STEM-Integrated Arts: A Discussion With Some "Sciencey" People

SEPT 15, 2021

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ZOOM POLL

What makes someone a "sciencey" person?

PICK TWO:

- Being naturally good at science
- Creativity
- Knowing the right vocabulary words
- Curiosity
- Discussing science ideas with others
- Getting the right answer

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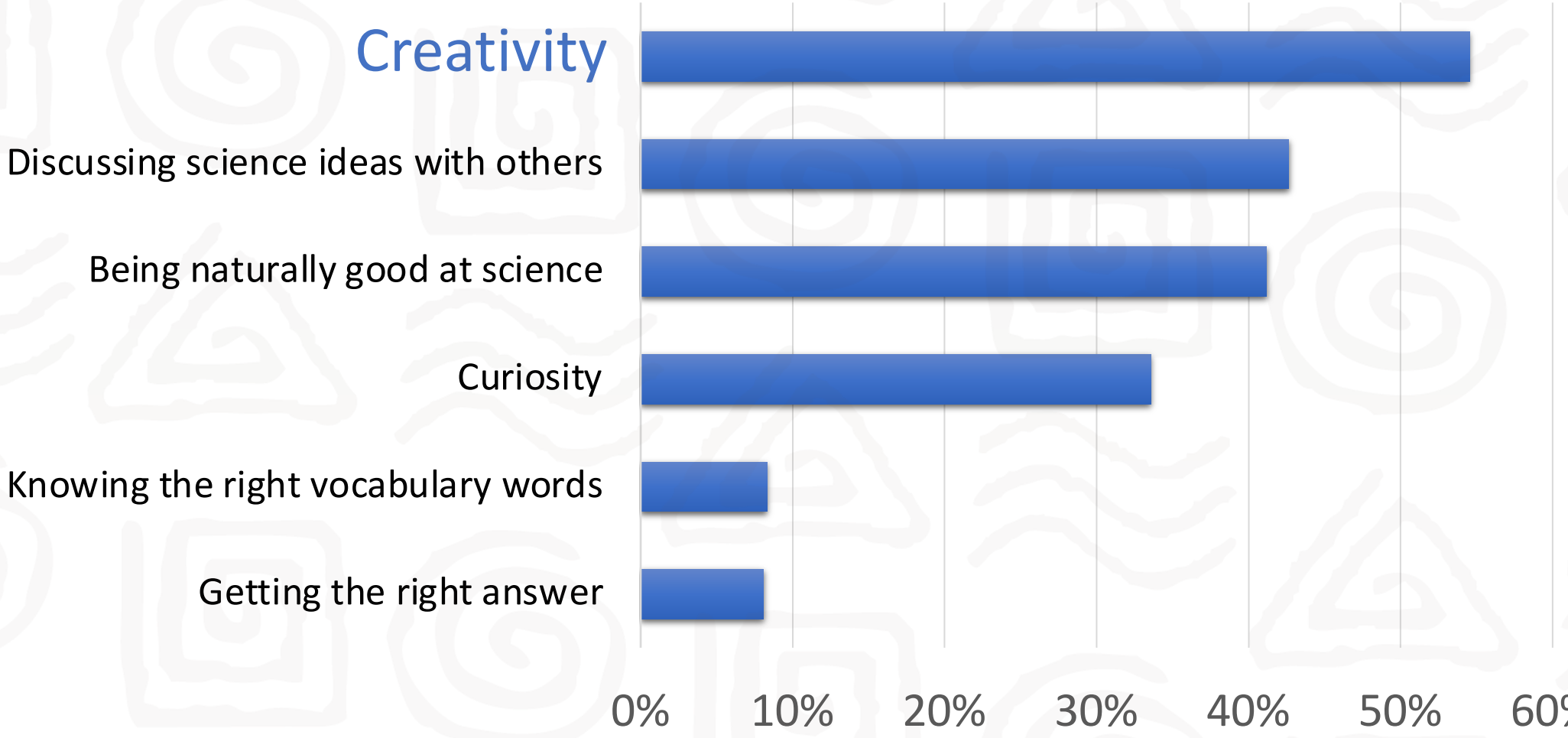
ARTS EDUCATION PARTNERSHIP

1,309 Allentown SD 4th & 5th grade students were asked…

What makes someone a "sciencey" person?



