



## Building Sensitivity to Design Through Maker-Centered Practice

Presented by: Jessica Ross, Project Zero | Harvard Graduate School of Education  
@ Moonshot Institute

05.06.17



# Introductions



# Plan for the session

- A thought prompt
- Dive in: looking closely
- A framework for teaching & learning
- Second dive: exploring complexity
- Final dive: finding opportunity
- Ideas in practice
- Current research implications & questions
- Implications for your contexts





Think of a memorable making experience you've had...

What was memorable about that experience?

What was  
memorable  
about that  
experience?

Experiences /  
Qualities



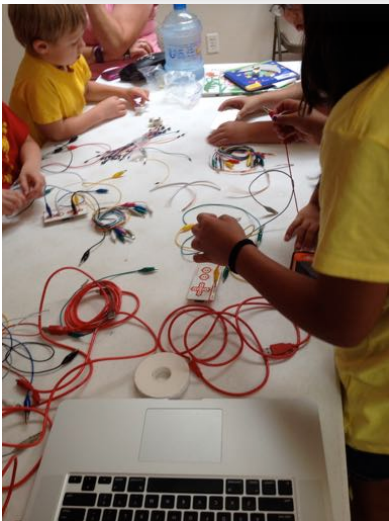
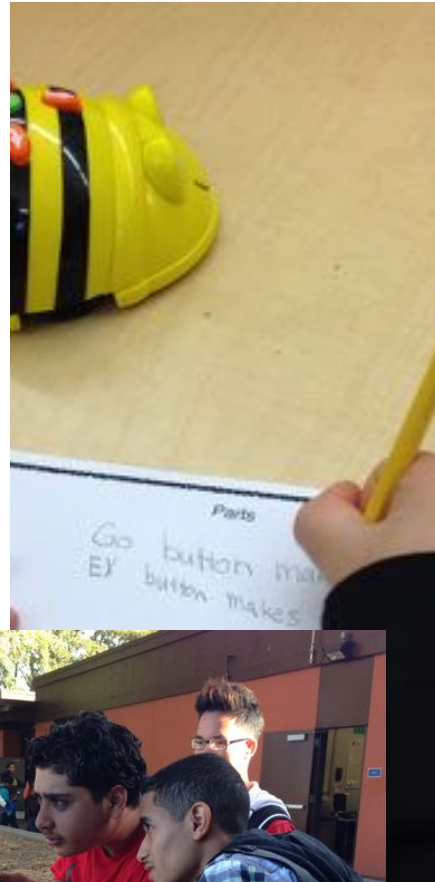
## Maker Movement

*A rising interest in sharing and learning from others while working with one's hands within interdisciplinary environments that combine a variety of tools and technologies.*



## Maker-Centered Learning

*Incorporating the practices and the ethos of the Maker Movement into various educational settings.*





## Maker Empowerment:

A sensitivity to the designed dimension of objects and systems, along with the inclination and capacity to shape one's world through building, tinkering, re/designing, or hacking.

## Sensitivity to Design:

Learning to notice and engage with one's physical and conceptual environment by looking closely and reflecting on the design of objects and systems, exploring the complexity of design, and finding opportunity to make objects and systems more effective, more efficient, more ethical, or more beautiful.

## Capacities:

- **Looking Closely:** noticing nuances and intricacies of object and system design
- **Exploring Complexity:** considering the people, interactions, and motivations associated with objects and systems
- **Finding Opportunity:** noticing if and where there are opportunities for imagining how an object or system might be otherwise

## Thinking Routines:

- Parts, Purposes, Complexities
- Parts, People, Interactions
- Think, Feel, Care
- Imagine If...





# Task: observational drawing

Working Independently

Materials: object, pencil, paper

Instructions: 5 minutes of complete silence, draw your object the entire time, draw it once, several times looking at different viewpoints, zoom in on specific parts

# Task: looking together

## Working as a Group

Materials: object, chart paper, marker

Instructions: Take 10 minutes to make notes about your object noticing:

- What are its parts?
- What are the purposes for those parts?
- How is the object or parts complex?

