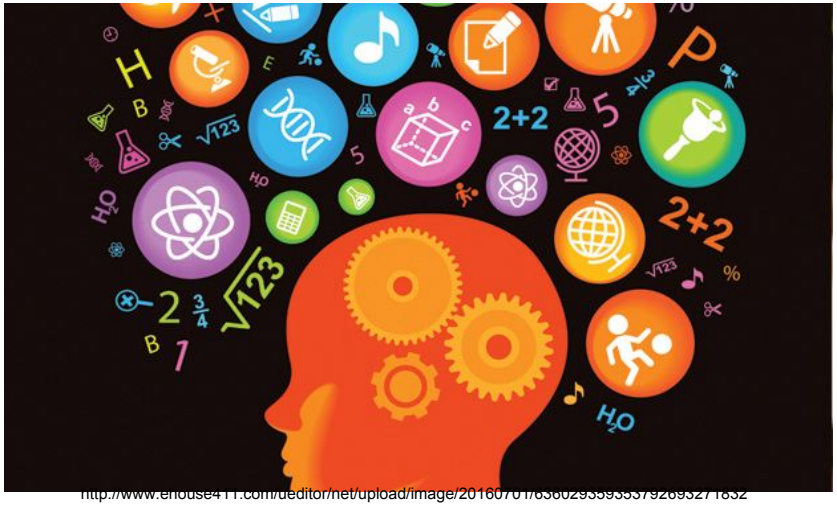


http://www.enouse411.com/ueditor/net/upload/image/20160701/6360293593533792693271832
2.jpg

# Creating a Maker-Space Mentality: Playing to a Deeper Thinking

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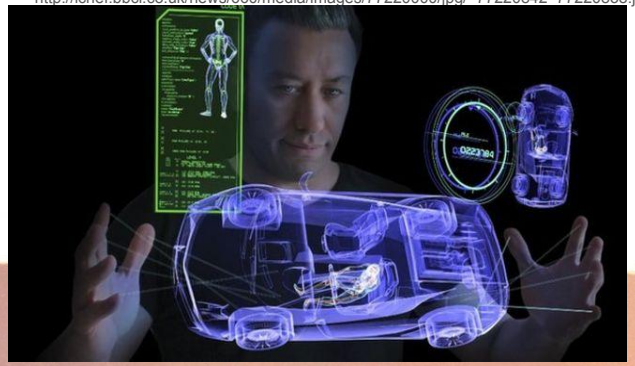
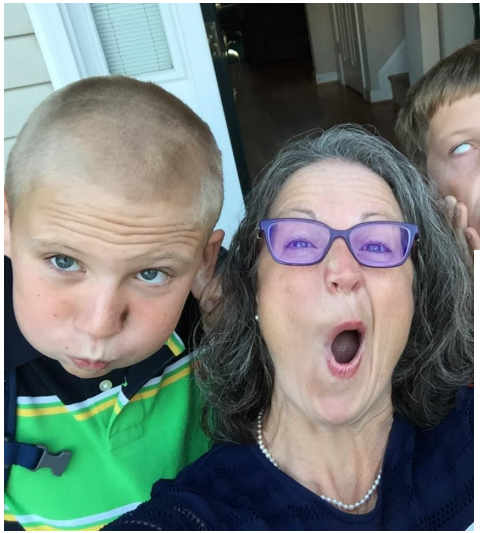
NCTM Conference
April 5-8, 2017

# Introductions

http://ichef.bbci.co.uk/news/660/media/images/77220000/jpg/_77220842_77220838.jpg



