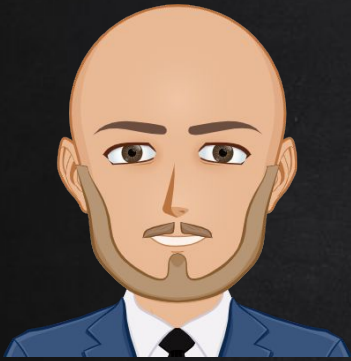


MAKING SPACE FOR INNOVATION



Todd Martin
Columbus Academy
2019





WHO IS THIS GUY?

ISACS Presenter – 2013, 2015
OTEC Presenter – 2011, 2014

Todd Martin

Technology Integration Specialist/ Makerspace Director

Middle School Science Teacher 16 years

@toddmartin4

martint@columbusacademy.org



Apple Teacher

LEVEL 2

CERTIFIED
Educator

Google for Education



“You do have to try, learn, and improve. You do have to put yourself out there and risk failure. But in this new world, you don’t have to go bankrupt if you fail because you can fail small. You can innovate as a hobby. Imagine that: a nation of innovation hobbyists working to make their lives more meaningful and the world a better place. Welcome to the maker revolution.” —

Mark Hatch, *The Maker Movement*





231
Acres

1086
Students
(3YO – 12th Grade)

This is our campus. It is also a classroom, an innovation center and a makerspace

@ColumbusAcademy

@CAVikesSteam

www.columbusacademy.org





OUR STORY OF INNOVATION

- 7th grade to 4 -12 iPad,
- Grade level laptop carts
- BYOD Policy in MS/US
- Apple TV, Apple Pencils
- Google Education Suite



School managed devices
Faculty are administrators of their devices
Generous App and software support



OUR STORY OF INNOVATION

MS Makerspace added 2015
US Makerspace 2017
LS Tech/Makerspace 2018

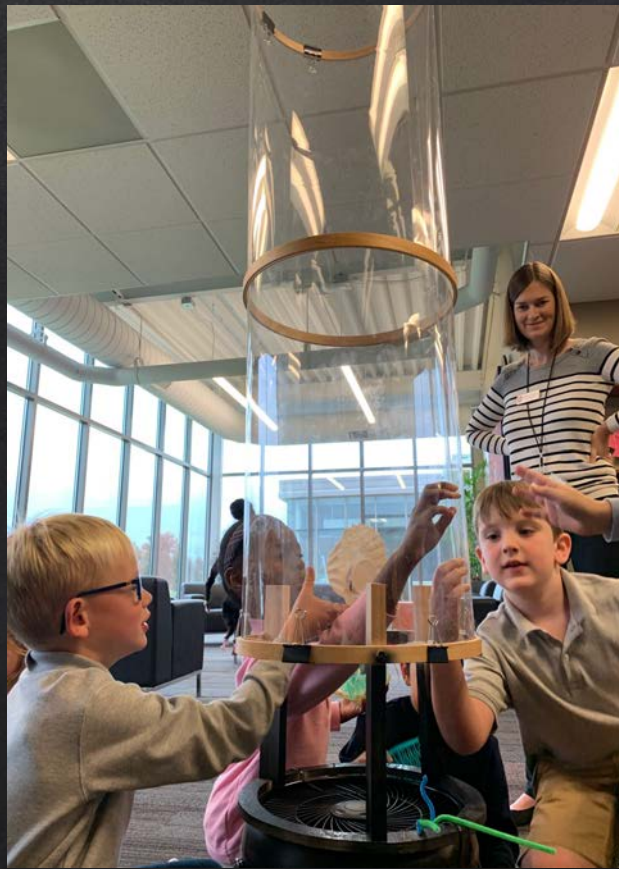


Created and renovate large open spaces with natural light
3D printing, Science Olympiad, Robotics club
Extension of the science lab, no oversight or constant faculty management
Innovations Fairs for faculty and students

TECHNOLOGY DEPARTMENT STAFFING



- Director and Assistant Director of Technology
- Computer systems and Desktop Support
- Technology Integration Specialist (Me)
- Makerspace Coordinator (K -12) (Me)
- 6 Librarians (2 per division)
- MS/LS Technology Coordinators Teachers
- MS STEAM Teacher (PT)
- 3 US Computer Science Teachers

