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

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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)
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?
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
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

I can choose a design and print it in 3 dimensions

I can choose a design, customize it, and print it in 3 dimensions

I can choose a design, modify it, and print it in 3 dimensions

I can design and print my own object.
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

• 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 OPTIONS

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

MATERIALS AVAILABLE:

1.Duct tape
2.LEGO kits and bins
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)
Maker Space - Duct Tape Creations
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

Domain Specific Process Skills
- Application of Math and Science
- Engineering Design Process Knowledge
- Design Principles (Stability, Symmetry, Scale)

Executive Function Skills
- Causal Reasoning
- Planning
- Cognitive Flexibility

7 Key Factors in LEGO Robotics Open Ended Challenge

Domain Structural knowledge
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 resisters
• Drawing robots
Lesson/Project Planning

- Is there a project we can all do that 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