http://home.howstuffworks.com/washer.htm

## First Thoughts?

Mean, Median, Mode with cards

Spaghetti Art

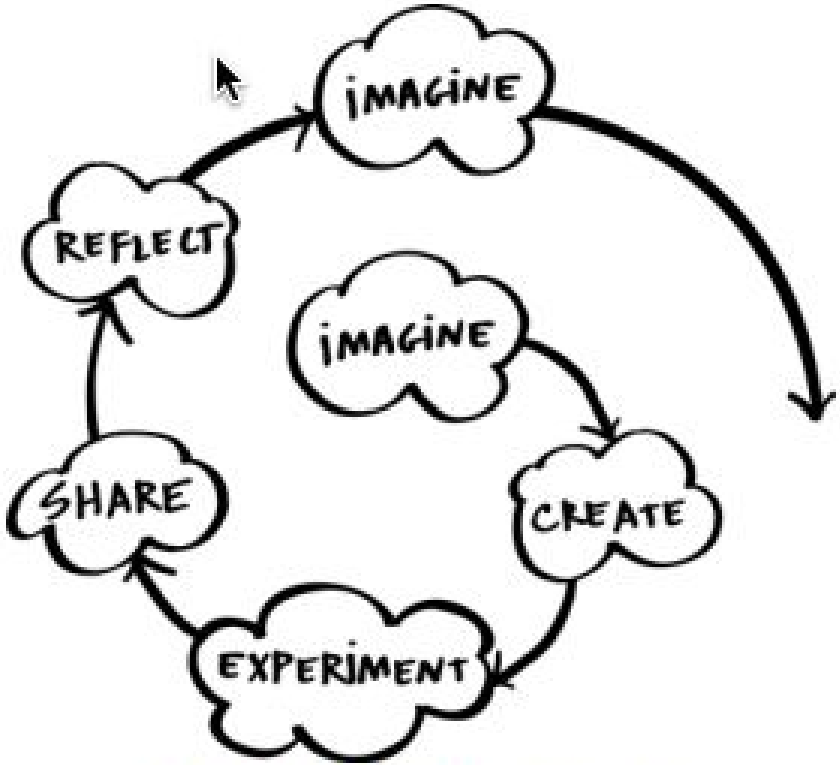
Tongue Rolling Sticky Notes

Play Dough Modeling

http://kidstoystalk.com/wp-content/uploads/2015/09/kidkraft-backyard-sandbox.j

Mentality