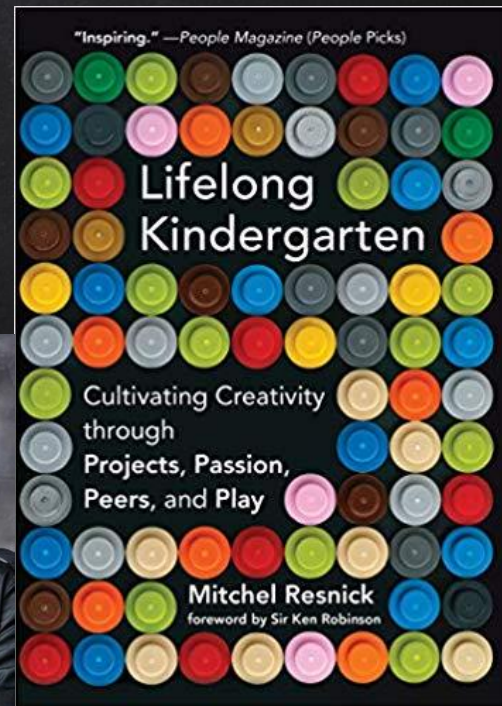
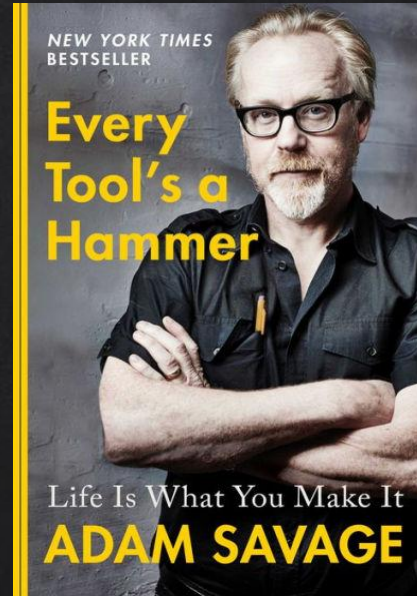
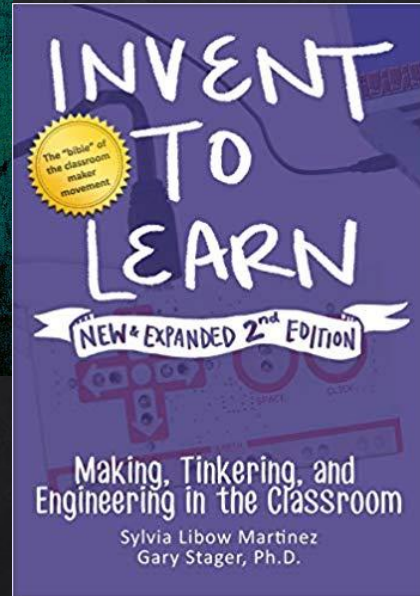


Interactive Hallways

I THINK.
I QUESTION.
I DESIGN.
I CREATE.
I STRUGGLE.
I COLLABORATE.
I TRY.
I SOLVE.
I INVENT.
I REFLECT.
I LEARN.

VENSPIRED.COM

MAKING LIFELONG LEARNERS



MS Makerspace/Library





Crane Outdoor Learning Center and Forest Fridays

In which areas does your school/department shine?



Where do you have opportunities for growth?





TURNING THE SHIP

CA is high achieving, somewhat traditional school that made a conscious decision to fully incorporate innovative curriculum to better educate 21 century learners

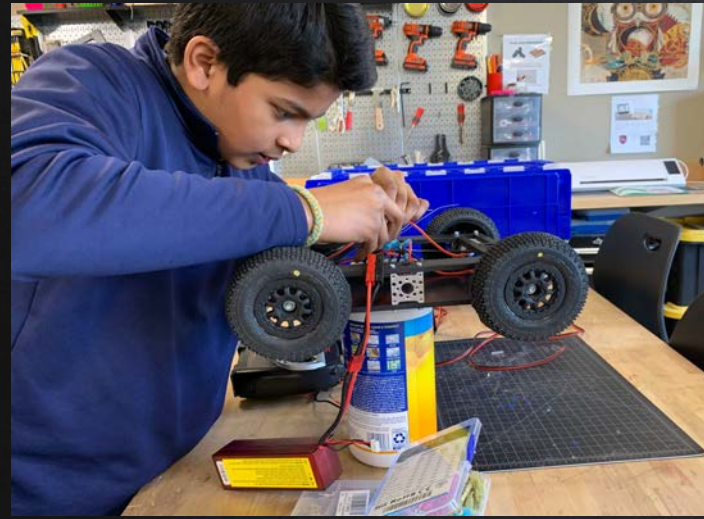
Benchmarks for change

- Supportive Leadership and Trustees
- Vision 2015 iPads, full technology integration
- Vision 2020 - bigger tools, makerspaces and curriculum alignment
- Dedicated Funding and PD for faculty and students

Strategic Vision

Columbus Academy's Strategic Vision is to imbue Columbus Academy's excellent academic tradition with critical thinking, creativity and reflection by pursuing these strategic goals:

- **Curricular Innovation:** Innovating the way we teach, learn and play while reasserting Columbus Academy's most sound programs both inside and outside our classes.
- **Ethics and Character Formation:** Elevating students' insight into difference, ethics and character formation through reflective discovery about self and others and active implementation of cultural competencies.
- **Student Flourishing:** Honoring the way our students achieve and flourish by emphasizing determination, creativity, sense of play and iteration as important and healthy components of their success.
- **Service Learning:** Fostering compassion, respect and moral courage through the intentional practice of sustained service work beyond the school's walls.
- **Campus as a Living Classroom:** Instilling a sense of stewardship and wonder of our campus as a living classroom.