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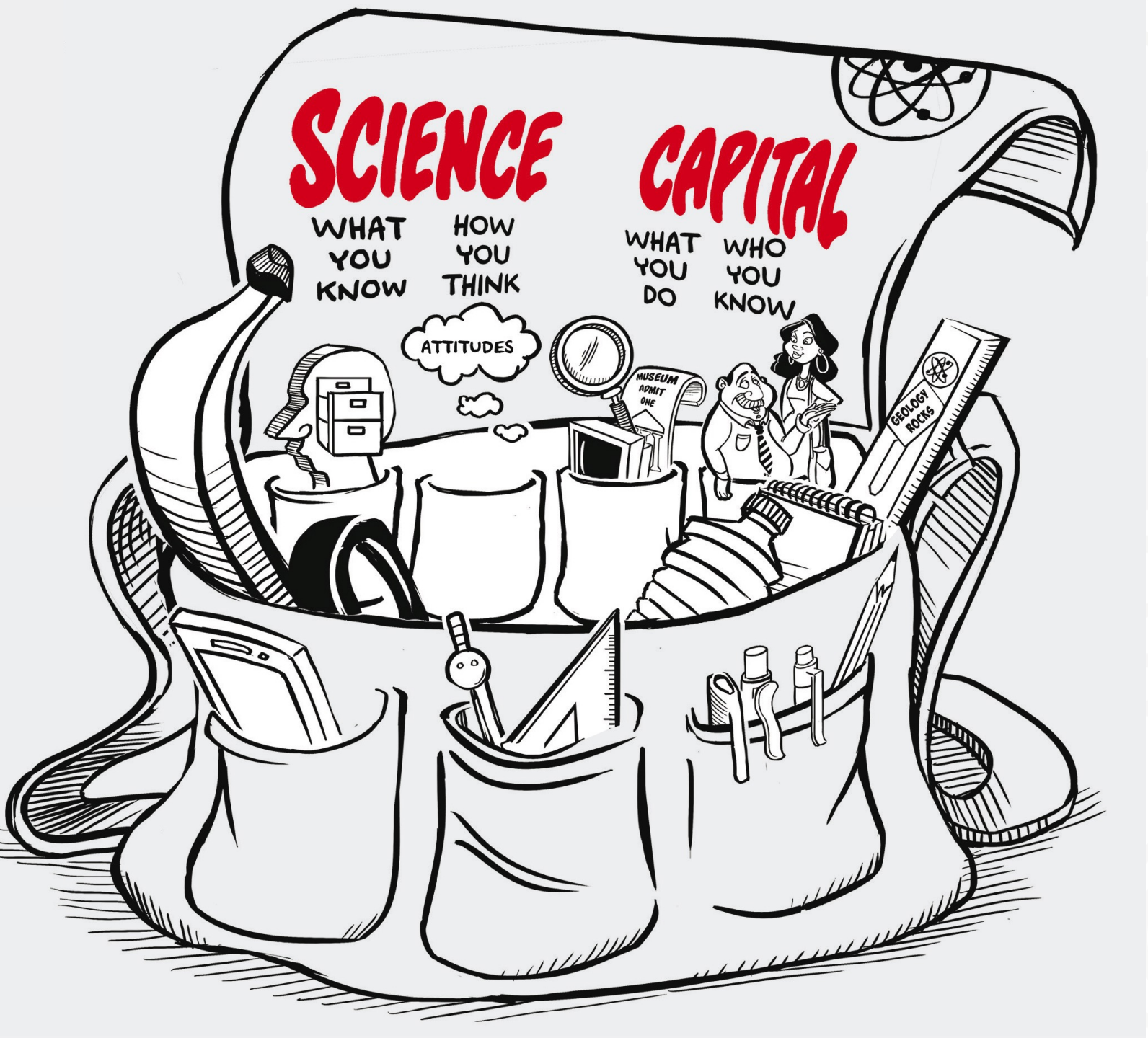

Science Capital is like a "holdall" containing all the science-related knowledge, attitudes, experiences and resources that you acquire through life.

Archer et al. (2015)

US Dept of Education grant
Professional Development for Arts Educators

Prepare students for the expanding design economy by…

- Developing art teachers' skills, knowledge, and comfort with artistic applications of digital design, coding, and fabrication tools
- Integrating principles from STEM Inquiry, Maker Education, and Design Thinking into K-12 visual arts classes

DEPARTMENT OF EDUCATION · UNITED STATES OF AMERICA

ARTS in EDUCATION

Helping Children Learn

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US Dept of Education grant
Professional Development for Arts Educators

- Summer intensive
- School year workshops
- Online professional learning
- Classroom programs

- Equipment lending library
  - 3D printers
  - laser cutter/engravers
  - microcontrollers
  - robotics kits