# Goal of Maker-Space ⬆Design Thinking

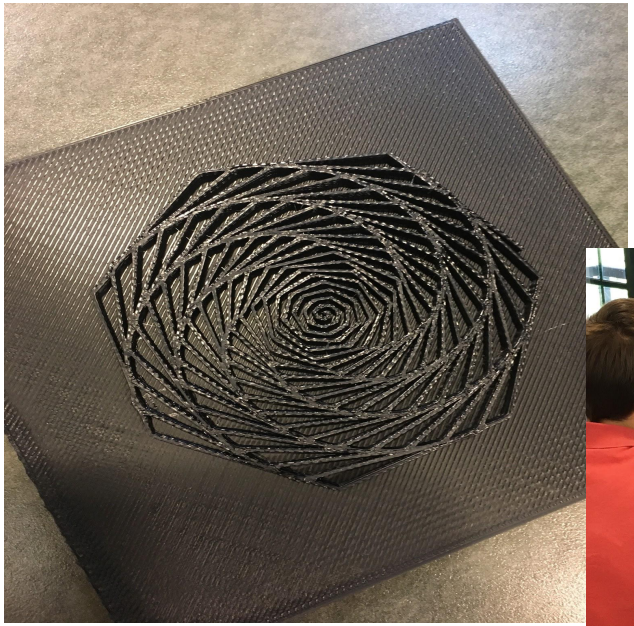


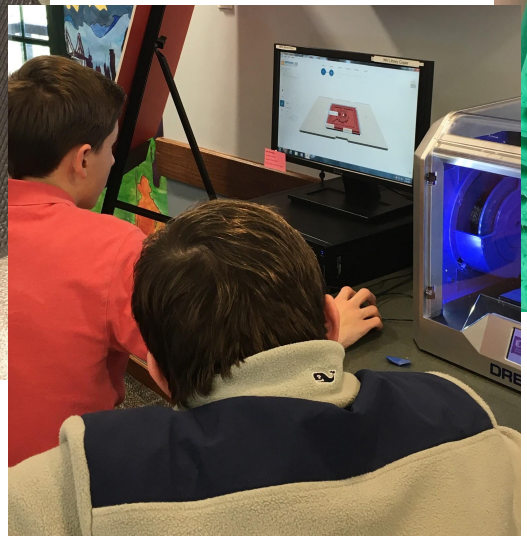

Lifelong Kindergarten Group, MIT Media Lab

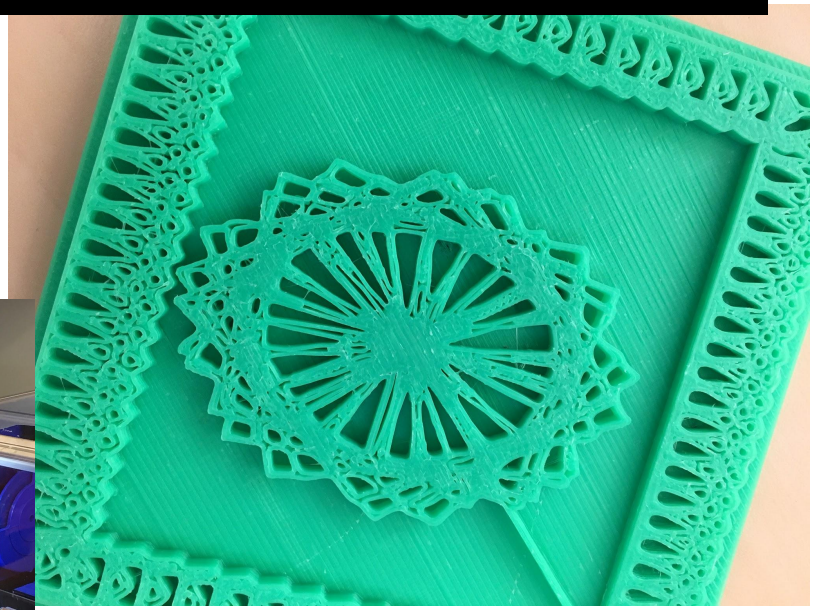


We created space to play by...
...using makey-makeys to power voter boxes (Statistics)