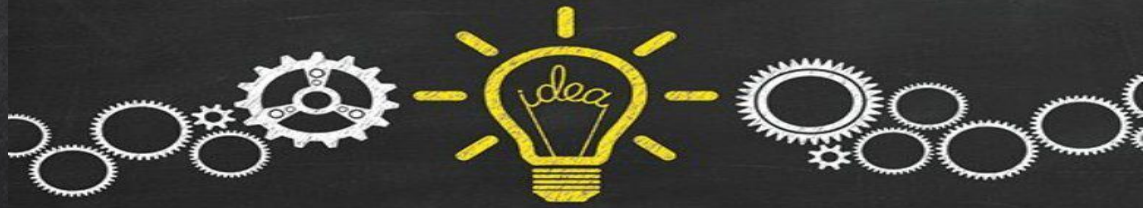


Questworks

Student Innovation Grant Program



MILT TAYLOR INNOVATION GRANTS



- Mathematical Modelling Tasks for US Courses
 - Develop Theater Stage and Movement Course
 - Develop STEAM and Engineering curriculum in the MS
 - 11th Grade US History / Science Collaboration
 - Redesign the H. Comp Sci course
 - Develop skill with several Makerspace tools
 - Garden and Greenhouse Activity Planning
 - 3D Printer integration
 - 5th Grade Social Studies Redesign
 - Design a new Physics 2 (Electronics and Sensors) Course
- Rolling enrollment
 - Stipend varies by project
 - Present to the full faculty

US Makerspace



Location, size and logistics are not ideal...



THE STRUGGLES ARE REAL...

Training/Personnel

- Tools, software and skills are changing quickly
- Staffing - who does what?
- When does PD happen

Scheduling and content

- Where does innovation fit?
- 3 Divisions with different schedules
- Meeting Curriculum standards
- "Too much on the plate"

Budget, management

- How are supplies acquired?
- Operating Budget - who pays?
- Consumables - needed or wasteful?
- Storage, inventory, safety

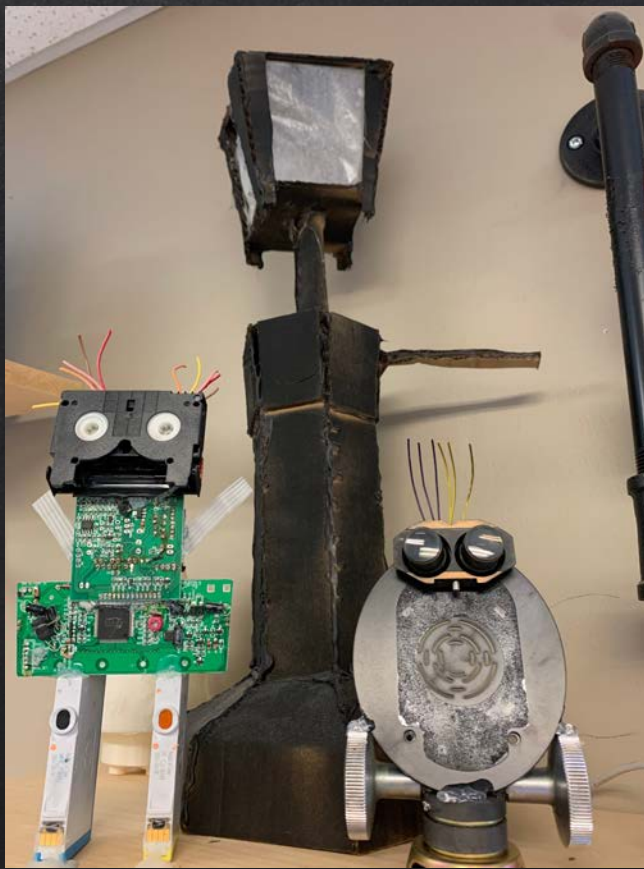


DEDICATED DESIGN AND TECH TIME



iDesign:
8th grade material
engineering





STEAM - 7th and 8th grade - problem solving



Coding 6th - 8th grade Allied

WHAT ARE 21ST CENTURY SKILLS? THESE 4 C's:

C

COMMUNICATION

Sharing thoughts,
questions, ideas &
solutions

C

COLLABORATION

Working together to
reach a goal. Putting
talent, expertise,
and smarts to work

C

CRITICAL
THINKING

Looking at problems in
a new way and linking
learning across
subjects & disciplines