# Documentation





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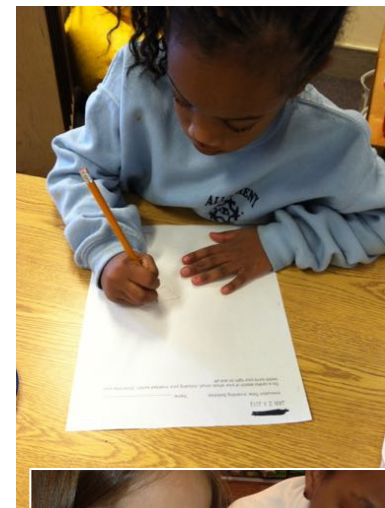
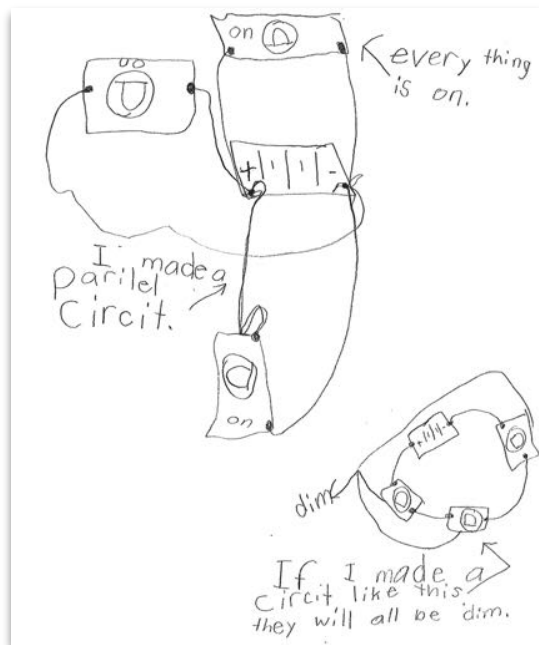
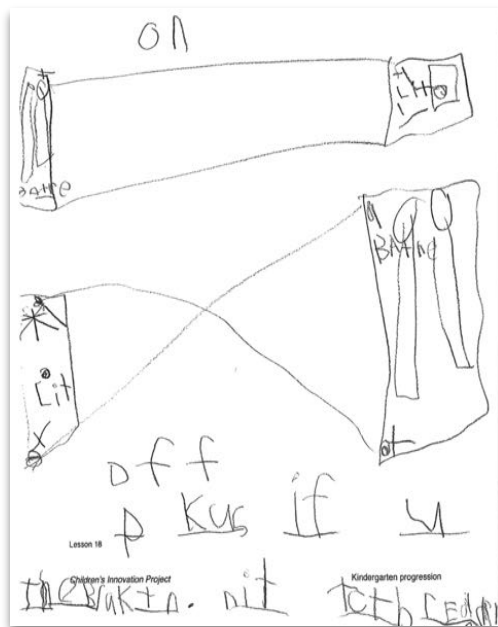
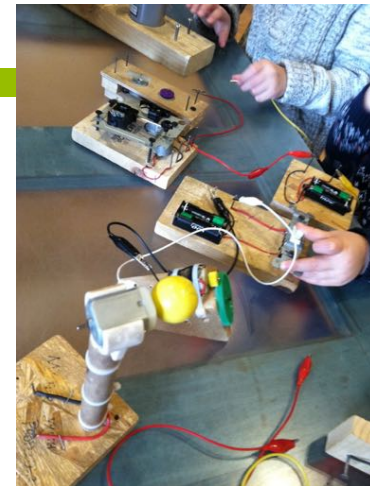
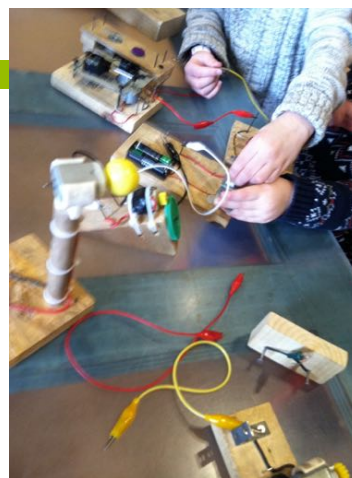


# Sensitivity to Design Capacities

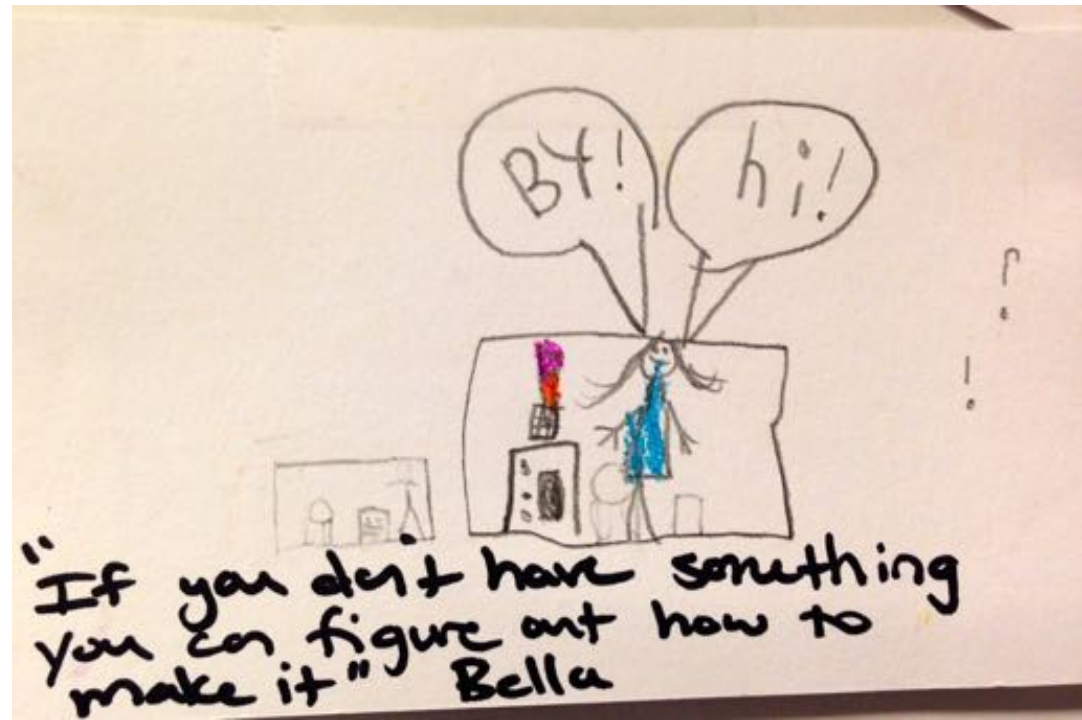
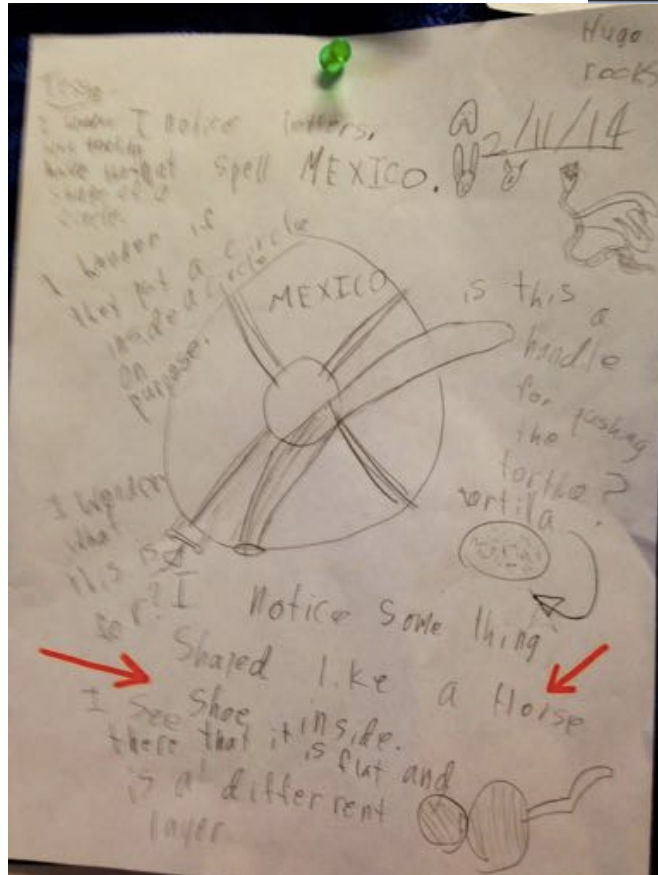