# We created space to play by...
## … using Scratch 2.0 and 3D printing (geometry)

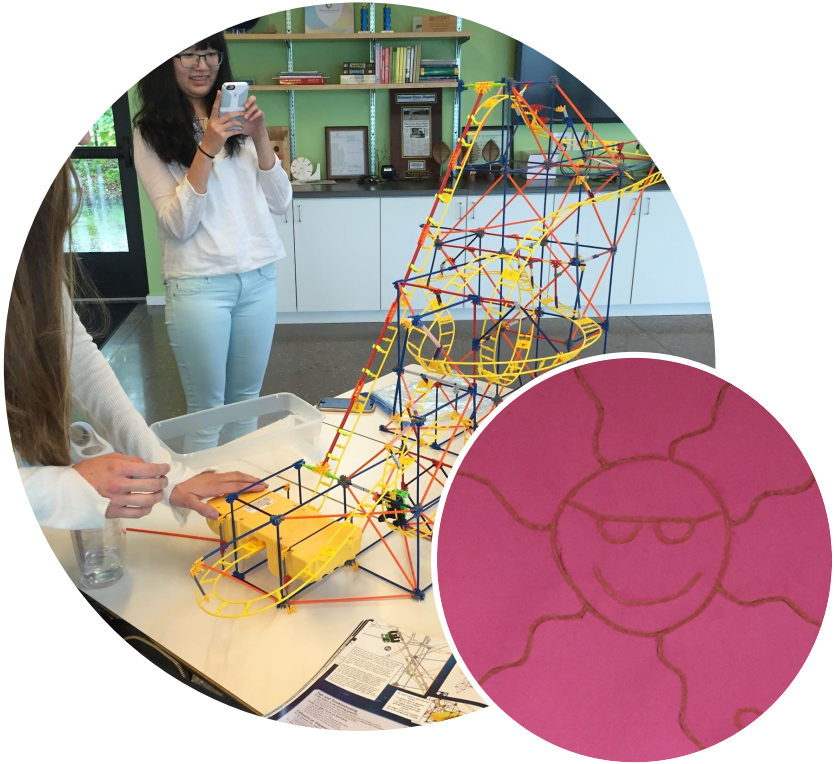


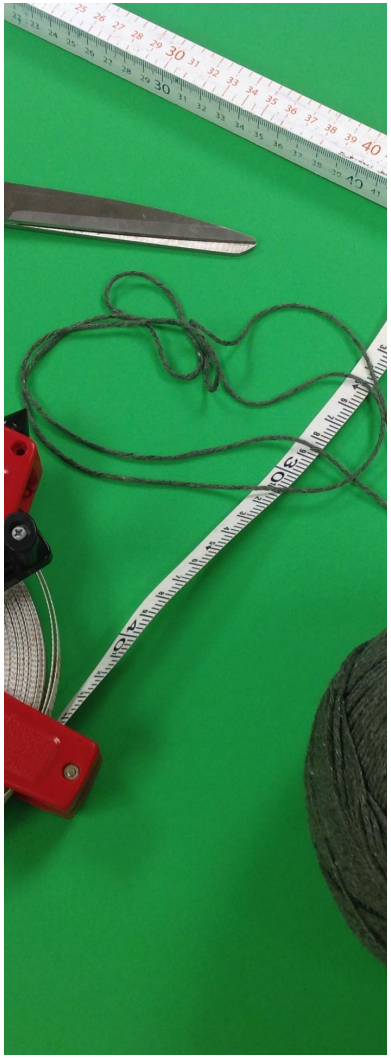


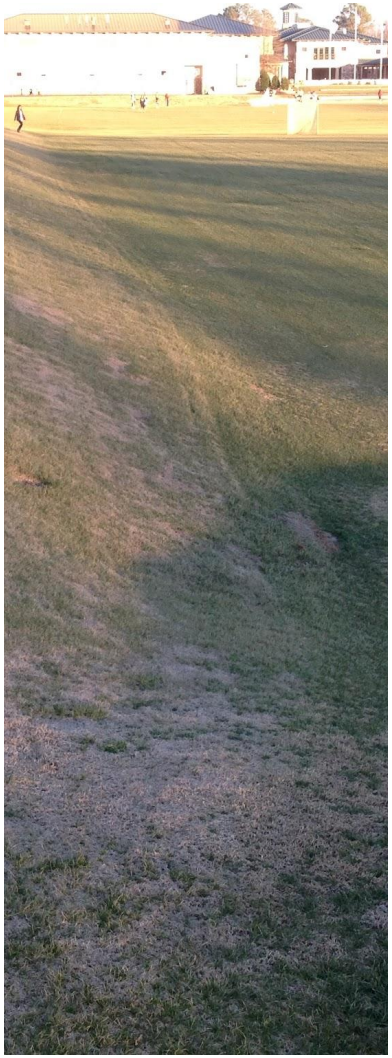


We created space to play by...

… Roller Coaster Projects (NCTM journal) and Spaghetti Art (Calculus)







We created space to play by...

… Measuring Slope (Algebra 1)