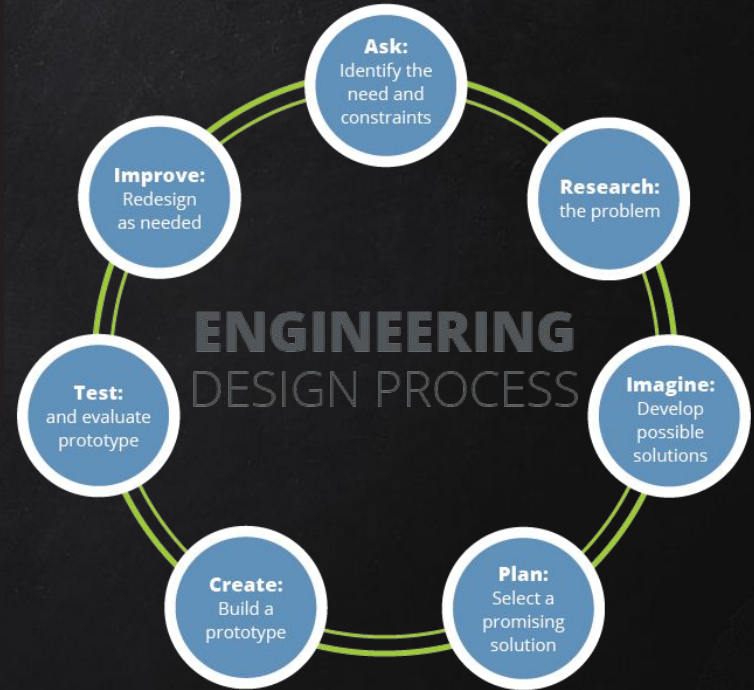
C

CREATIVITY

Trying new approaches
to get things done equals
innovation & invention

Making creates community

Making should be “siloeed”





More opportunities for female engagement in math and science



EQUITY AND INCLUSION

Provide projects that meet students where they are.. Allow them to make items of personal importance



Offer tools that level the playing field, and spaces and resources that allows students to create, try new things and learn from each other.

EMPATHY



GIVING

MEMORY BEARS



Adding open ended exploration

Art Projects - Cigar Box Guitar
Genius Hours - 3rd grade
Project Discover - 8th grade
Senior Projects - 12th grade

The ship became student driven....



THE SCHEDULE

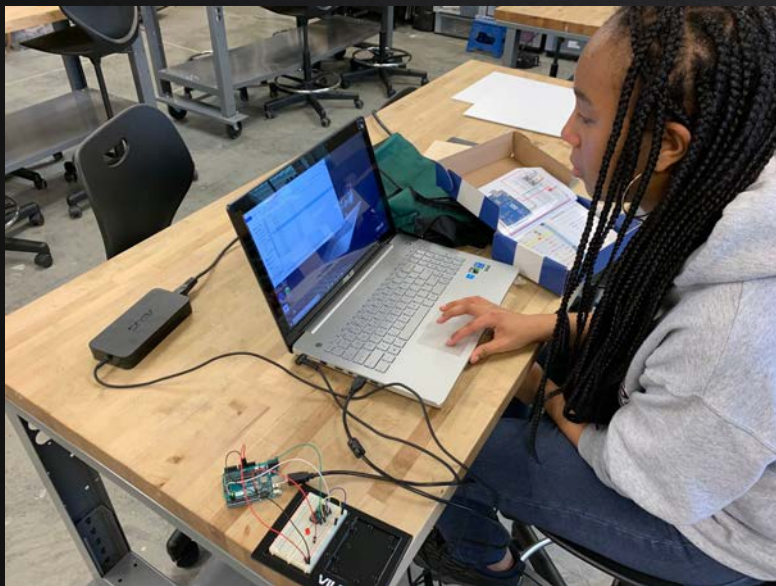
Middle School 8th Grade											
A Day				B Day				C Day			
8:05-9:10	1st Period	C211		8:05-9:10	1st Period	B105		8:05-9:10	1st Period	C211	
Lang. Art 1		M. Belcher		Art		P. Menu		Lang. Art 1		A. Seymore	
Algebra 1		C210		Creat. Exp.		E204		Algebra 3		C210	
Science 1		C214		R. Oglio		C110		Science 3-1		C214	
Spanish 1		C208		B. Romo		C218		Science 3-2		A223 US	
Soc. St. 1		C213		L. Miller		C218		Soc. St. 3		C213	
								Chinese 3		C112	
8:15-9:45 Class Meeting/DENIS				8:15-9:45 Advisory				8:15-9:45 Activity			
8:50-10:50	2nd Period	C211		8:50-10:50	2nd Period	C211		8:50-10:50	2nd Period	C211	
Lang. Art 2-1		A. Seymore		Lang. Art 5		A. Seymore		Lang. Art 2-1		A. Seymore	
Geometry 2		C214		Geometry 5		C208		Science 4		C214	
