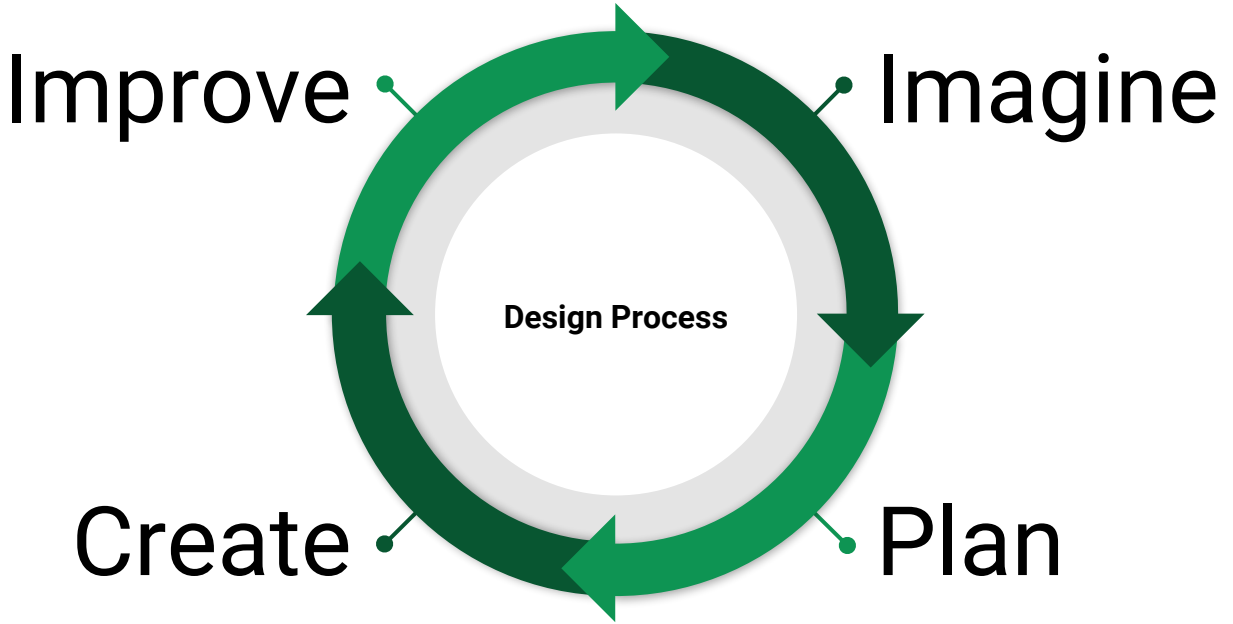
Participation in STEAM activities and grit proficiency

Steven Edward Gross

“STEAM is an acronym for a growing movement that explores science, technology, engineering, art and math in public education.” -The Congressional STEAM Caucus, 2013.

“STEAM curriculum-making behaves like the classic railroad switching station of yesteryear.” -James Rollings Jr. (Art Education, Nov 2016)