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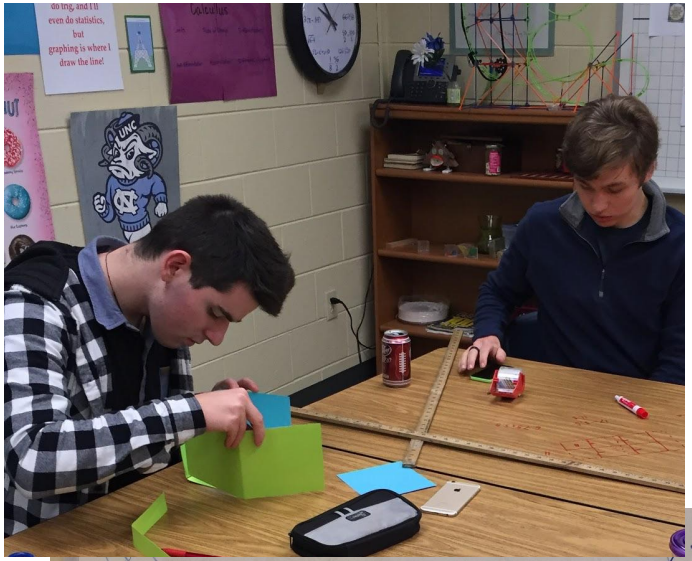
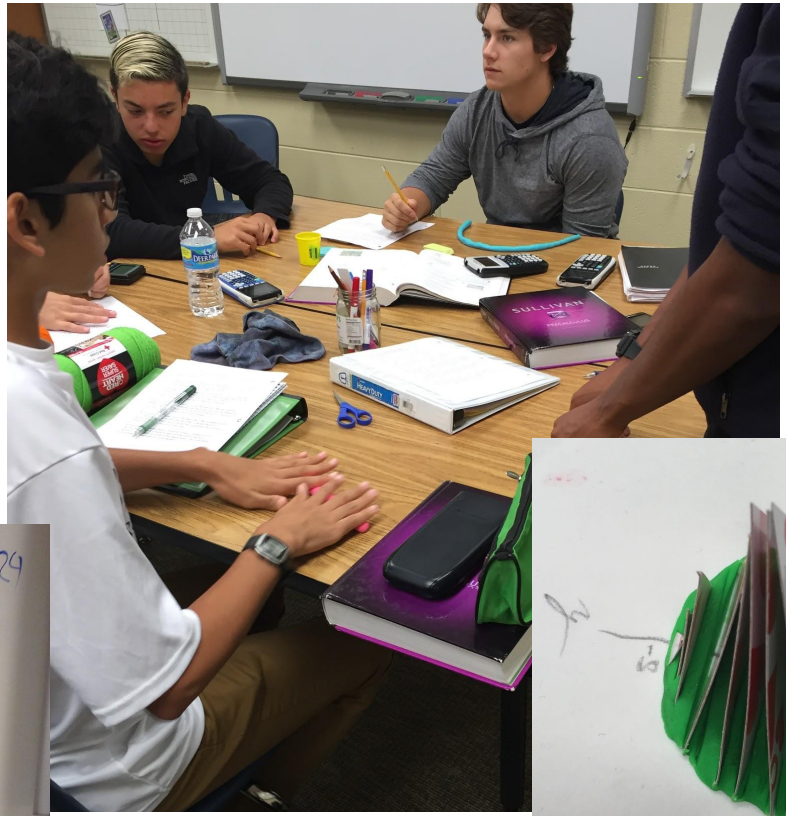
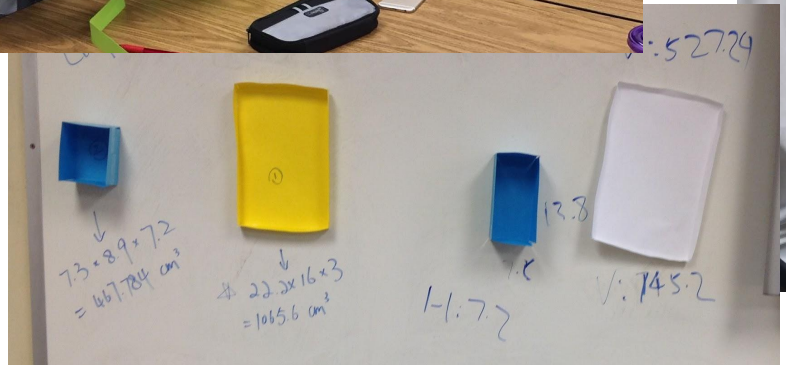
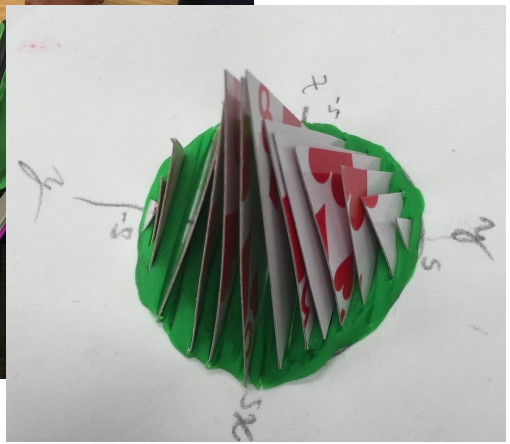
# We created space to play by...