Rec. St. 2		C213		Science 5		C214		Soc. St. 4-1		C208	
Geometry 2		C208		Chinese 5		C112		Rec. St. 5		C213	
Latin 2		C202		Algebra 5		C210		Spanish 2		C208	
Spanish 2		C208									
10:55-11:55	3rd Period	C211		10:55-11:55	3rd Period	C211		10:55-11:55	3rd Period	C211	
Lang. Art 3		A. Seymore		Lang. Art 2-1		A. Seymore		Lang. Art 3		A. Seymore	
Algebra 3		C210		Lang. Art 2-2		C214		Algebra 3		C210	
Science 3-1		C214		Science 2		C214		Science 3-1		C214	
Science 3-2		A223 US		Soc. St. 2		C213		Science 3-2		A223 US	
Soc. St. 3		C213		Geometry 2		C208		Soc. St. 3		C213	
Chinese 3		C112		Spanish 2		C208		Chinese 3		C112	
12:00 - 12:45 LUNCH/RECESS				12:00 - 12:45 LUNCH/RECESS				12:00 - 12:45 LUNCH/RECESS (TL Lunch)			
12:50-1:50	4th Period	C211		12:50-1:50	4th Period	C211		12:50-1:50	4th Period	C211	
Lang. Art 4		C211		Lang. Art 1		C211		Lang. Art 4		C211	
Science 4		C214		Algebra 1		C210		Science 4		C214	
Soc. St. 4-1		C208		Science 1		C214		Soc. St. 4-1		C208	
Soc. St. 4-2		C213		Spanish 1		C208		Soc. St. 4-2		C213	
Spanish 4		C208		Soc. St. 1		C213		Spanish 4		C208	
Algebra 4		C210						Algebra 4		C210	
1:55-2:25	FLEX			1:55-2:25	FLEX			1:55-2:25	FLEX		
RG C202	MB C210	PM C213		RG C204	MB C210	LM C213		RG C204	MB C210	LM C213	
AC C206	AS C211	TM C214		AC C206	AS C211	TM C214		AC C206	AS C211	TM C214	
2:30-3:20	5th Period			2:30-3:20	5th Period			2:30-3:20	5th Period		
PE	GYM			Band	E103			Band	E103		
				Choir	E205			Choir	E205		
				Orchestra	E102			Orchestra	E102		
				Golfing	C204			Golfing	C204		
				Via Arts	E105			Via Arts	E105		

