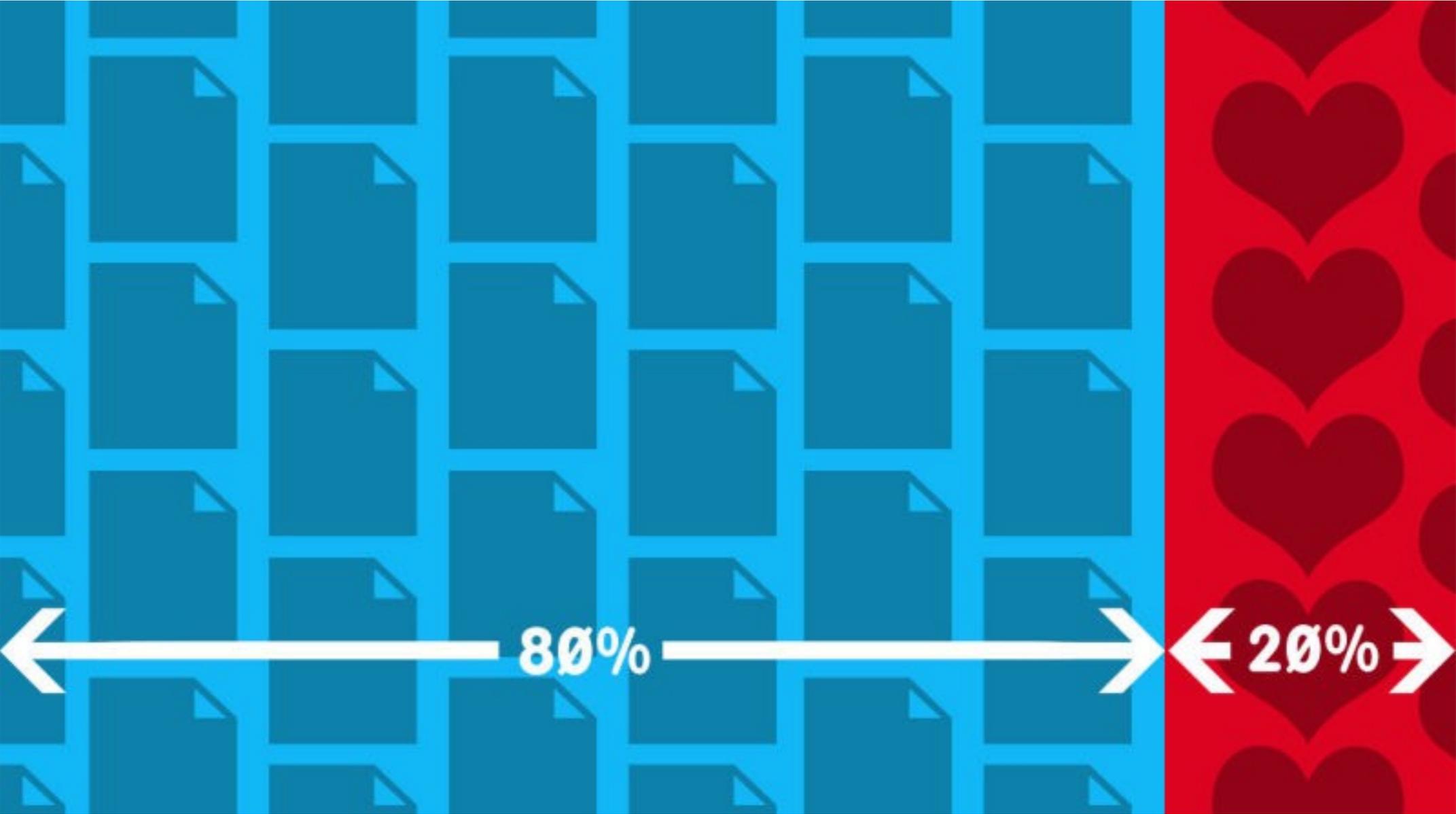
MAKER SPACE OPTIONS

Main Idea: CREATE, INVENT,
DESIGN for 1 to 4 weeks

MATERIALS AVAILABLE:

- 1.Duct tape
- 2.LEGO kits and bins
- 3.Computer programming: Scratch, Scratch, Jr. Code.org
- 4.Little Bits
- 5.Craft materials in combination with technology (Art Room)
- 6.Clay and Claymation program (HUE Animation)
- 7.Animation (Animation-Ish)
- 8.Multimedia Presentations (Keynote, HyperStudio)
- 9.Robotics (WeDo 1, WeDo 2, NXT)

- 3D printing a key part of our MakerSpace
- MakerSpace is a time more than a place
- Student driven but starter ideas provided
- Create and invent (not the same as “choice” time)
- Parent help important
- More unstructured; different role for teacher(s)
- Funding



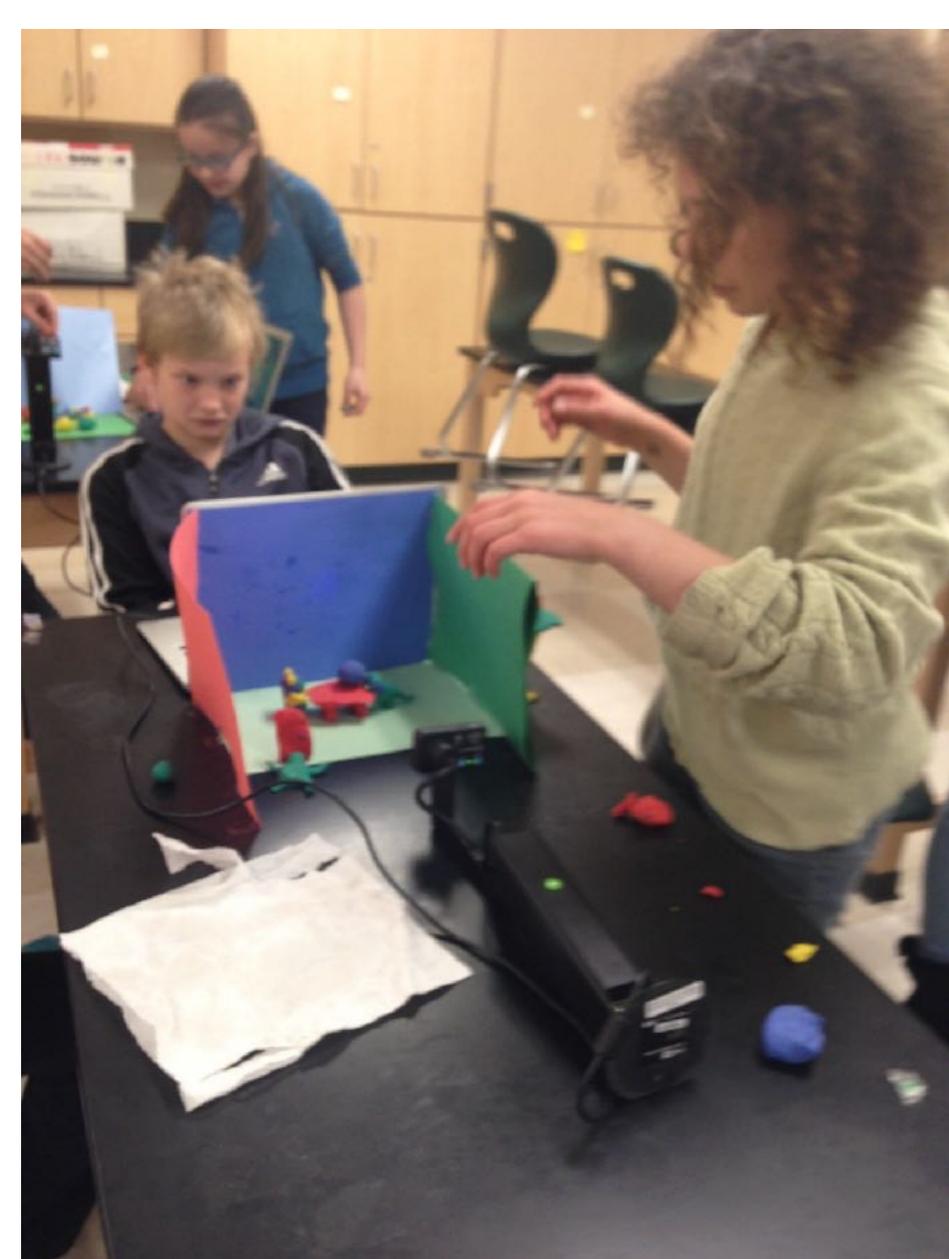
Maker Space - Duct Tape Creations



Duct Tape 2