## ...modeling with paper and play dough (Algebra 2, Precal, and Calculus)



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We created space to play by...
… building a ramp in the neighborhood (Algebra 1 & 2)

# Intermediate Thoughts?

# What can you do?

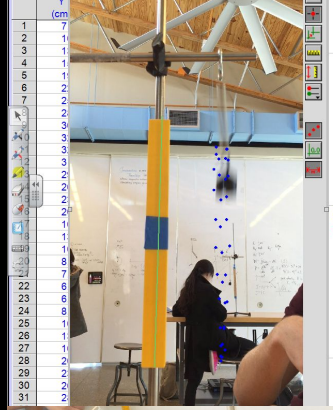
(function activity, sticky note histograms, unit circle cake walk)

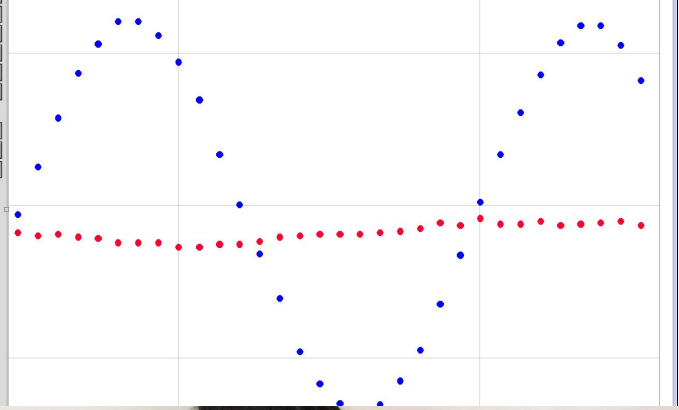
We created space to play by...

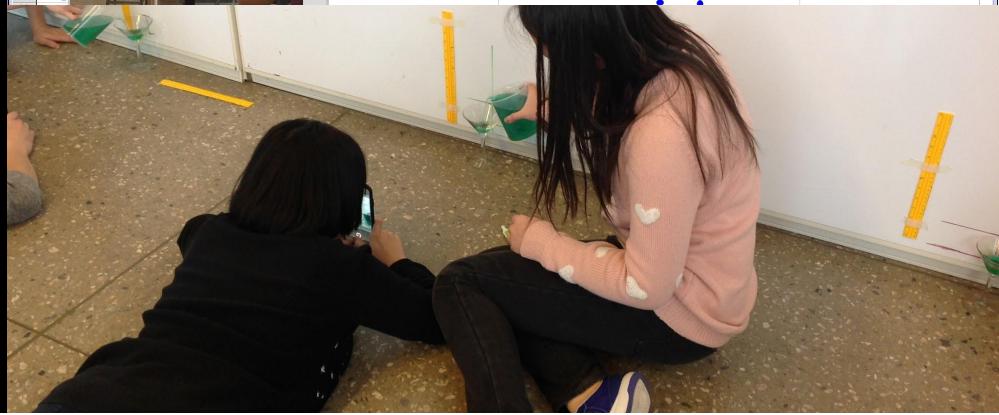
… creating our own data

(Statistics)

We created space to play by...
… creating our own data (precalculus, calculus)