Time/Day	A	B	C	D	E	F
7:40 - 8:00	Check-In	Check-In	Check-In	Check-In	Check-In	Check-In
8:05 - 9:10	1	7	3	1	7	3
9:15 - 10:20	2	8	6	2	8	6
10:25 - 10:50	Mon: Assembly	Tues: Advisory	Wed: Service/Activity	Thurs: JR Speeches	Fri: Activity	
10:55 - 12:00	3	1	7	3	1	7
12:05 - 12:50	4A	4B	4C	5D	5E	5F
12:55 - 1:20	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch
1:25 - 2:10	5A	5B	5C	4D	4E	4F
2:15 - 3:20	6	2	8	6	2	8



INFORMAL MAKERSPACE TIME

- Lunch/free period
- Flex Period
- Open hours (before/after school)
- Lots of tours....

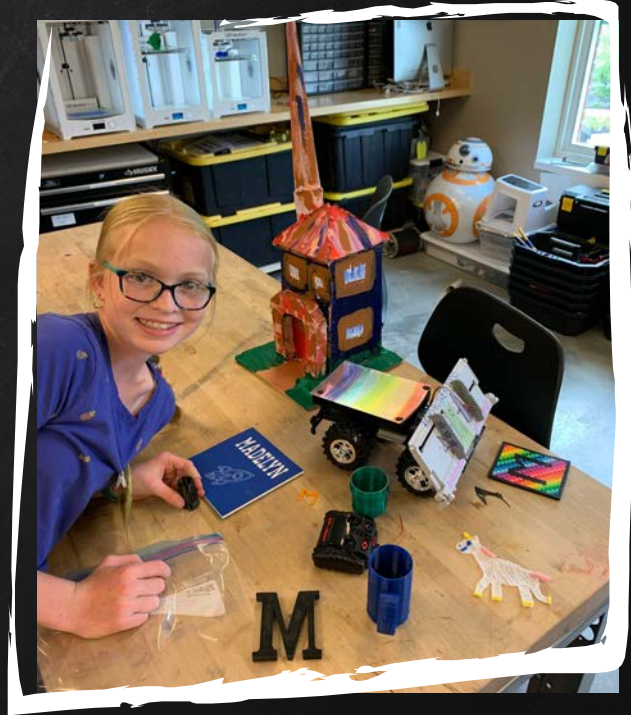




ADVISORY MAKERSPACE PROJECTS



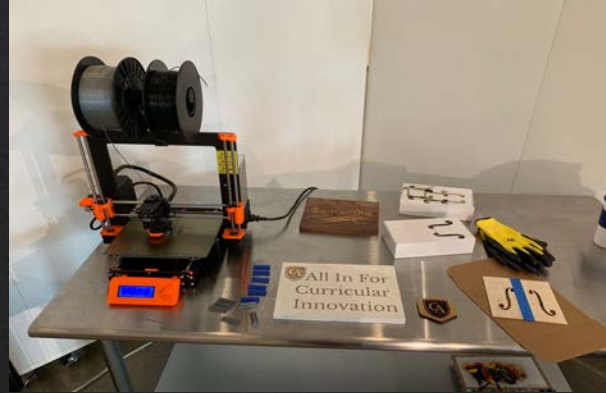
- Family Name Signs
- Bag Tags
- Seasonal crafts
- Perler Beads
- Rainbow Looms
- Button Making
- Silicon Molds
- 3D Printing





WHOLE GRADE OPPORTUNITIES

Project Discover



Service Day – memory bears, box top

3rd grade Passion Projects

Art Projects – Cigar box guitars, frames



Lower School Connections



Box Guitar



Cardboard Mazes

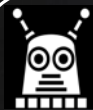


Solar Cars



Garden composters



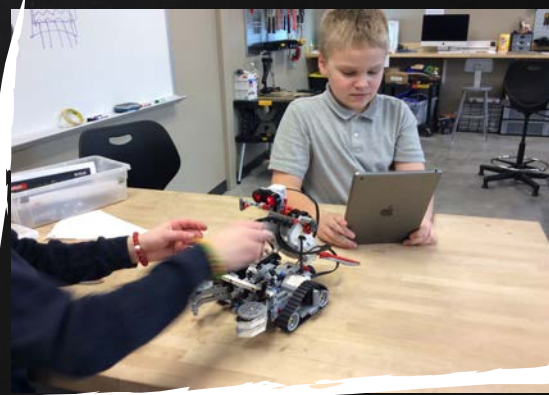


AFTER SCHOOL ROBOTICS CLUB



K - 5 grade

- Lego
- Sphero
- Ozobots



Upper School Connections

Quest works

Senior Projects

Robotics Team



Other classes that spill into the Makerspace

Art Elective



Theater Tech



Sculpture Class



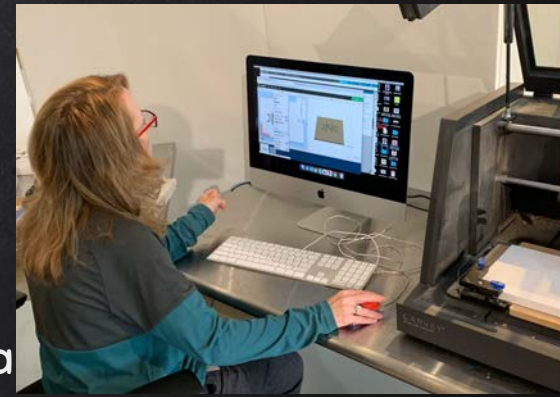


Mobile Makerspaces

Inspiration "a la Cart"

3D Printer, CNC, Screen Printing

Bring the workflow into common area



HELPFUL RESOURCES



Websites/community forums

[Instructables.com](https://www.instructables.com)

[Make Magazine](https://www.make-magazine.com)

[Inventables](https://www.inventables.com)

[Glowforge](https://www.glowforge.com)

[Ultimaker](https://ultimaker.com)

Youtube Channels:

[Tested,](#)

[ILTMS,](#)

[Oden Makes](#)

[Troy the Maker](#)

[April Wilkerson](#)

[3D Printing Nerd](#)

[Make Anything](#)

[Makers Muse](#)

[Make Build Modify](#)

[Evan and Katelyn](#)

A photograph of four children of diverse backgrounds (three girls and one boy) looking intently at a glowing electronic project on a breadboard. The project features a breadboard with various components and a strip of warm white LEDs that are illuminated. The children are in a classroom or workshop setting with desks and chairs visible in the background. A white, hand-drawn rectangular box with a rough border is superimposed over the center of the image, containing the text 'WONDER, MAKE, INTEGRATE' in a white, hand-drawn, all-caps font.