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# Looking Closely: might look like...



# It might look like...


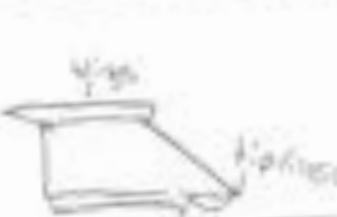




Ben H



### Parts, Purposes, Puzzles Looking Closely

Parts	Purposes	Puzzles
<p>What are the different parts of your object? Draw a diagram and label it.</p>	<p>What is the purpose of each part?</p>	<p>Look at the parts and their purposes like a puzzle coming together. Are there any problems? What could you change to make it better?</p>
<p>1</p> 	<p>wings so it can fly          + feather so the tip is not          sticky          + bone so it can hold the          wing          + feather so it can hold the          wing          + bone so it can hold the          wing</p>	<p>Only that there were all          of jobs in one because          it's better if you could fold          it          + feather          + bone</p>
<p>2</p> 	<p>wings: so it can fly          nose: so it can see          feet: so it can walk          body: so it can hold          it all together</p>	<p>It was to hold          the wing          + feather          + bone          + feather          + bone          + feather          + bone</p>





Hopewell Junior High @HMHHS\_Vikings · Jan 26

Kids describing simple machines to help improve their writing skills. #makered #vikingpridep3



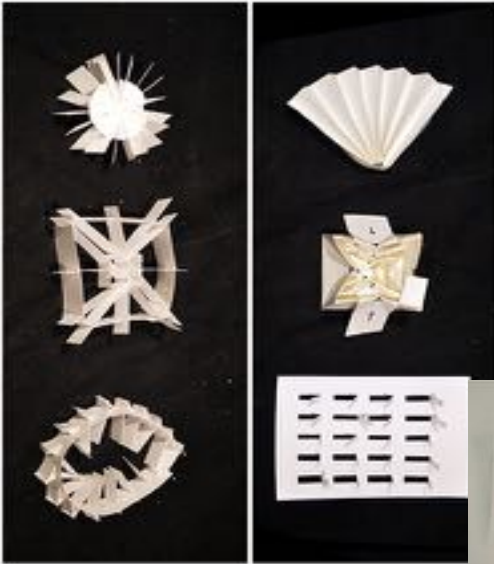
# Documentation & Assessment



# Task: materials exploration

Materials: paper, glue scissors, or masking tape, or aluminum foil

Instructions: 7 minutes of exploring the potential of the material you have been given, what might these materials/tools want to become?



It might look like...



# It might look like...



What are its complexities?

The complexities of the shoe is that the simple parts often are constructed to for aesthetics but at the same time be build for speed, comfort...ect. Because of this, shoes can have very different hybrids of the same design and choosing a "perfect" design for one shoe can be very complicated. What must be put at the front of the priorities? Speed, durability, comfort...ect.?

Art and Science of Making  
Shoes

Imagine If:

In what ways could it be made more effective?

Shoes can be made lighter and stronger with different material. The shape and mold of the shoe can be changed for a more comfortable design.





What's the object or system you're looking at?

What do you think the designer(s) thought about when creating this object or system?

What would you change if you could redesign this object or system? Why?