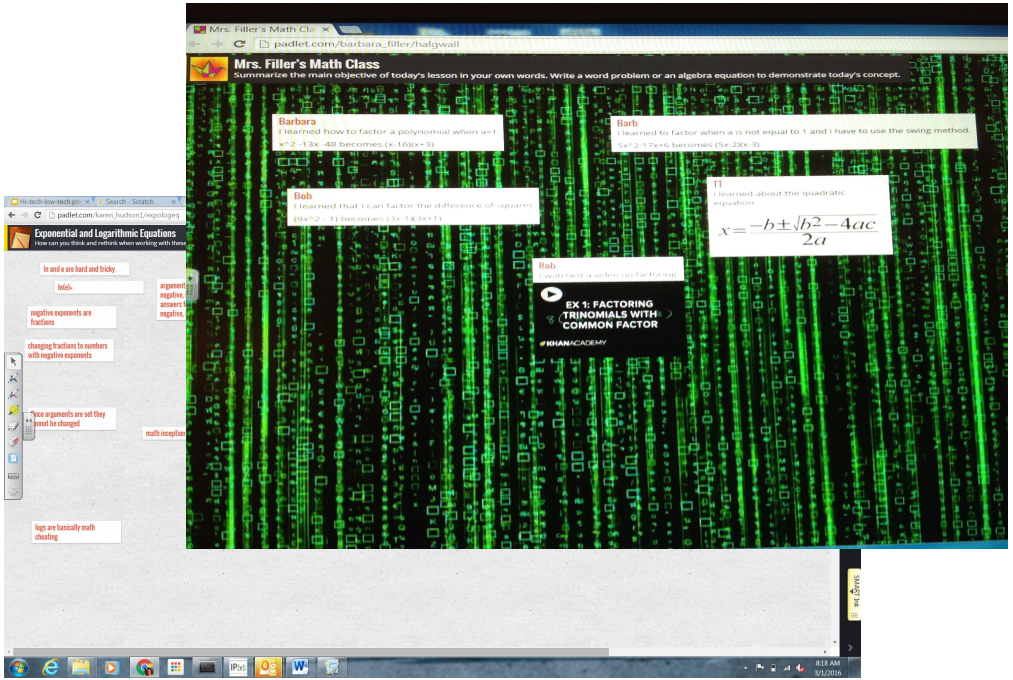


Logger Pro and Video Physics

# We created space to play by...
# … incorporating games and activities

Statistics Carnival

We created space to play through...
… technology like Padlet and VideoNot.es (flip classroom)


# VideoNot.es

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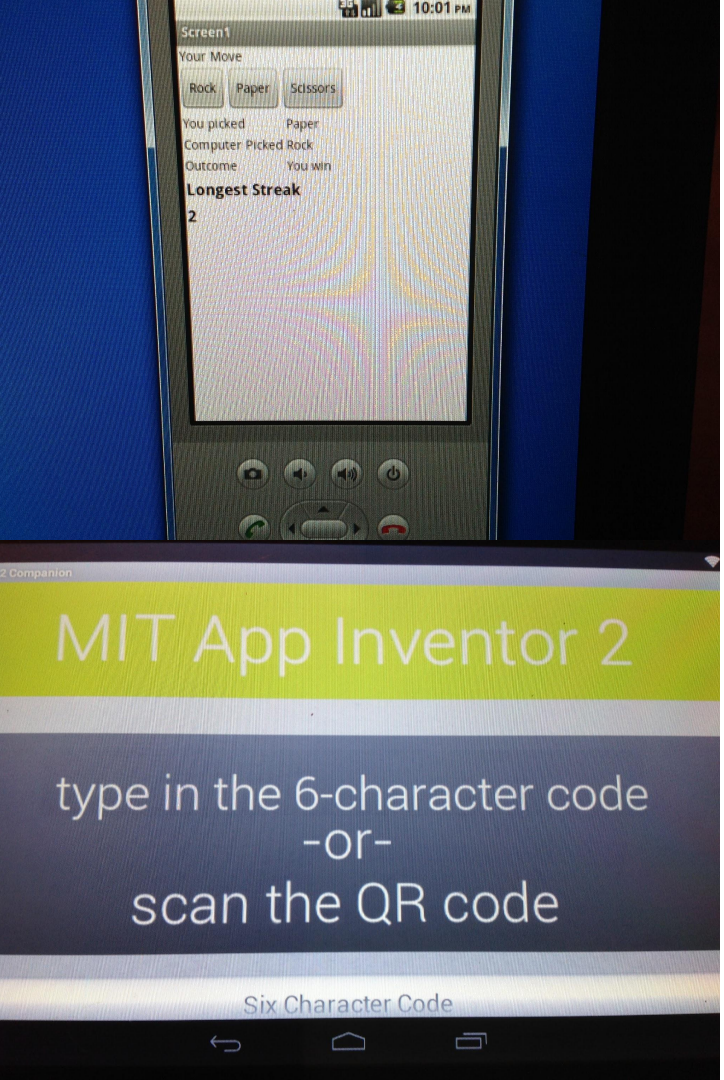
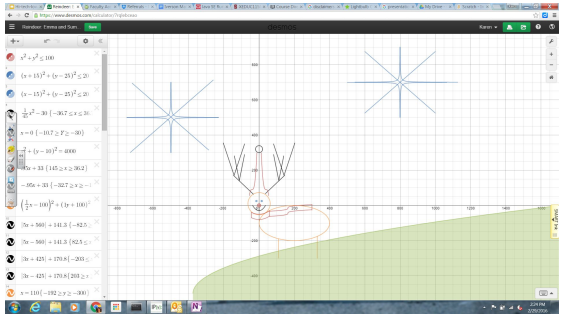
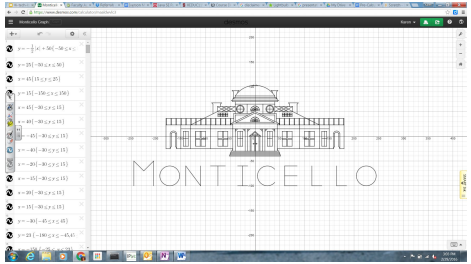



We created space to play through...