DEPARTMENT OF EDUCATION
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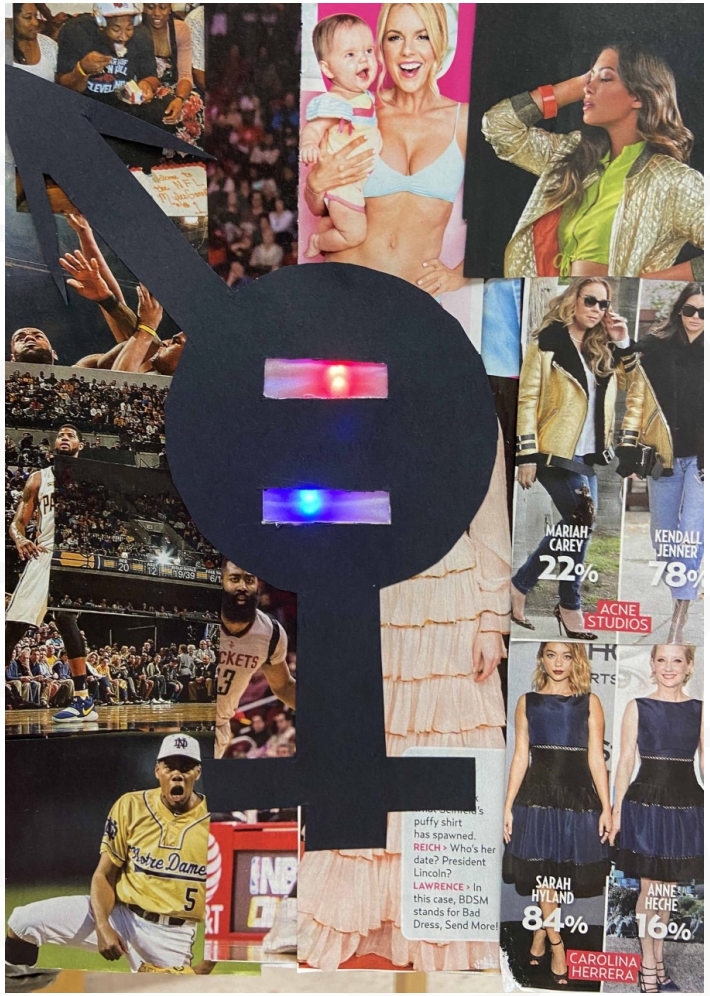
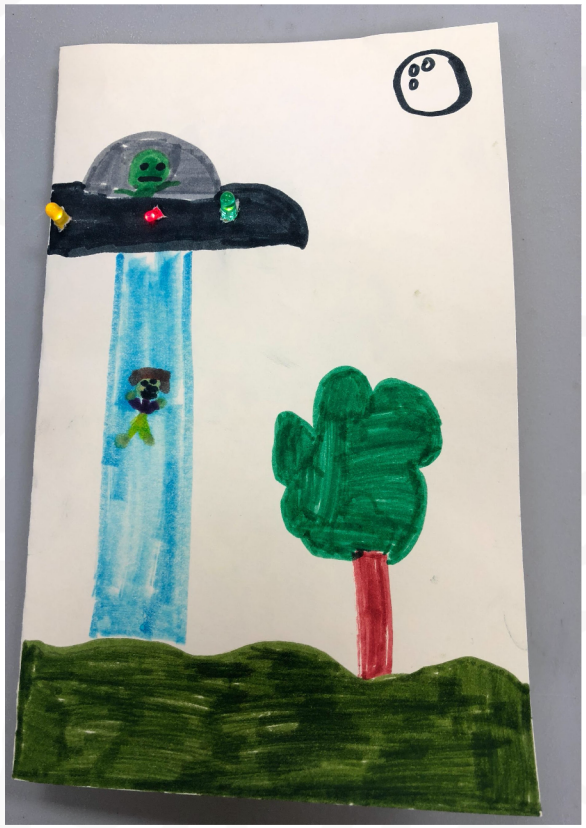
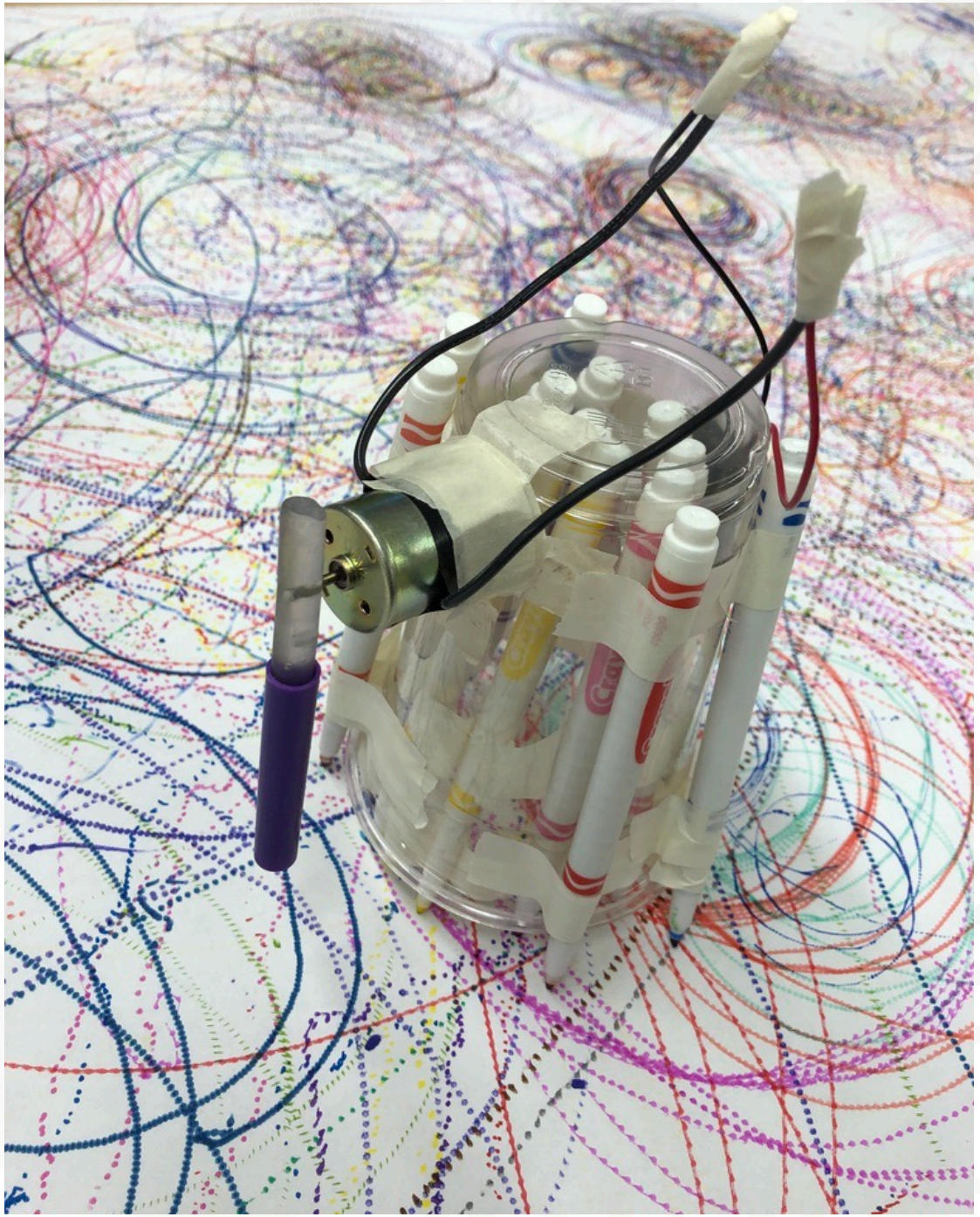
Simple circuits with LEDs