ClayMation



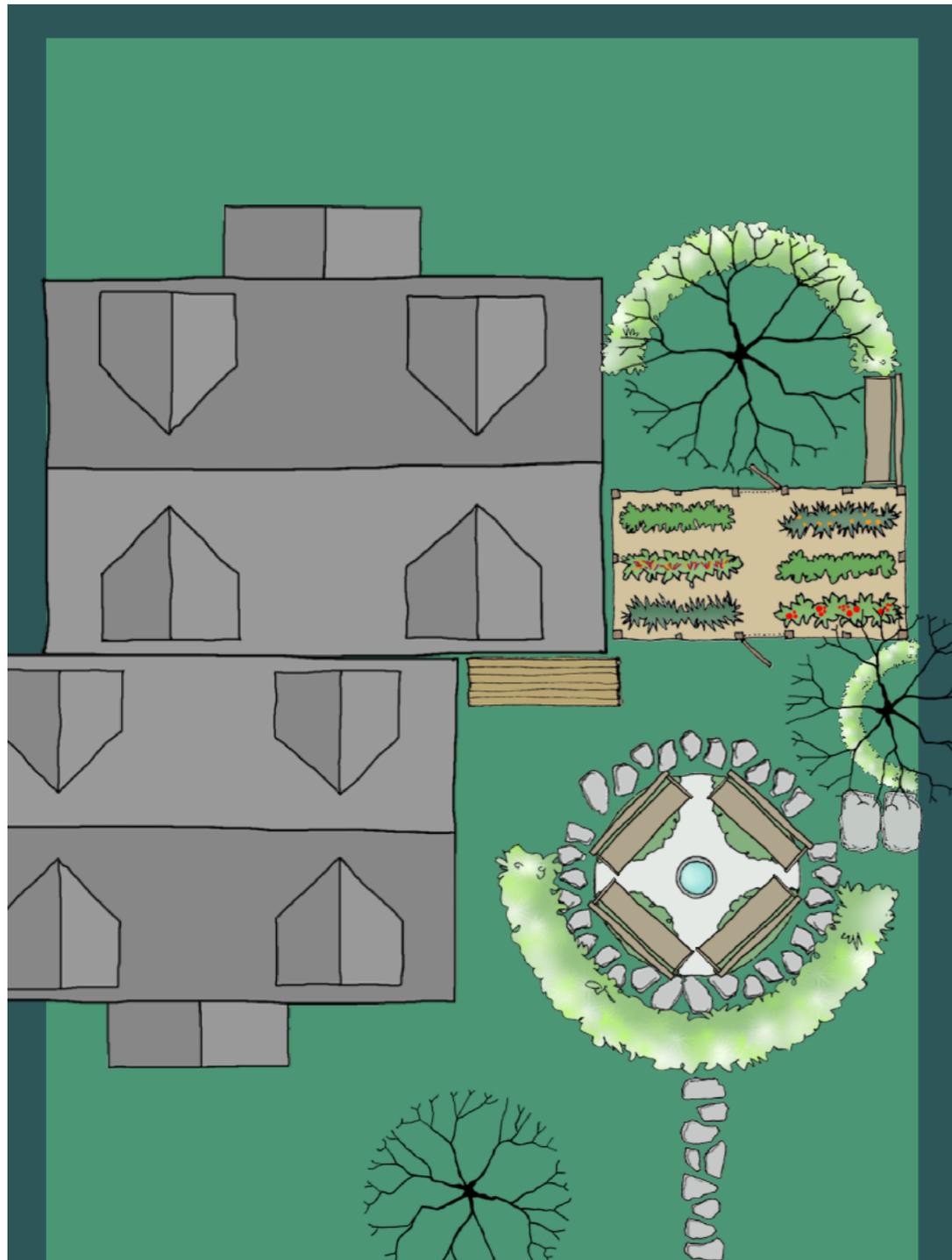
Circuits - SNAP and Littlebits



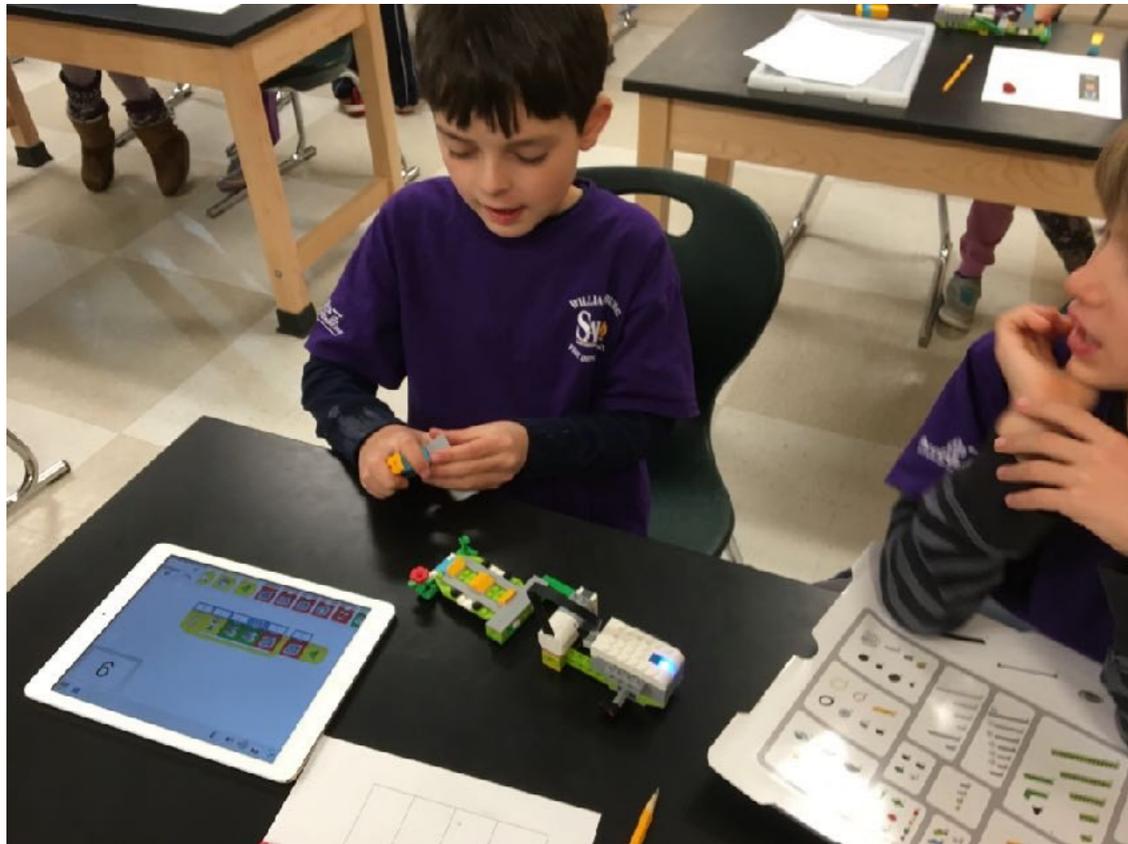
Maker Space[?] - Baby Sitting