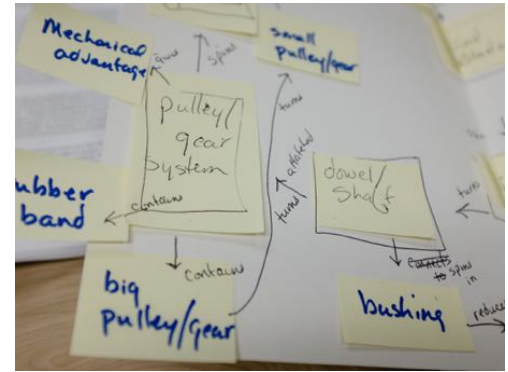


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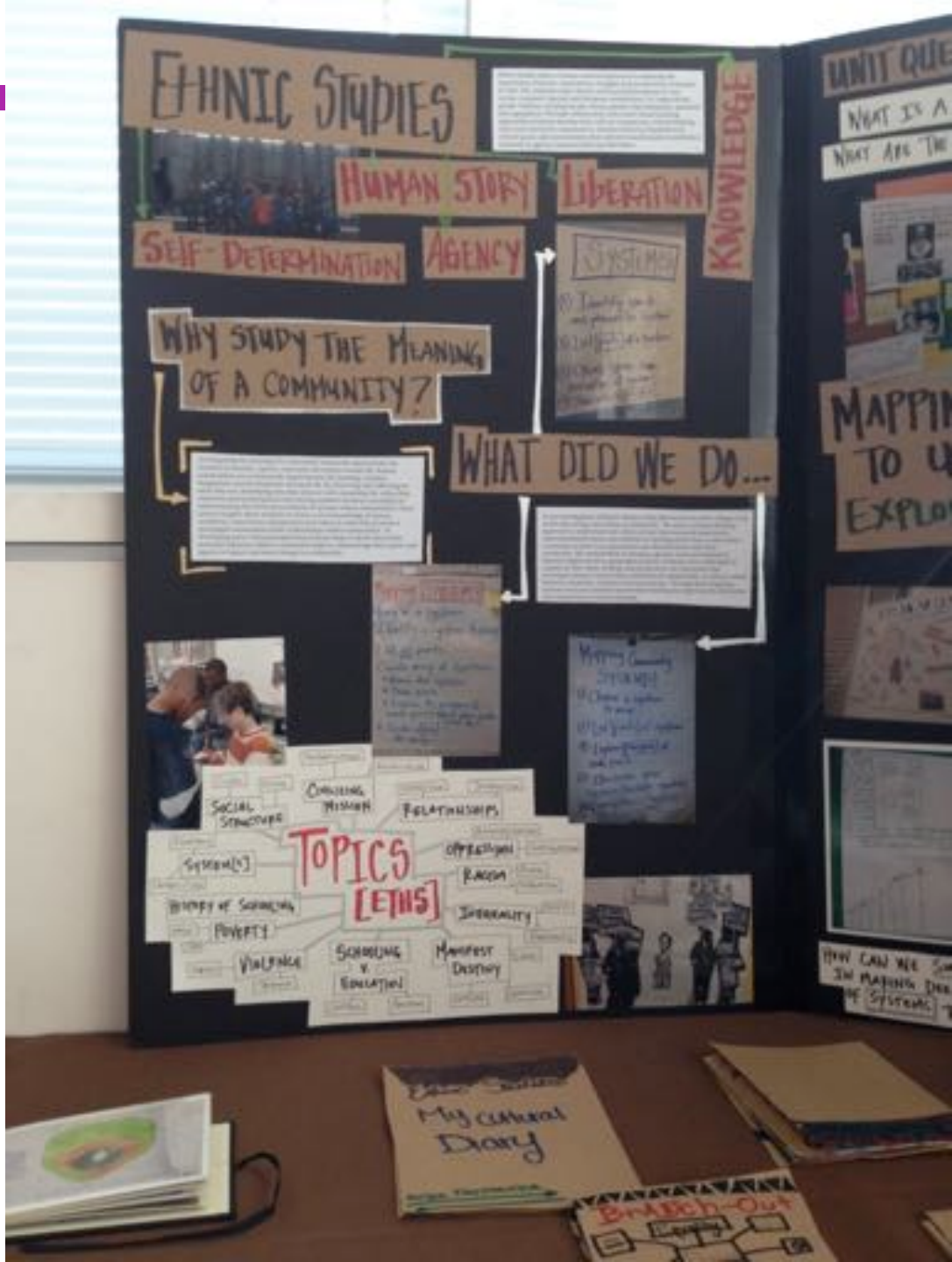
# Wind Power Prototypes and Understanding Systems

Students in Portland, Maine engaged in wind-powered design solutions

Exploring Complexity:  
might look like...

## Ethnic Studies Course

Studying the systems in a  
community at Claremont  
Middle School, Oakland, CA.