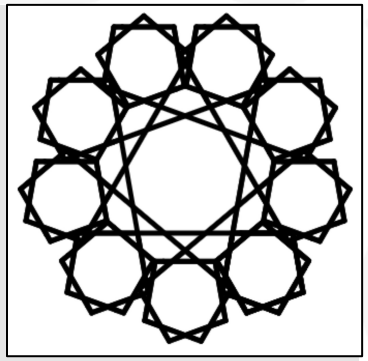


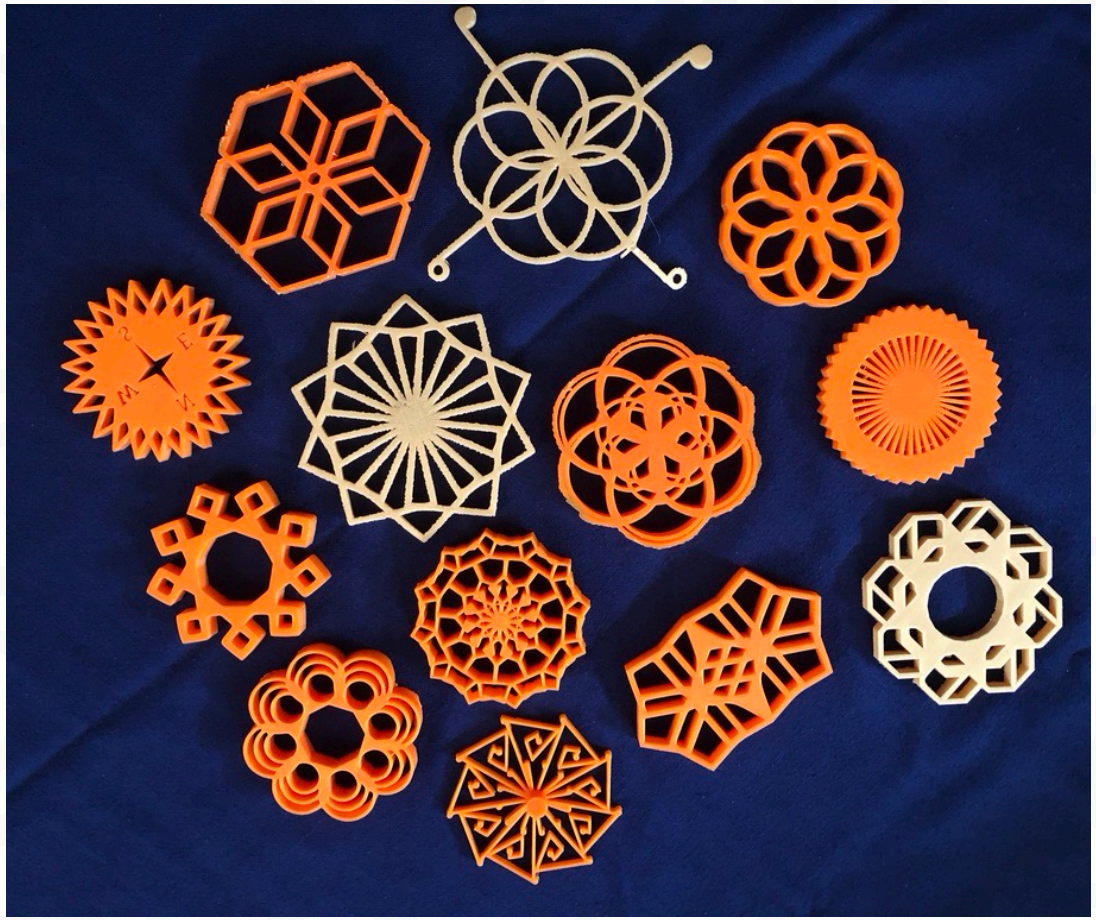
Scribbling Machines

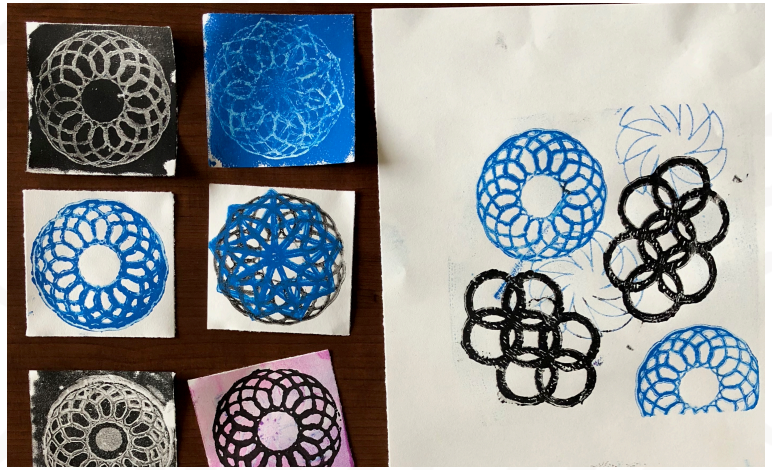


Coded Designs

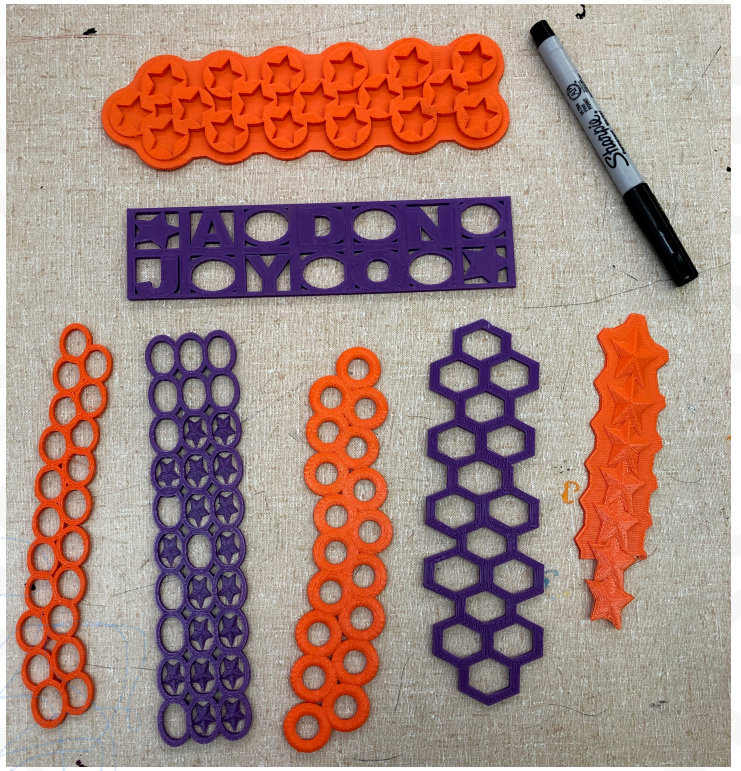
```
when run
jump to 238 over 230 down
set width to 7
repeat 10 times
do
    repeat 17 times
    do
        move forward by 50 pixels
        turn right by 80 degrees
        move forward by 8 pixels
    move forward by 150 pixels
jump forward by 30 pixels
jump to the top left position
```