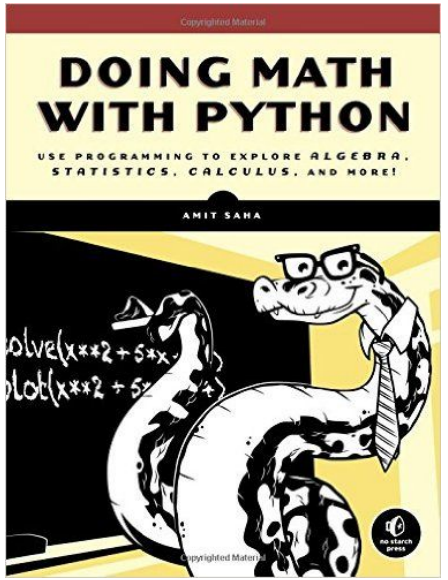
… technology like MIT App Inventor

# We created space to play through...
# … technology like Desmos, Scratch, and Python (function family graphing, creating surveys, geometry projects, quadratics coding challenge)









# Connections to curriculum objectives:

## Common Core goals of Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

# Questions

# Resources

**Makey-Makey resources:** http://www.makeymakey.com/

**Scratch Programming:** https://scratch.mit.edu/

**VideoNot.es:** http://www.videonot.es/

**Padlet used for collaboration:** https://padlet.com/

**Logger Pro® : Vernier Software & Technology**: www.vernier.com

**MIT App Inventor:** http://appinventor.mit.edu/explore/

**Rock, Paper, Scissors tutorial:** https://awoodbridge.wikispaces.com/file/view/AND.RPS+Update.pdf

**American Statistics Association - resources for educators:** http://www.amstat.org/education/stew/index.cfm

**Codecademy:Learn to code:** https://www.codecademy.com/

**Python Monkey Lords:** https://www.youtube.com/watch?v=RC5GeZIOZaU&list=PL7B50A021C2B4B28E

# More resources:

Physics/math lesson http://makeymakey.com/lessons/distance-rate-time-lesson/

Word problem posters http://makeymakey.com/lessons/interactive-word-problem-lesson/

Colleen Graves maker space resources and programming ideas
https://colleengraves.org/makerspace-resources-and-programming-ideas/

3-d Printing https://www.simonsfoundation.org/multimedia/3-d-printing-of-mathematical-models/

MakerSpace for Education http://www.makerspaceforeducation.com/makey-makey.html

MakerSpace Playbook http://makered.org/wp-content/uploads/2014/09/Makerspace-Playbook-Feb-2013.pdf

It Looks Like Fun, But Are They Learning?
https://www.exploratorium.edu/sites/default/files/pdfs/PetrichWilkinsonBevan-2013-ItLooksLikeFun.pdf

Learning Through STEM-Rich Tinkering: Findings From a Jointly Negotiated Research Project Taken Up in Practice
http://onlinelibrary.wiley.com/store/10.1002/sce.21151/asset/sce21151.pdf;jsessionid=9715020372A82461DC59DD7EE5B1729C.f03t04?v=1&t=izhrzrno&s=9e7d824b69012df7747ff5a052bdfef881211a41

Social Learning Theory and Developmental Psychology: The Legacies of Robert Sears and Albert Bandura
http://psy.cmu.edu/~siegler/35grusec92.pdf

Maker Mindset: Dale Dougherty https://llk.media.mit.edu/courses/readings/maker-mindset.pdf

# Even more resources

**Blogs we've found helpful so far:**

- Square Root Of Negative One Teach Math
- Continuous Everywhere But Differentiable Nowhere

**Books:**

- Functions Into Practice 9-12 (NCTM)
- Doing Math With Python by Amit Saha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