WONDER,
MAKE,
INTEGRATE

Becoming a lead learner rather than a teacher

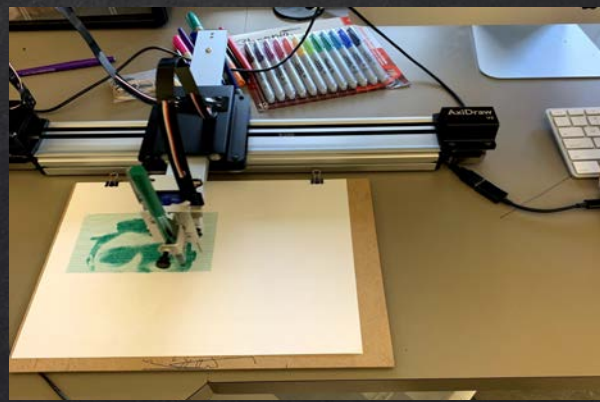


In order to make meaningful connections we need this mindset to move from fringe experiences to part of the explicit curriculum

MATH CONNECTIONS

Measurement

Scale – AR Ship



3D Printed Geometry Puzzles



Parabolic solar ovens

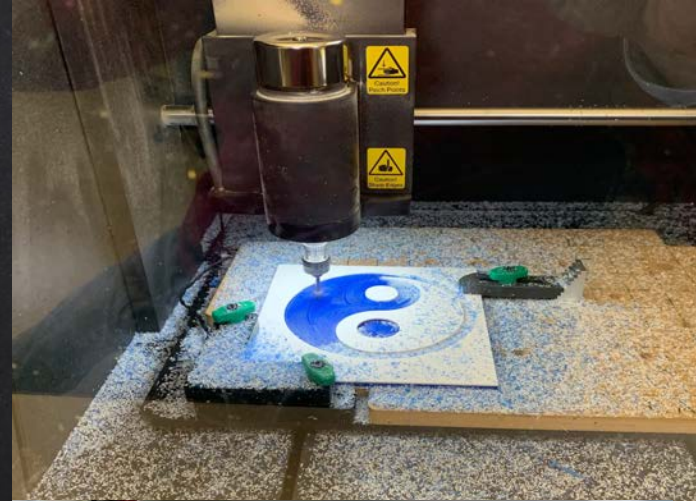


HISTORY/SS CONNECTIONS

- World Religion Symbolism
- Monument Project
- Ancient structures



- Entire grade with written and design component
- Vary from 2 to 6 classes.
- Final projects are presented and displayed in a public location





WORLD LANGUAGE CONNECTIONS



Refugee Raft Challenge

Latin Coins

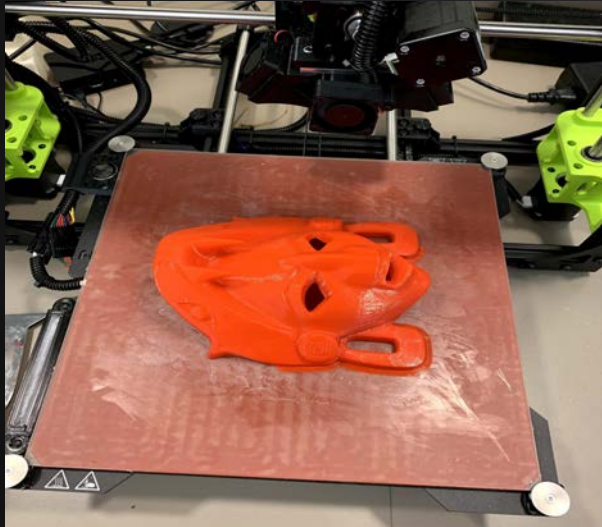
Chinese New Year





WORLD LANGUAGE CONNECTIONS

Mayan Market Items



Latin Script Writing



Bula Making



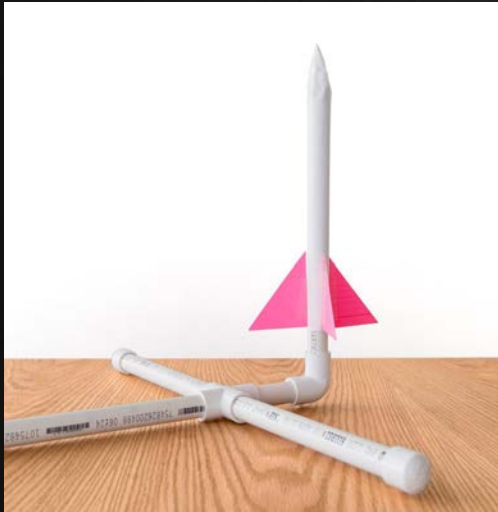


SCIENCE CONNECTIONS

Biology – Prairie plot, Ecosystem Dioramas, DNA and Protein models

Chemistry – 3D printed VSEPR models, ion Compound dice

Physics –(Most fully integrated) mousetrap vehicles, egg car,
Battle bot robotics and Arduino elective
New PBL Physics class