# Finding Opportunity: might look like...



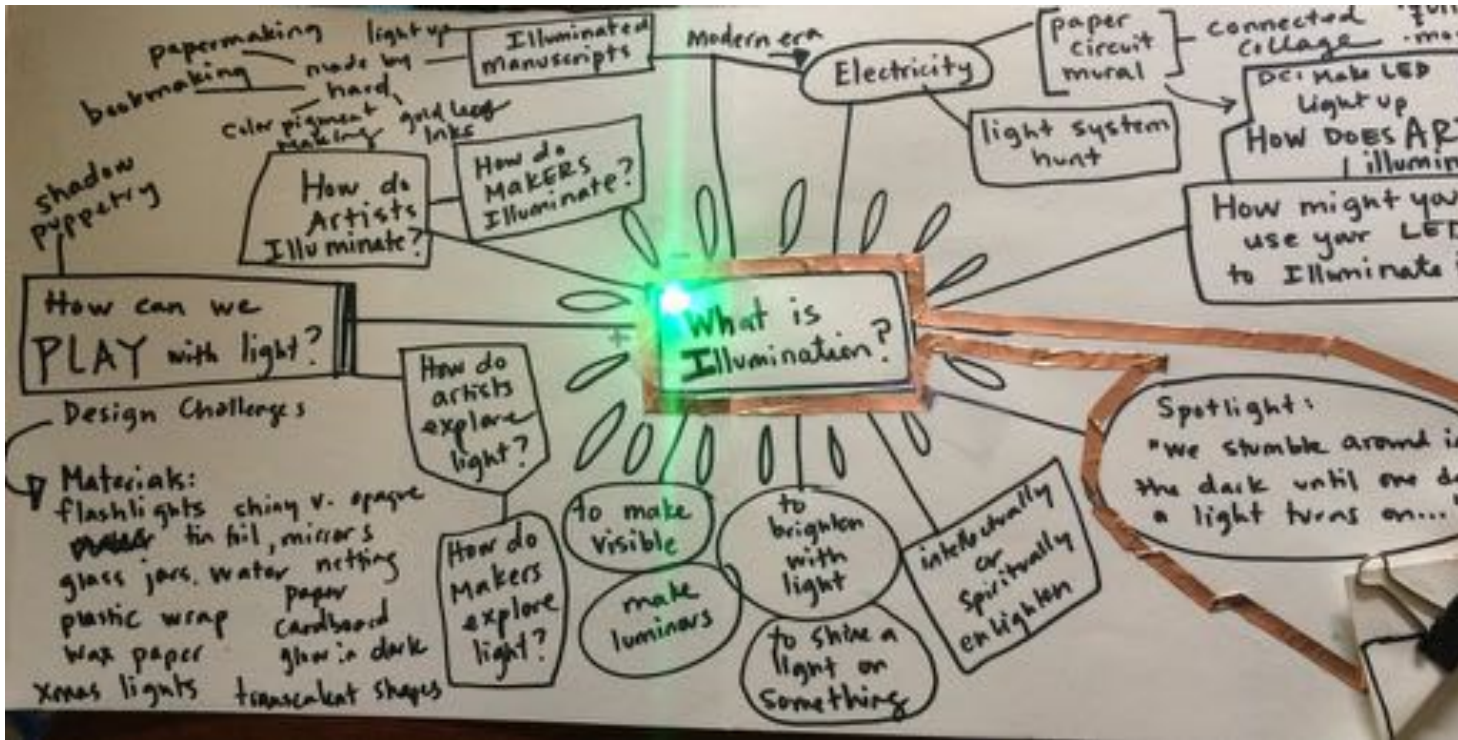
PARTS What parts do you see in this program?	PURPOSE What is the purpose of these parts?
<p><del>viewer</del> Polette viewer Components Properties</p>	<p>- what is a slider? - what does it do - what other devices use a slider? - what is a spinner? - does webviewer let you go on the internet on your phone?</p>
COMPLEXITIES How do the parts relate to each other?	REALIZATIONS What do you learn from the experience? Did you answer any of the questions you had? Did you deal up any confusion?
<p>you fit on the viewer whats in user interface, The Components Browser whats on the viewer and the properties help fix or adjust whats on <del>the</del> all of the columns.</p>	<p>each part has a description button/part. Describing what it does you can slide the screen to the next one instead of putting a button on each page and pressing it each time there's a lot more buttons/parts. I'd like to use and see how they work now</p>

PARTS What parts do you see in this program?	PURPOSE What is the purpose of these parts?
<p>UIE - buttons - UIE - media • Viewer - what screens</p> <p>• Components • Properties</p>	<p>• UIE - what you put • properties - edit you</p>

COMPLEXITIES How do the parts relate to each other?	REALIZATIONS What do you learn from the experience? Did you answer any of the questions you had? Did you deal up any confusion?
<p>• spinner button • most of the media had no properties, which might imply they only serve on purpose</p>	<p>• basically on app is just as complex as I assumed • with year five and after that, I could have done more depth like the program is built the way you have to put out design progress</p>

Exploring the design of an app developer to design your own app.