Design process focused STEAM projects

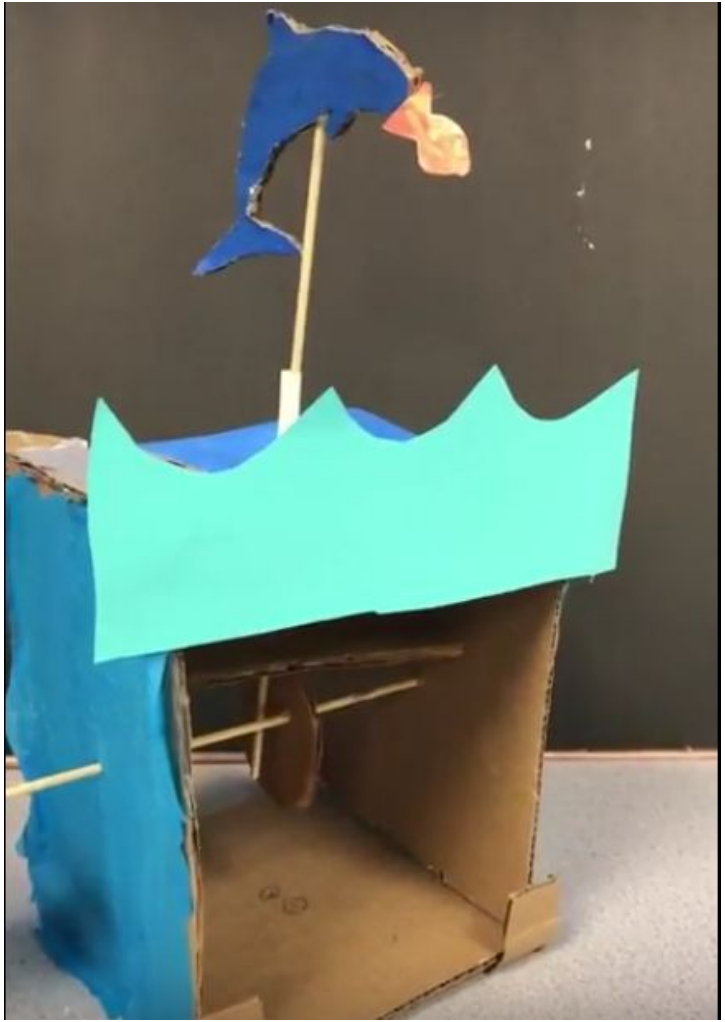


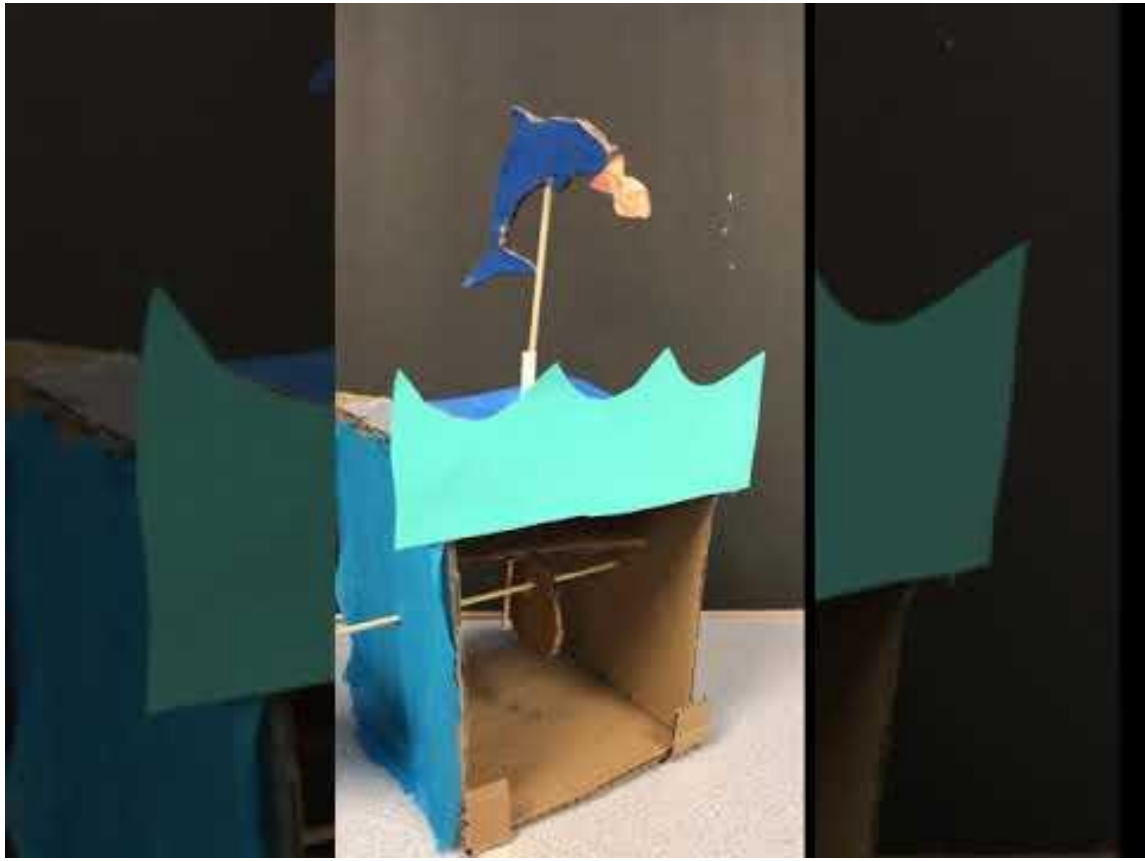
“Students gather information from sources and take into consideration their failures along with feedback from presentations to further refine their project. It is the reciprocity between student and materials, along with fellow students and teachers in the class, which help students to construct understanding.” (Gross & Gross)