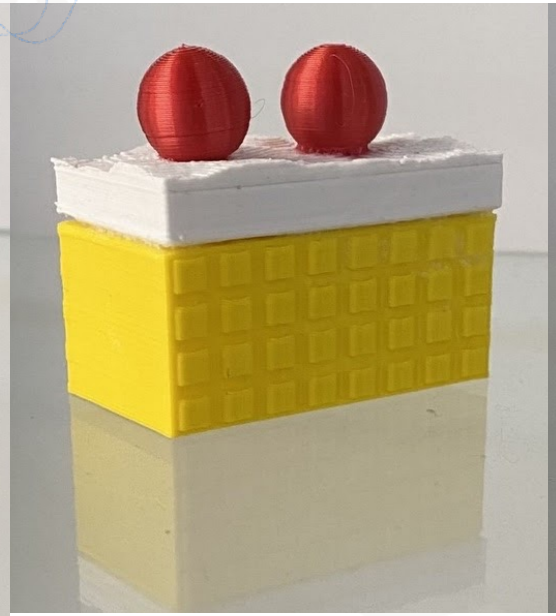






3D Printing

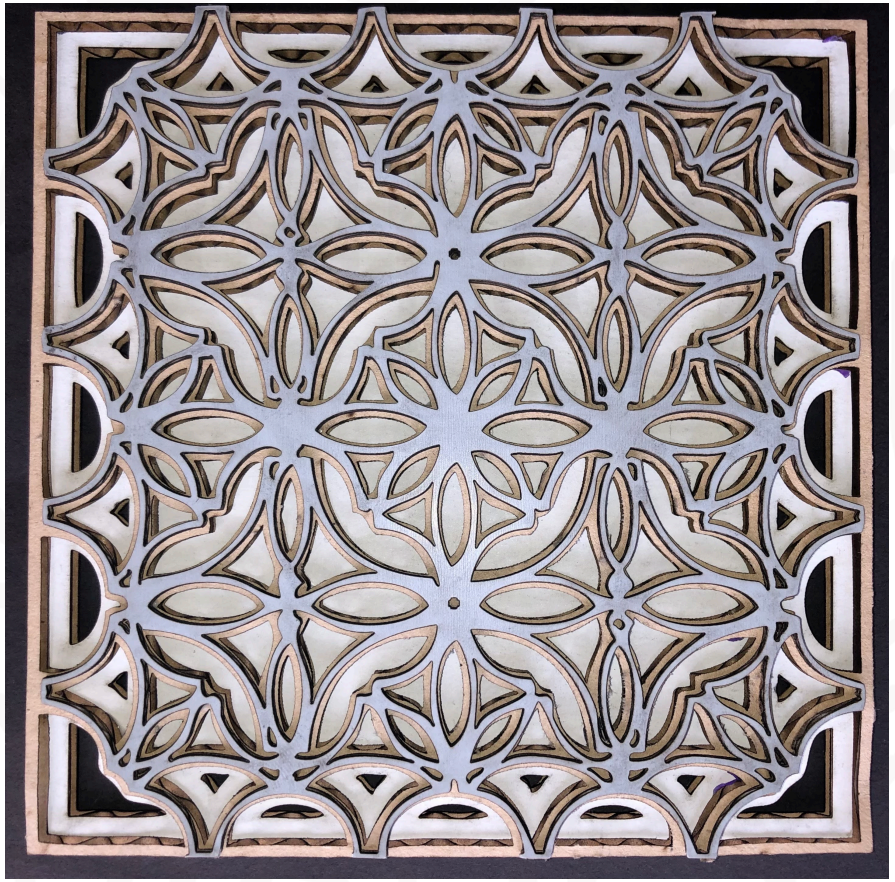


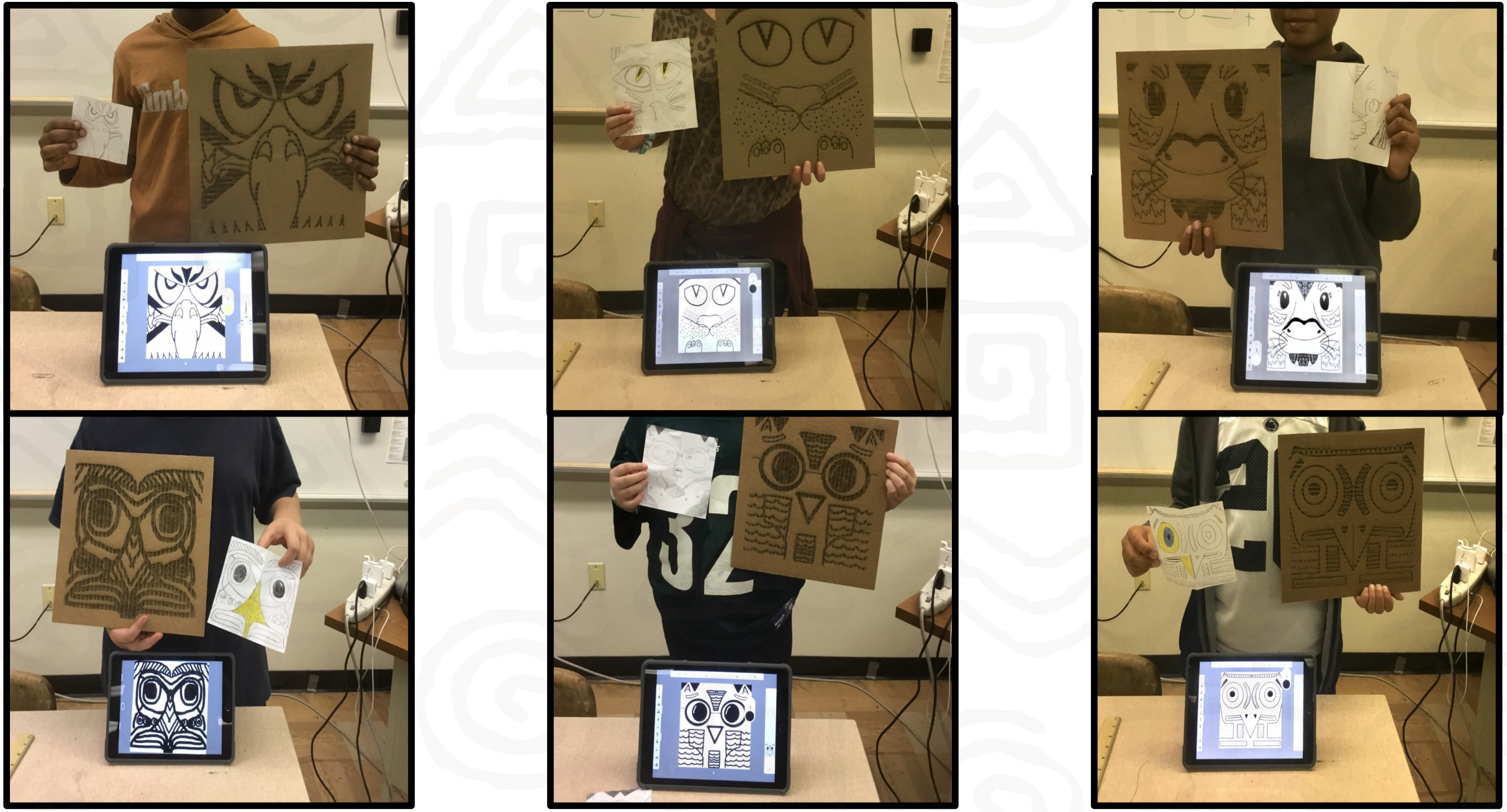


Laser cutter/engraver