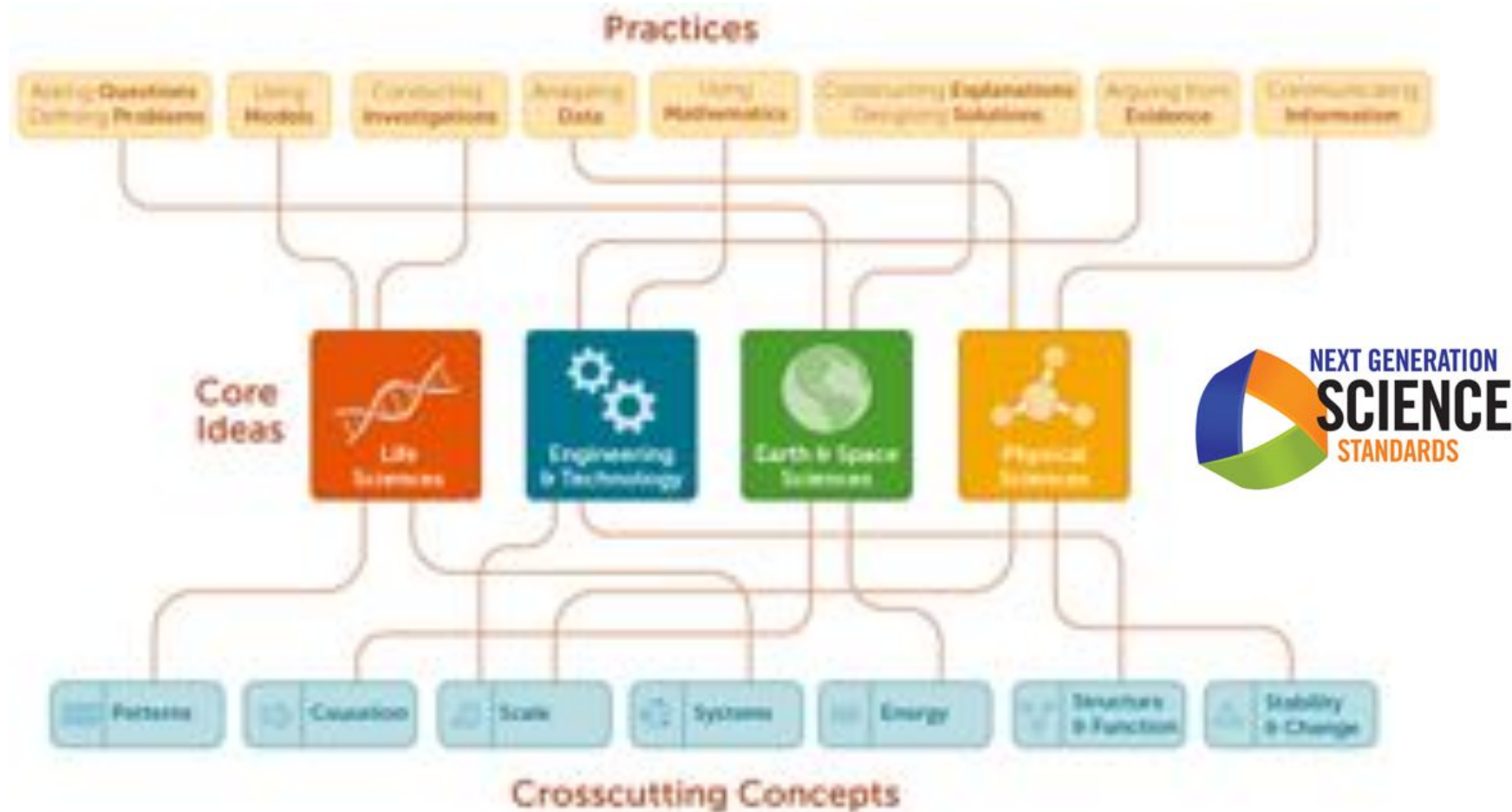
High School Tech Class at Global Learning Charter Public School, New Bedford, MA.



Connections to Frameworks and Standards

## Sensitivity to Design:

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### Creative Practices

<p><b>Imagine</b></p> <p>To form a mental image of concept</p>	<p><b>Investigate</b></p> <p>To observe or study through exploration or examination</p>	<p><b>Construct</b></p> <p>To make or form by combining or arranging parts or elements</p>	<p><b>Reflect</b></p> <p>To think deeply or carefully about</p>
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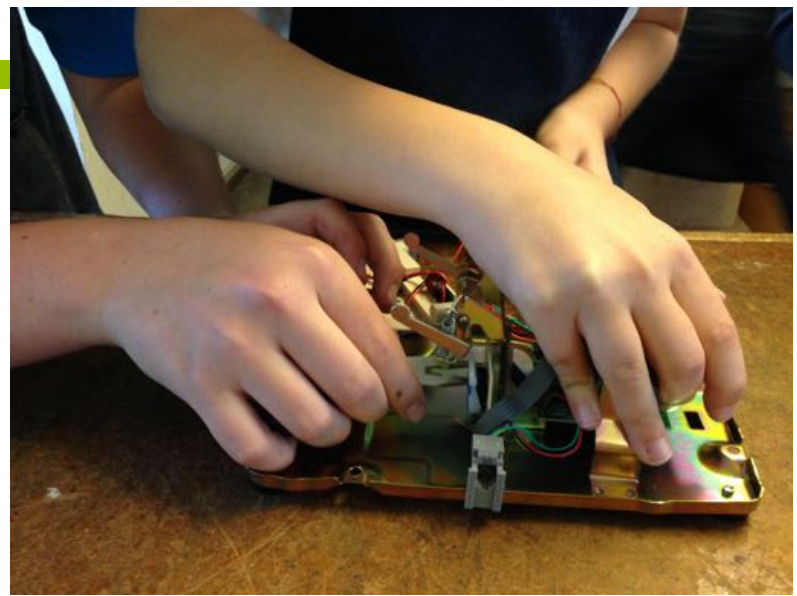
# Promises and Practices of Maker-Centered Learning

Peer-to-Peer Learning  
Empathy  
Systems Thinking  
Inquiry  
Curiosity  
Teacher Development  
Maker Skills  
Peer-to-Peer Learning  
Risk Taking  
Craftsmanship  
The development of character  
Learning through Failure

Student Agency  
Flexibility  
Observation Skills  
Aesthetic Sensitivity  
Creativity  
Technical Skills  
Interdisciplinary Learning  
Comfort with Ambiguity

Student-Driven Learning  
Perspective Taking  
Collaboration  
Pursuing Passion  
Persistence  
Self-Directed Learning  
Sense of Community  
Confidence Building

STEM Learning



“The world doesn’t need more graduates with good grades. What the world needs is voracious, self-directed learners with the creative capacity to see the problems of the world as puzzles, and the tenacity to work on them, even in the face of adversity.”