Stop motion

Catapult creation and competition

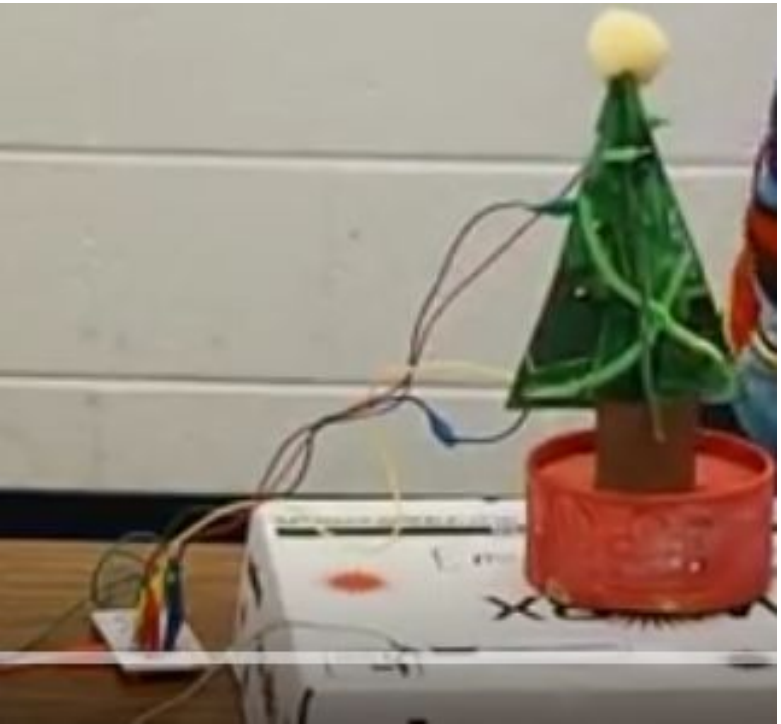
Student Created Game involving circuitry and Scratch programming language





Cardboard Automata

Interactive Sculptures incorporating circuitry and scratch programming language



What are the outcomes of STEAM club?

- Specific content knowledge
  - Circuitry
  - Introduction to coding
  - Working with tools
  - Some CC math, CC ela, NGS, and ISTE standards
- What does our emphasis on the design process teach kids? Preserverance

"To me, the most shocking thing about grit is how little about we know, how little science knows about building it...We need to take our best ideas, our strongest intuitions, and we need to test them. We need to measure whether we've been successful, and we have to be willing to fail, to be wrong, to start over again with lessons learned. In other words, we need to be gritty about getting our kids grittier."

https://www.ted.com/talks/angela_lee_duckworth_grit_the_power_of_passion_and_perseverance/transcript?language=en#t-244297

4:09, 5:29

This quote demonstrates that Angela Duckworth believes grit is malleable.

The research in this study suggests that kids can learn grit. It's possible that this research has found a strategy about how grit can be learned.

Angela Duckworth Grit Scale

(Child Adapted Version 4)

8 question survey
1-5 points per question
Answers range from:

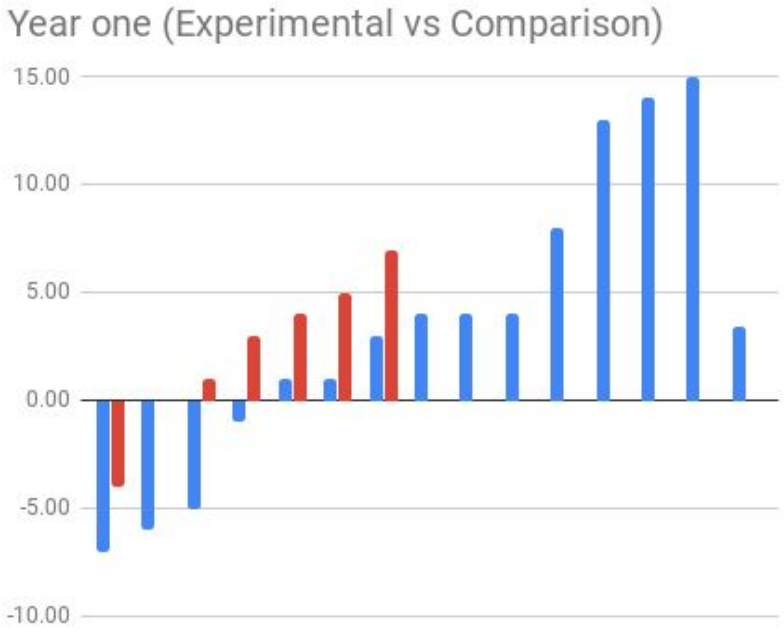
"very much like me" to "not like me at all."