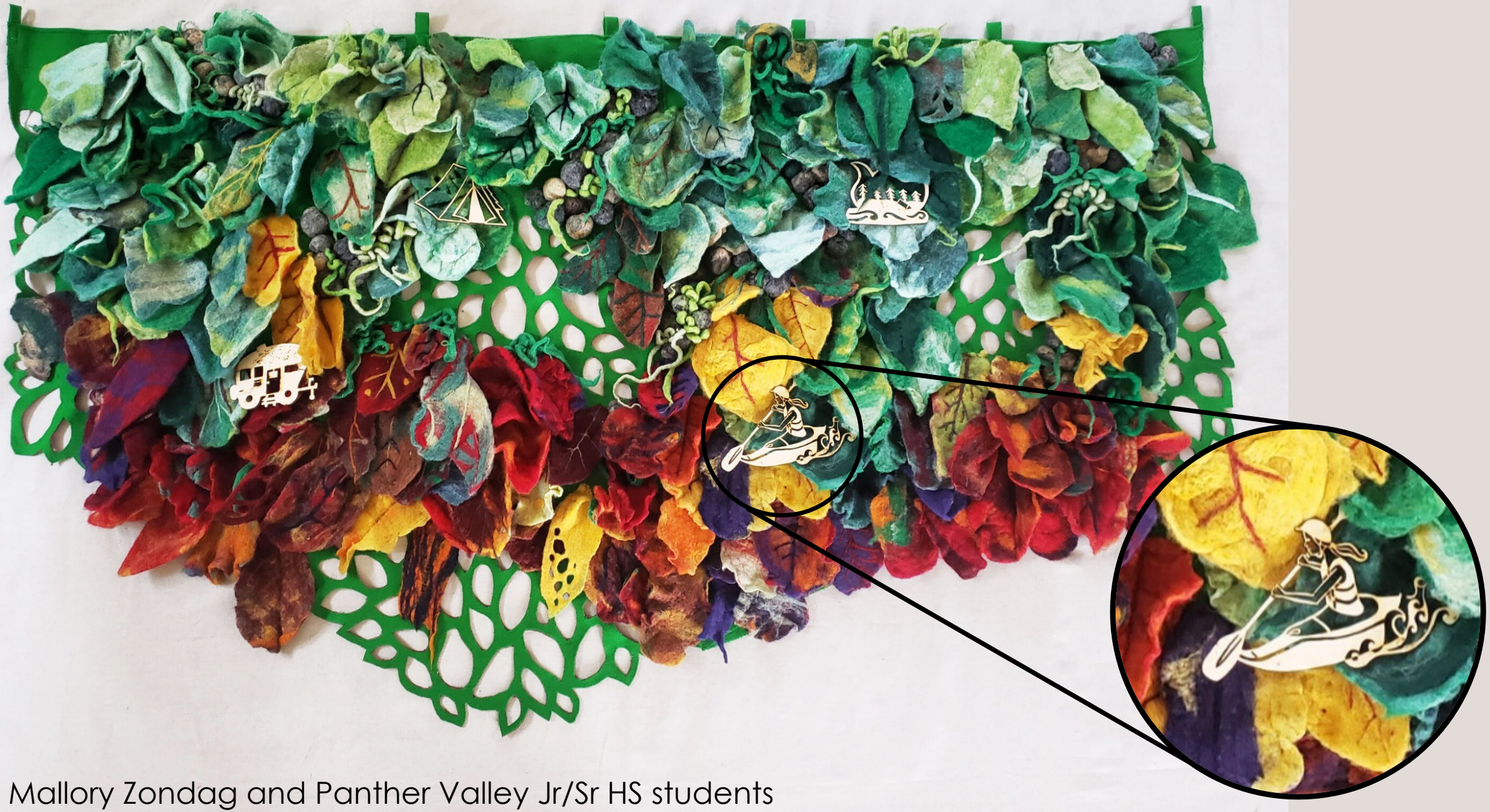
1/8” plywood with kerf hinge

6”x6” cardboard, 3 layers glued



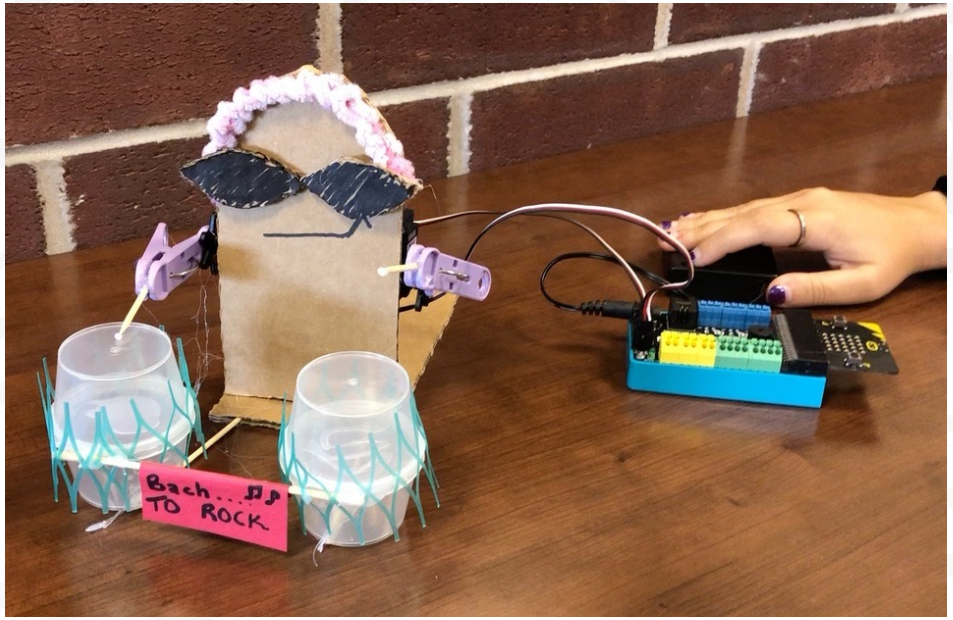


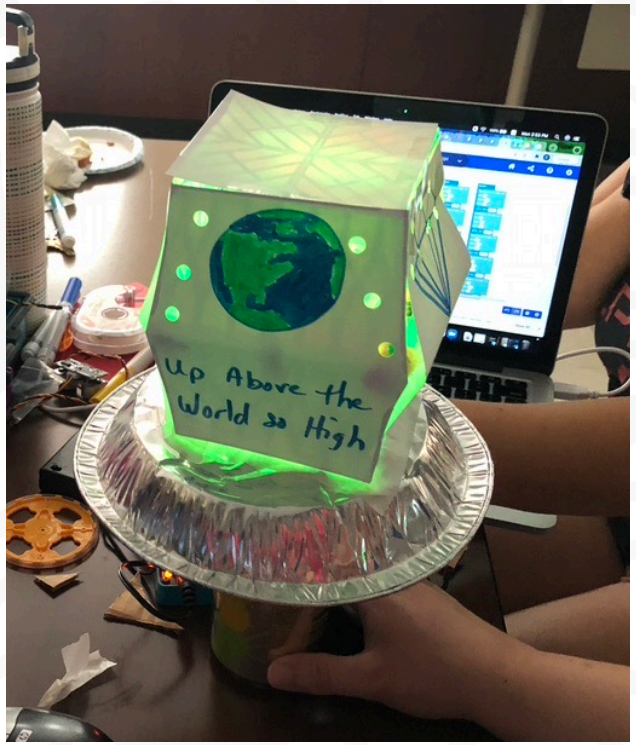