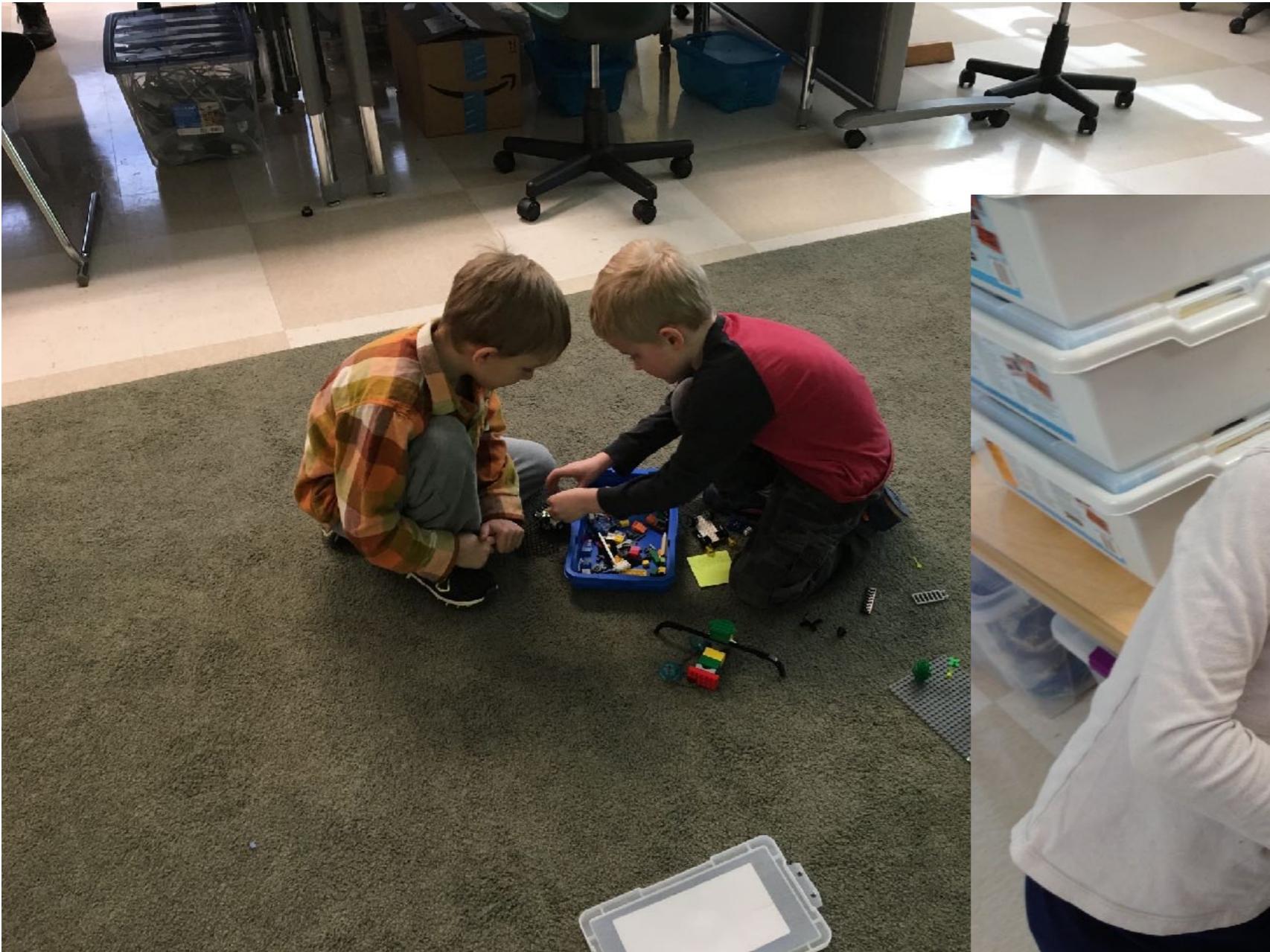
Student Requested Design Project



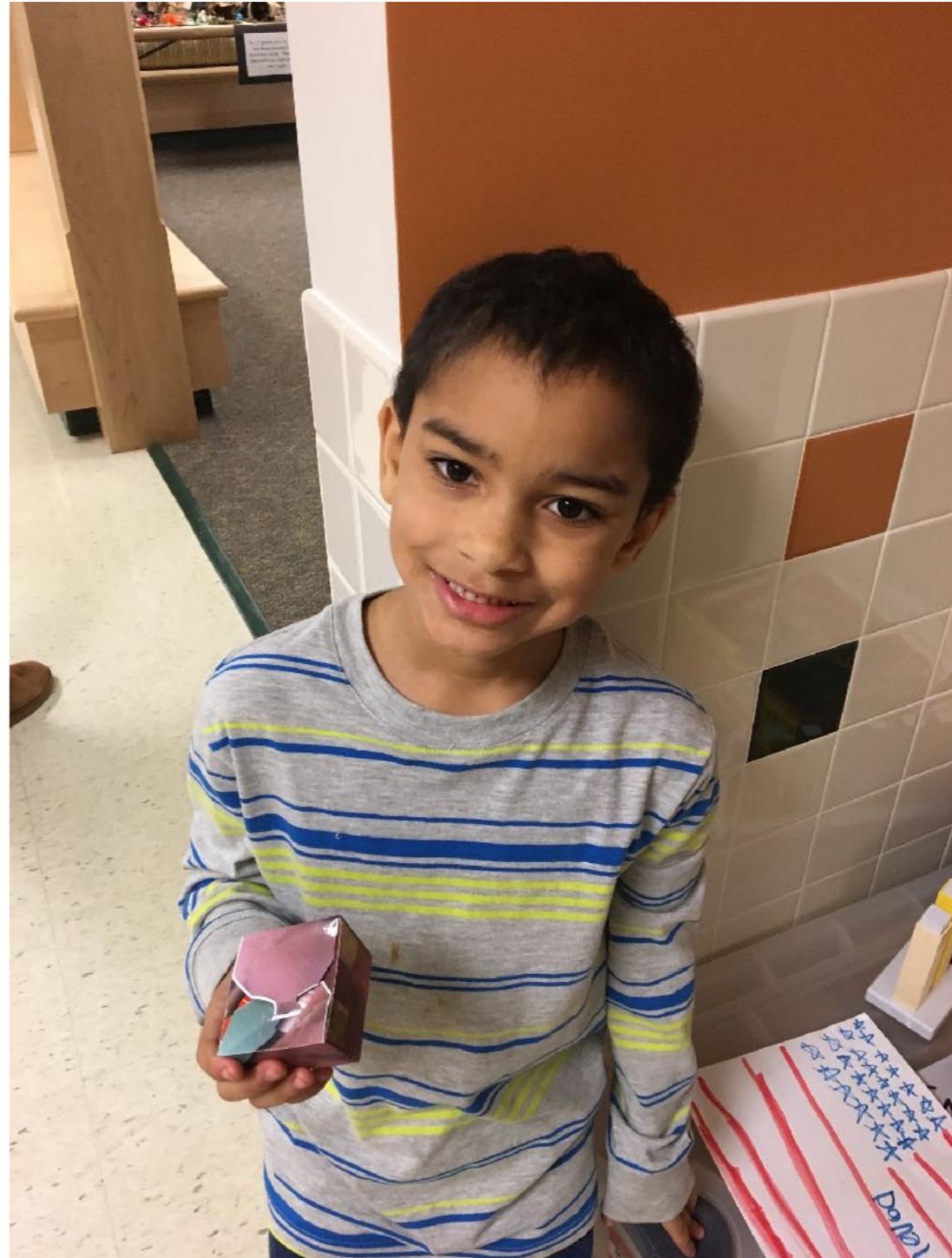
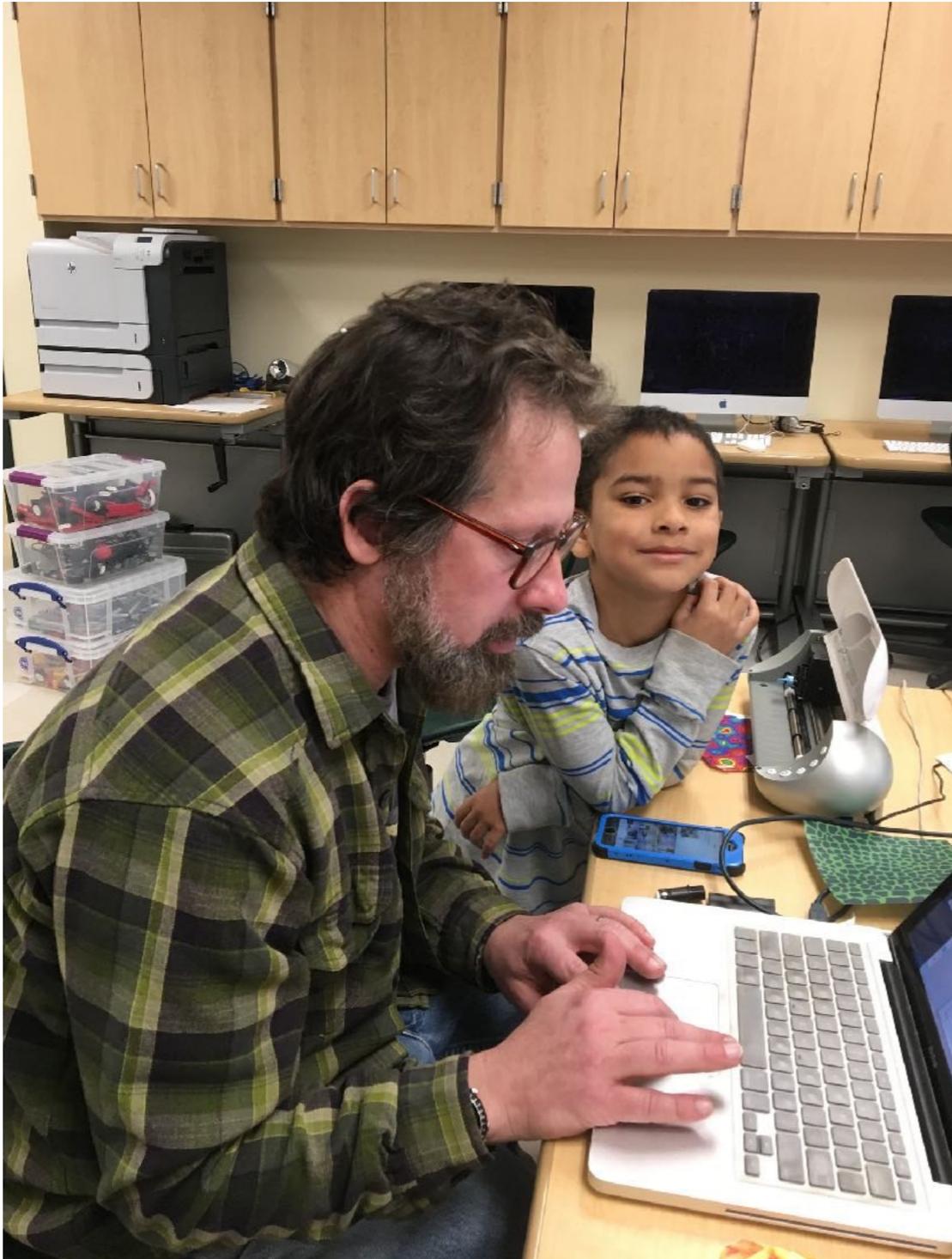
Maker Space - LEGO Building