ENGLISH / LANGUAGE ARTS

Business Faire – proposal writing, product creation

Leopold Bench – A Sand County Almanac

Cooking Literature – laser cut recipe boards

Children's Book making – Dr. Seuss B-Day

*Huge opportunity for literary and diversity connections





GAMIFICATION – HISTORY AND LATIN



Minecraft Monuments



New Deal Monopoly



Roman Ticket to Ride



RETRO GAMING

3D printing,
Electronics,
Coding



Raspberry Pi

Arcade Machines

Coding Faire





FACULTY SUPPORT

"There are no rules here--we're trying to accomplish something."
– Thomas Edison

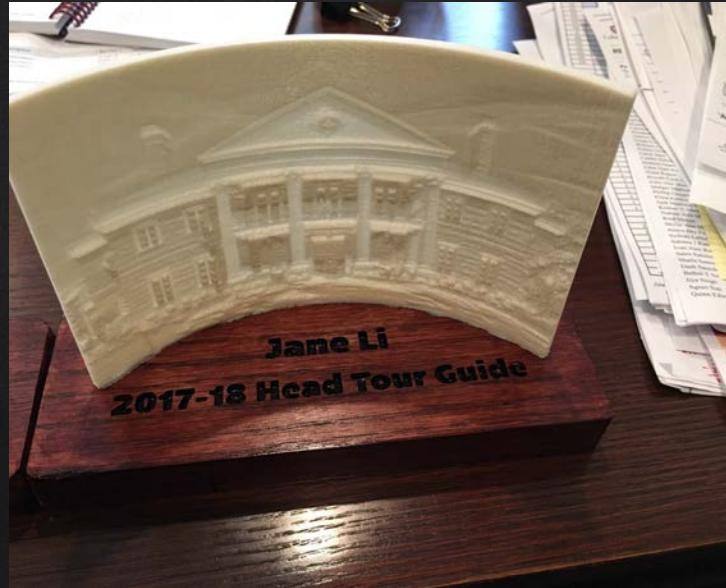
Make for CA - student created items for classrooms

Personal project to learn tools



3D PRINTERS

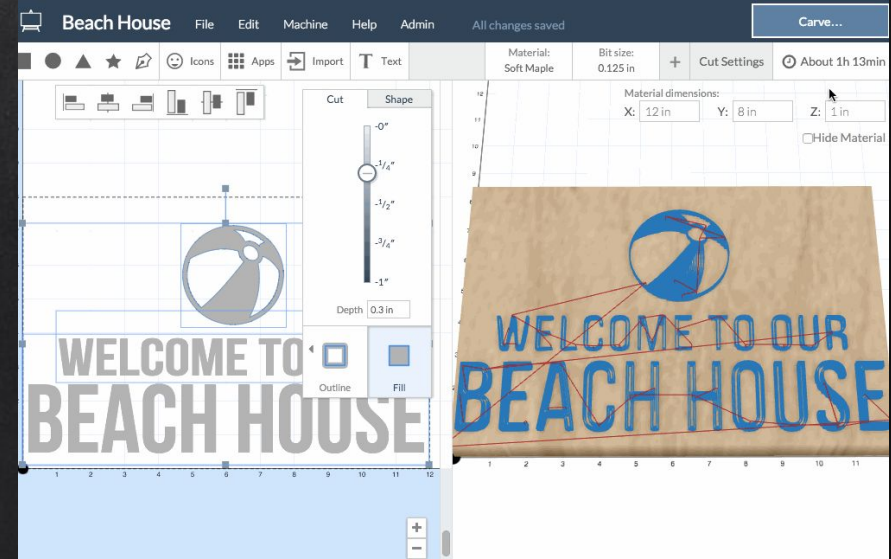
Machines – Ultimaker 2+ and 3, Lulzbot Taz 6 and Prusa MK3
Design Software – TinkerCad, Fusion 360, Solidworks
Slicing Software – Cura, PrusaSlicer



CNC

Carvey (inventables) – Easel Pro

Shopbot Desktop – VCarve Pro



LASER CUTTER – GLOWFORGE

Inkscape / Illustrator
Glowforge.com



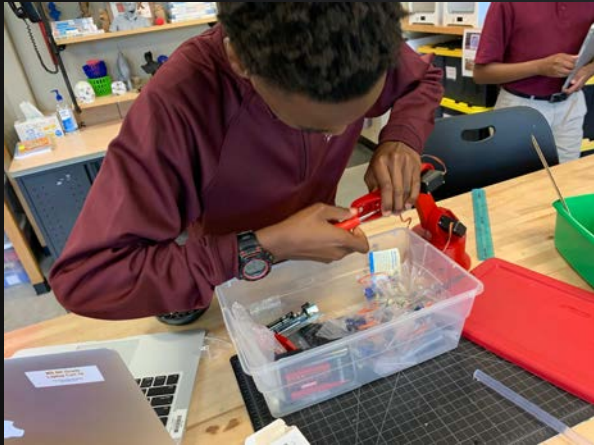
3YO Symbols
School Signage
Finger trace puzzles





New Initiatives this year

- Silicone Molds - Pewter casting
- Welding and CNC sculpture class
- Foam cosplay and theater props/vinyl cutting
- Increased microcontrollers and robotics
- Tabletop Arcade
- Farmbot and Bee Hives





THANKS!



Let's keep the conversation going...

<http://qr.ai/q4tp8>

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martint@Columbusacademy.org