- Gever Tully, Brightworks School



# AbD Study Group Reflective Practice

## Documentation & Planning Forward

Oakland fellows. #makered  
#documentation [ift.tt/2ffntt3](http://ift.tt/2ffntt3)



## Looking at Student Work & Capacities

Aaron Vanderwerff @Avdrwrff · 2h  
Looking at student work for signs of looking closely, exploring complexity, and finding opportunity @AgencybyDesign #makered



# Insights, Puzzles, & Implications

- *How have the ideas presented today offered you new insights for you?*
- *How have the ideas discussed today uncovered new puzzles for you?*
- *What might be some of the implications in your context?*



- ❖ Online course: Thinking and Learning in the Maker-Centered Classroom <http://hvr.d.me/SSifi>

The screenshot shows the Agency by Design website. The header is orange with the Agency by Design logo (A, b, D in colored boxes) and the tagline "Investigating the promises, practices, and pedagogies of maker-centered learning." Below the header is a navigation bar with links: About Us, Educator Resources, Blog, News, What We're Reading, Contact Us, and social media icons for Twitter, Facebook, and RSS. The main content area features a large image of hands working on a project with the text "Project Zero Perspectives Pittsburgh". Below this is a blue button that says "Visit Conference Website". At the bottom of the main content area are two buttons: "WHAT IS AbD?" and "MAKING THINKING HAPPEN" with the subtitle "The official blog of the Agency by Design project".

The book cover for "Maker-Centered Learning" features a photograph of children working on a project. The authors listed are Edward P. Clapp, Jessica Ross, Jennifer O. Ryan, and Shari Tishman. The title "Maker-Centered Learning" is in large, bold, red letters. Below the title is the subtitle "Empowering Young People to Shape Their Worlds". At the bottom of the cover is a photograph of four children looking at a project. The Jossey-Bass logo is visible in the bottom right corner.

[www.agencybydesign.org](http://www.agencybydesign.org)

*Thank you!*



# Keep in Touch!

Let us know how you play around with the ideas...



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Image Credits:

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Melissa Rivard, Jeanine Harmon and the AbD team

Life Magazine from UH Digital Library

Jim Dine – The Yellow Painting 1972-1973

<https://www.sfmoma.org/artwork/FC.458>

Maker Movement images:

Top Image:

<https://gigaom.com/2014/05/19/here-are-the-robots-drones-and-fire-spewing-octopus-you-missed-at-this-weekends-maker-faire/>

Middle Image: Mark Obrien

Bottom Image: Amy O’Leary/The New York Times

[http://bits.blogs.nytimes.com/2013/09/23/is-maker-faire-made-for-kids/?\\_r=0](http://bits.blogs.nytimes.com/2013/09/23/is-maker-faire-made-for-kids/?_r=0)

László Moholy-Nagy's *Light Prop* for an Electric Stage (Light-Space Modulator), 1930

<http://www.harvardartmuseums.org/collections/object/299819?position=8>

<https://vimeo.com/111474831>

Jim Dine Tools Detailed

Illuminated Systems Artwork by Brooke Toczylowski

Maker Campus: David Stephen

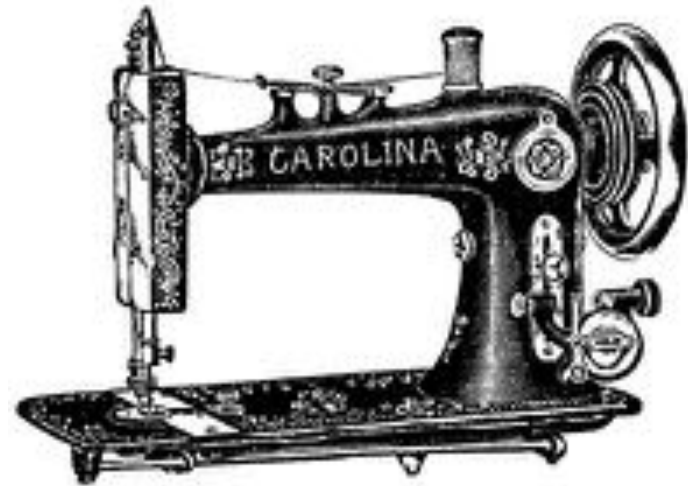
Thanks to the maker educators and young people who shared their work with our team!