Laser-engraved cardboard totems – art lesson on symmetry

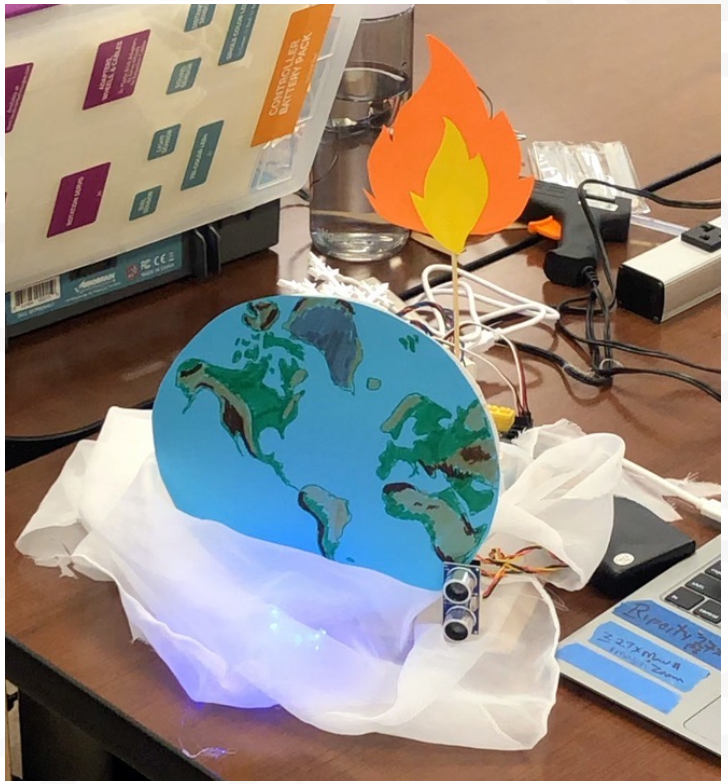


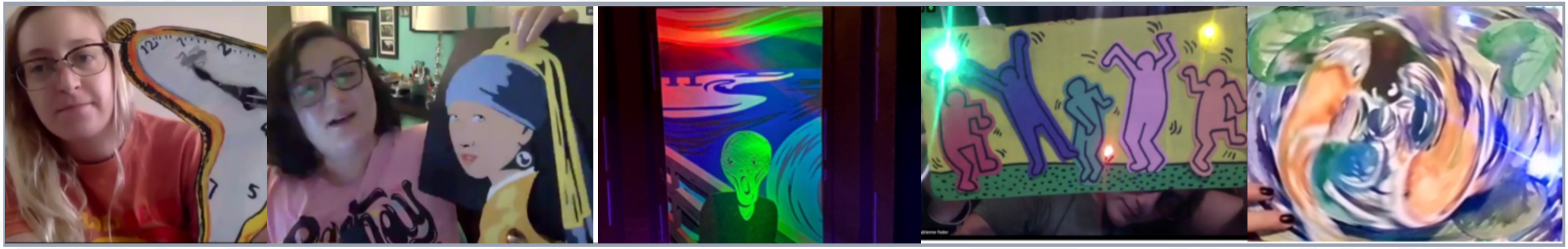
Mallory Zondag and Panther Valley Jr/Sr HS students