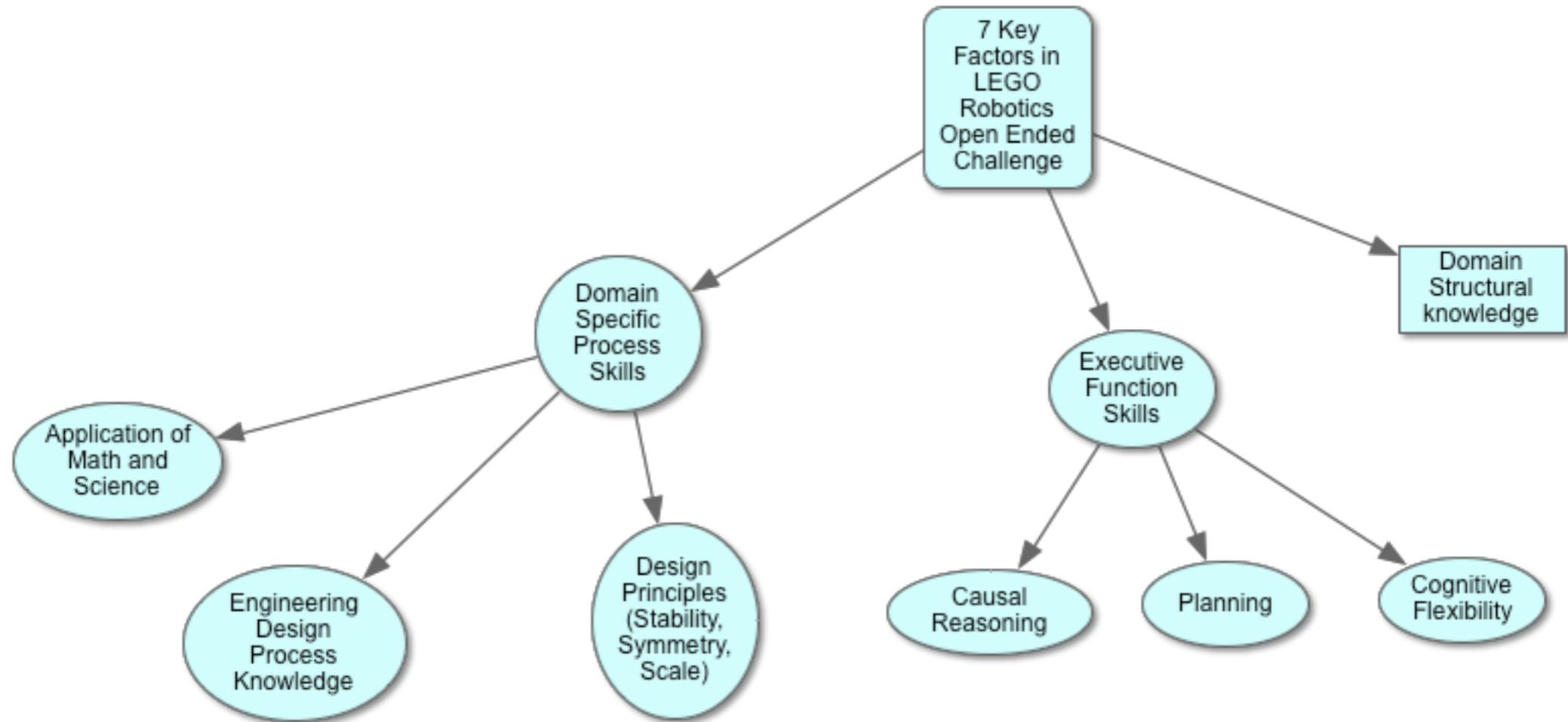
Maker Space - LEGO Building



Maker Space - Die Cutting



Seven Factors



Maker Space Summary



Maker Space Summary



Empowering Design

- More art and design integration
- Keep your end goal in mind
- Create and invent solutions; transfer knowledge to an end
- Student driven



Materials Exploration

- 3D Printing
- LittleBits including Makey Makey
- ClayMation
- LEGO (including ramp)
- Snap Circuits
- Gears
- New robots (Sphero, Droid Inventor, BOOST)
- Duct tape/wearable tech
- LED bulbs and resistors
- Drawing robots



Lesson/Project Planning

- Is there a project we can all do that is meets our educational goals?
- Where does it fit in the conceptual framework?
- What materials do we need?
- What coordination do we need?



Resources

- <http://kidsengineer.com/?p=1148>
- <https://ultimaker.com>
- johnsheffernan99@gmail.com
- <http://ceeo.tufts.edu>
- <https://www.thingiverse.com>
- <http://littlebits.cc>
- <http://www.snapcircuits.net>
- <https://www.tinkercad.com>



To Do

- Bring in LED stuff
- Post presentation on kidsengineer.com