Tools by Cyrus Highsmith

# Think, Feel, Care

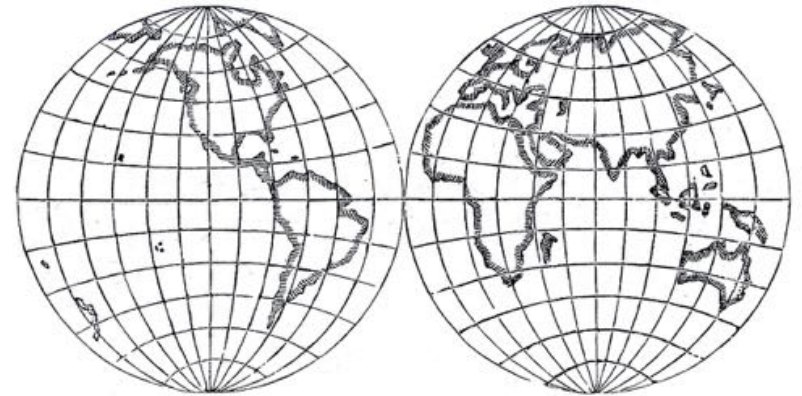
## ➤ *Exploring viewpoints*

- On your own: pick one stakeholder and use the routine to create a monologue.
- Once you have that monologue in your head...
- Go meet another person (from a different system) and share your monologue.
- *What do you think you know about this stakeholder? What don't you know about this stakeholder?*



# Parts, People, Interactions

- Now that you have identified a system:
- What are the **parts** of the system?
  - Who are the **people** connected to the system?
  - How do the people in the system **interact** with each other and the parts?



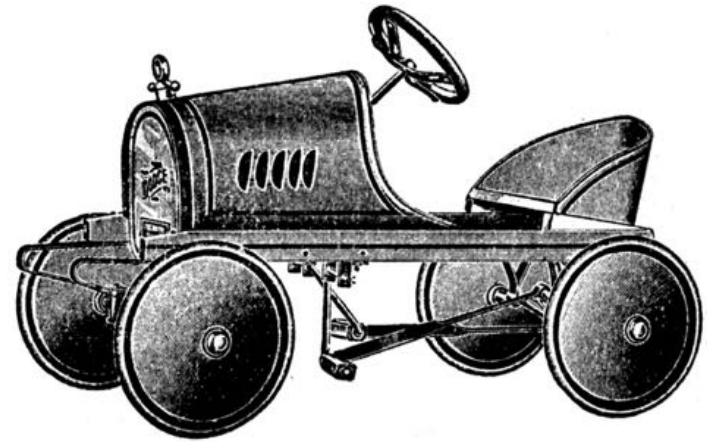


# Imagine if...

## ➤ Finding Opportunity

In what ways can your object or system be made to be more...

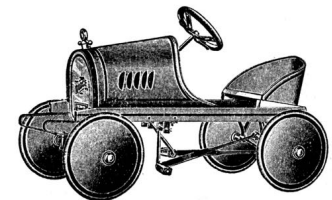
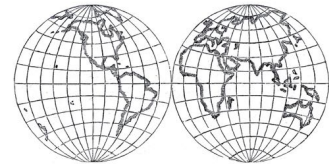
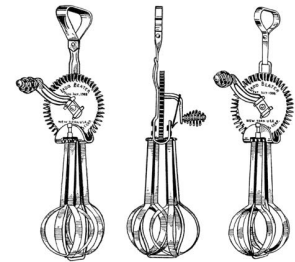
- More effective?
- More efficient?
- More ethical?
- More beautiful?



# Thinking Routines

To foster capacities and build dispositions:

- Parts, Purposes, Complexities
- Parts, People, Interactions
- Think, Feel, Care
- Imagine If...



# DESIGN THINKING @ THE NUEVA SCHOOL

By using the design thinking process, students can learn to solve problems in a creative and innovative way. The process helps them to think outside the box and find solutions to their problems. It is a process that can be used in many different ways and is a key part of the design thinking process.

## MONITOR TEAM DYNAMICS (DELL)

Monitor team dynamics to ensure that all team members are contributing equally and that the team is working effectively together. This involves observing the team's interactions and providing feedback as needed.

## MOTIVATE & INSPIRE

Motivate and inspire team members by providing them with a clear vision of the project and by encouraging them to think creatively and to take ownership of their work. This involves providing support and encouragement throughout the process.

## PROJECT MANAGEMENT

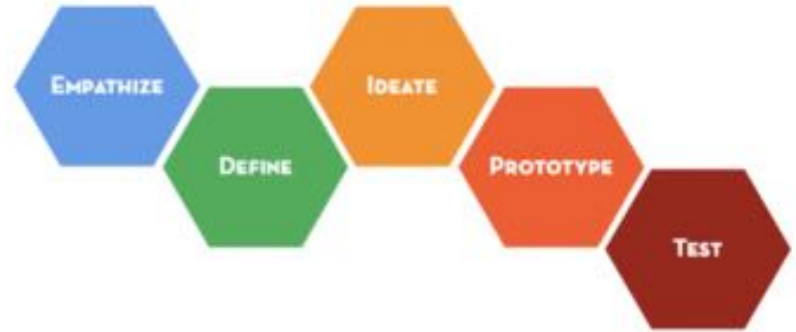
Manage the project effectively by setting clear goals, timelines, and responsibilities. This involves regular communication and collaboration with team members to ensure that the project is on track and that all team members are contributing equally.

## INCORPORATE FEEDBACK

Incorporate feedback from team members and stakeholders to improve the design and to ensure that the final product meets the needs of the users. This involves listening to feedback and making changes as needed.

## SEEK FEEDBACK

Seek feedback from team members and stakeholders to improve the design and to ensure that the final product meets the needs of the users. This involves listening to feedback and making changes as needed.



# Design thinking

is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success.

—Tim Brown, president and CEO