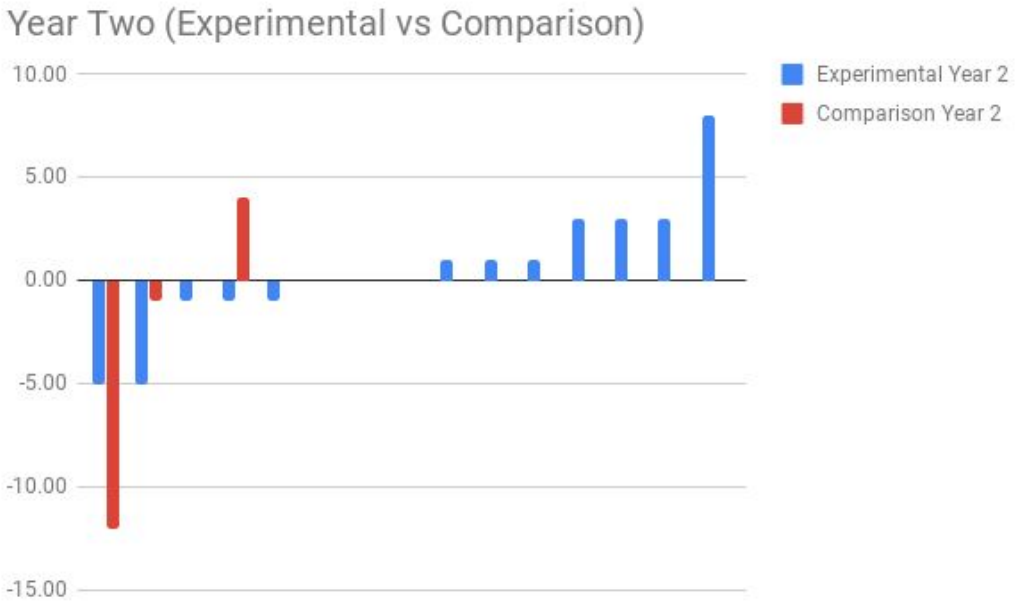
Study spans 2 school years

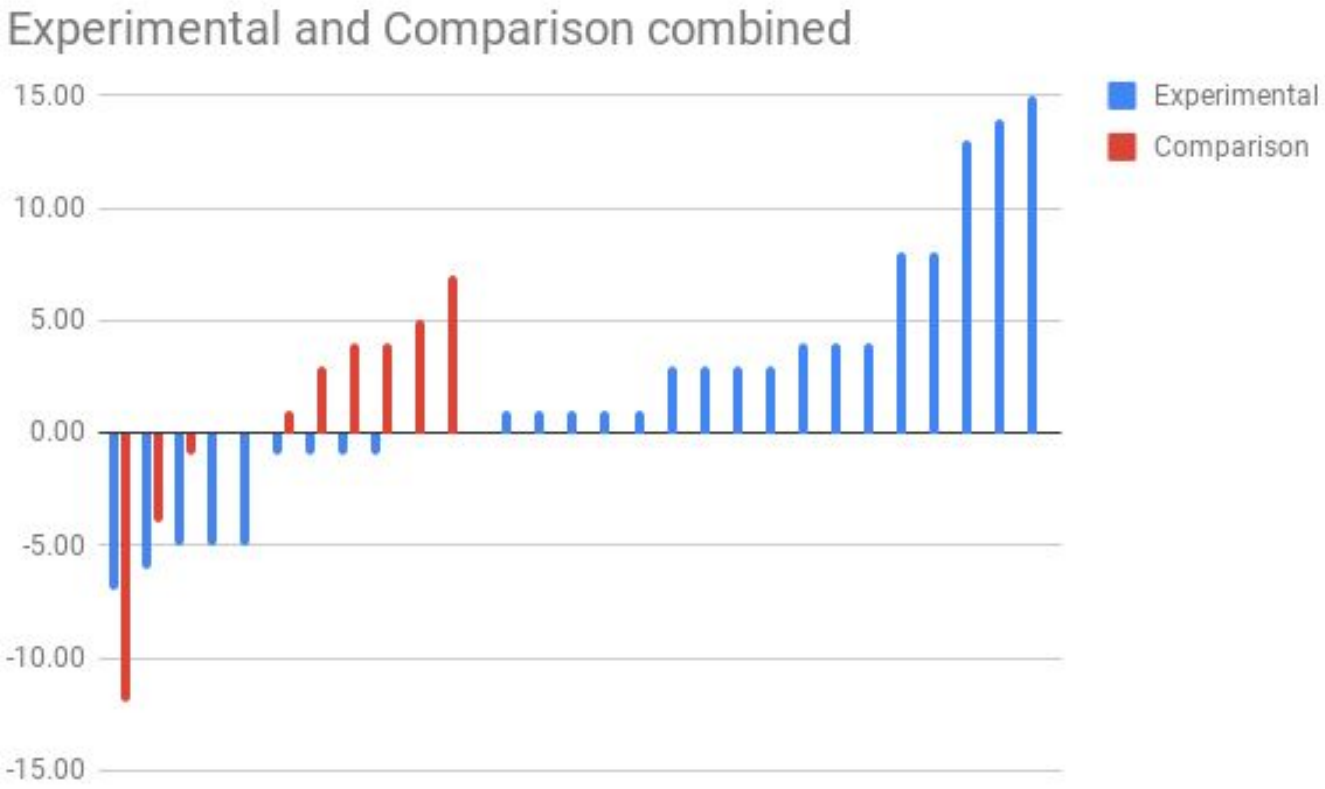
(2016-2017) (2017-2018)