Moving Masterpieces

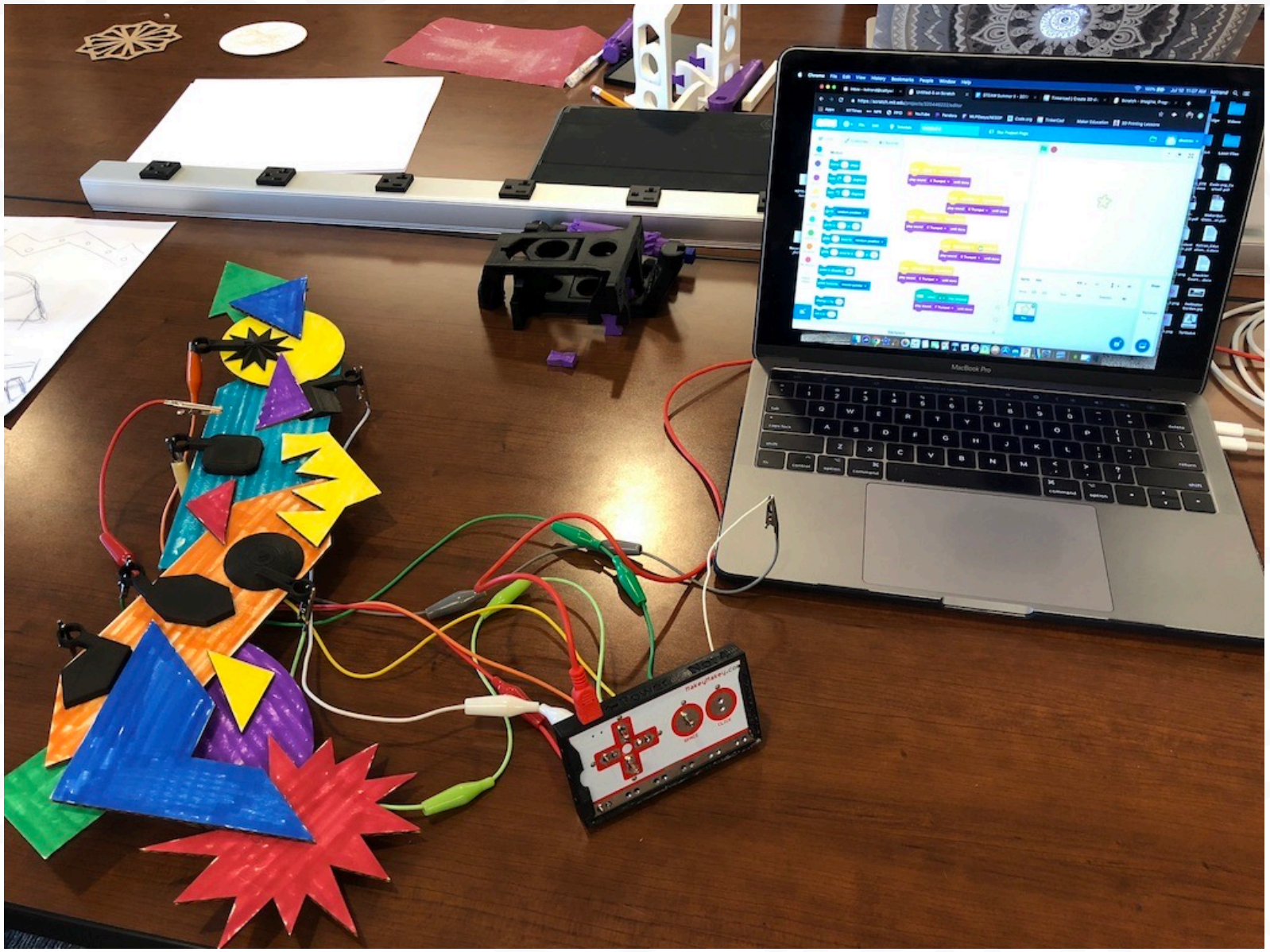








Electronic Musical Instruments



Arts Integration is

an **APPROACH** to **TEACHING**

in which students construct and demonstrate

UNDERSTANDING

through an **ART FORM**.

Students engage in a

CREATIVE PROCESS which

CONNECTS an art form and another subject area

and meets **EVOLVING OBJECTIVES** in both.

"Defining Arts Integration" by Lynne B. Silverstein and Sean Layne. © 2010, The John F. Kennedy Center for the Performing Arts

STEM or STEAM?

An integrated, interdisciplinary, and student-centered approach to learning that encourages curiosity, creativity, artistic expression, collaboration, … communication, problem solving, critical thinking, and design thinking.

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Pennsylvania Department of Education

STEM or STEAM?

An approach to education that promotes student-led explorations driven by curiosity and the application of competencies and practices across disciplines that can effectively and equitably prepare them for success in education and the 21st century workforce.

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The Innovation Collaborative

the INNOVATION COLLABORATIVE
Networking Arts, Sciences, and Humanities Education

STEAM is…

CREATIVE

Students leverage content from S, T, E, and M to create meaningful artwork that focuses on outcomes with a personal or aesthetic meaning.

EXPERIENTIAL

Students conduct open exploration in the context of both science and art, communicating about the processes and outcomes.

INQUIRY-BASED

Using scientific and creative processes, students ask questions, design and experiment with intention, improvise and solve real-world problems.

INTERDISCIPLINARY

Student learning occurs at the intersection of S, T, E, Arts, and M – incorporating standards in all subjects.

EDUCATION COMMISSION OF THE STATES

ARTS EDUCATION PARTNERSHIP

What we have heard STEM Professionals say:

- **Leave the A out** – Arts aren't rigorous enough.
- **Put the A in** – It helps the medicine go down.

What we have heard
Arts Professionals say:

- STEAM is…
  - the same as Design Thinking
  - the same as Project Based Learning
  - a mindset
  - anything requiring creativity

- STEM is
  - missing creativity and innovation

Breakout Room Questions

- What are the benefits and risks if school systems distinguish between STEM and STEAM approaches?

- What needs to be done to ensure that the important characteristics of STEAM have a place in school systems long term?

Jamboard at https://bit.ly/3zHOXRQ

PARTING THOUGHTS

STEAM programs offer an opportunity to build arts identities and increase community involvement in the arts.

STEM and Arts professionals should **collaborate to design and study** the effectiveness of STEAM education programs.

Empowering art teachers as STEAM experts in their buildings/districts is a good way to ensure that Art remains a central part of STEAM curricula.

The **Exploratorium** is an inspiring STEAM example, founded to be "a museum of human awareness" that combines art and science while encouraging play, experimentation, and a sense of joy and wonder.

THANK YOU!

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