2016-2017		2017-2018
14 experimental participants		15 experimental participants
7 comparative participants		4 comparative participants

2016-2017	2017-2018	overall
Experimental group mean change:+3.43	Experimental group mean change:+.47	Experimental group mean change:+1.90
Comparison group mean change: +2.29	Comparison group mean change: -2.25	Comparison group mean change: +.64
Experimental increased +1.14 more than comparison group.	Experimental increase +2.72 more than comparison group.	Experimental increase +1.26 more than comparison group.


Year one (Experimental vs Comparison)
15.00
10.00
5.00
0.00
-5.00
-10.00
Experimental Year 1
Comparison Year 1


Year Two (Experimental vs Comparison)
10.00
5.00
0.00
-5.00
-10.00
-15.00
Experimental Year 2
Comparison Year 2


Experimental and Comparison combined
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
Experimental
Comparison

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
PrePostDifference	Equal variances assumed	.104	.749	.650	38
	Equal variances not assumed			.669	19.199
Q1DifferenceFinal	Equal variances assumed	1.599	.214	-.914	38
	Equal variances not assumed			-.855	16.039
Q2DifferenceFinal	Equal variances assumed	.102	.751	1.596	38
	Equal variances not assumed			1.554	17.195
Q3DifferenceFinal	Equal variances assumed	3.552	.067	1.773	38
	Equal variances not assumed			2.130	27.572
Q4DifferenceFinal	Equal variances assumed	1.369	.249	.452	38
	Equal variances not assumed			.504	22.918
Q5DifferenceFinal	Equal variances assumed	1.574	.217	-.317	38
	Equal variances not assumed			-.369	25.544
Q6DifferenceFinal	Equal variances assumed	.002	.967	-.338	38
	Equal variances not assumed			-.357	20.260
Q7DifferenceFinal	Equal variances assumed	.000	.986	.109	38
	Equal variances not assumed			.101	15.943
Q8DifferenceFinal	Equal variances assumed	.094	.761	-.242	38
	Equal variances not assumed			-.259	21.007

YEAR:	Number of projects:
14-15	5
15-16	4
16-17	3
17-18	2

STEAM Club is not burdened by required curriculum. We slowed way down to allow students to complete their own projects

Questions?

Steven Edward Gross

- B.A. History, Education- Coe College
- M.S.E.D Instructional Technology- Northern Illinois University
- PMP, Project Management Institute
- HS classroom teacher in NW Iowa and New York City
- Teach for America staff member in New Orleans
- Director of Data for charter school group
- Decade + experience consulting with 400+ school districts on technology
- Founder of The Rubber Band Project - www.rubberbandproject.org
- Slides and paper: www.rubberbandproject.org/mwera