

[sites.google.com/cantonschools.org/canton-steam/resources](https://sites.google.com/cantonschools.org/canton-steam/resources)

# CANTON



Design, Collaborate, Dream!

Canton Public Schools STEAM Academy

Dr. Jordan Grossman  
Assistant Superintendent

Mr. Jon Bishop  
K-12 STEM Coordinator

Connecticut State Math and Science Partnership  
September 27, 2017



# Community Expectations for Learning

**All Canton Students will graduate ready for college, career, and life success as demonstrated by the ability for:**

- Rigorous, critical and logical reasoning
- Innovative thinking for authentic problem solving
- Effective communication and collaboration
- Community engagement and socially responsible citizenship

# What is STEAM

**an integrated approach  
to science, technology,  
engineering, the arts  
and math**



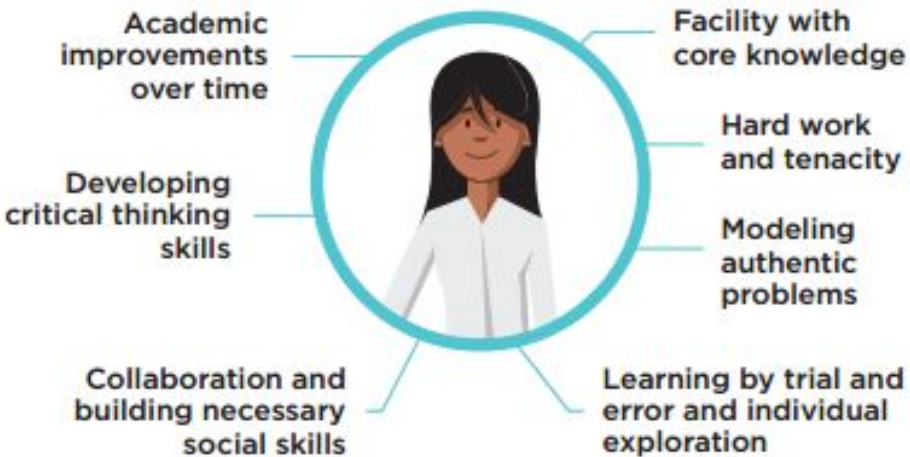
**a bridge of understanding  
by showcasing application  
and relevance in  
real-world situations**

**both an acronym  
and a mindset**



# The STE M 2026 Vision

## INNOVATIVE MEASURES OF LEARNING



## FLEXIBLE LEARNING SPACES



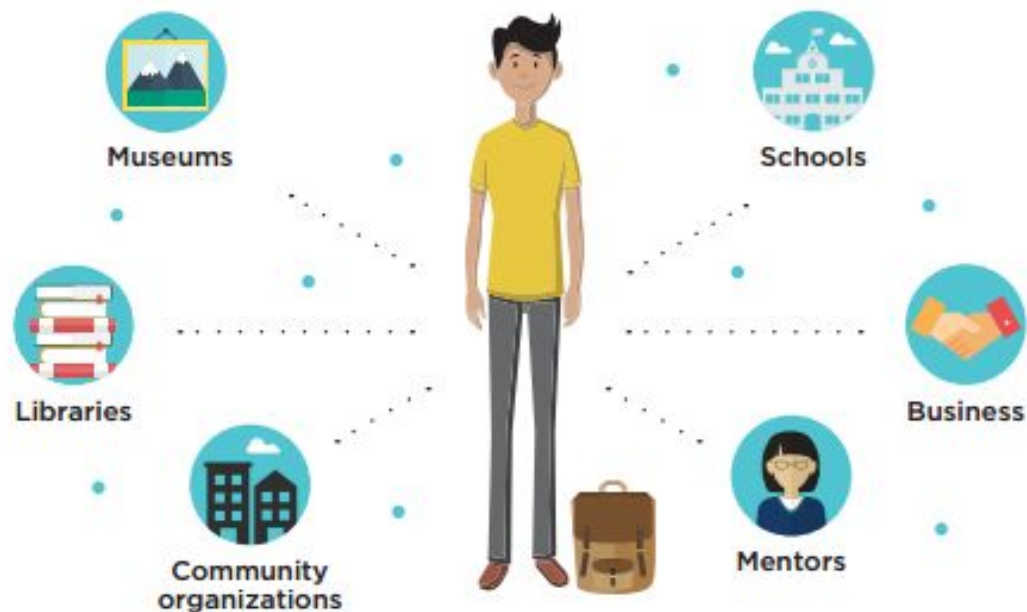
## SOLVING RELEVANT GRAND CHALLENGES



## ACCESSIBLE ACTIVITIES THAT INVITE PLAY & RISK



## ENGAGED & NETWORKED COMMUNITIES OF PRACTICE



## PROMOTING DIVERSITY



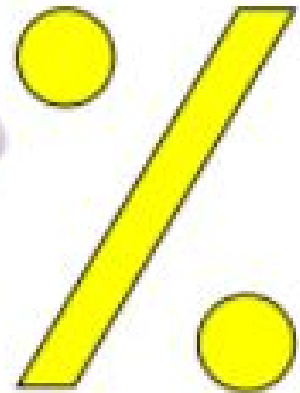
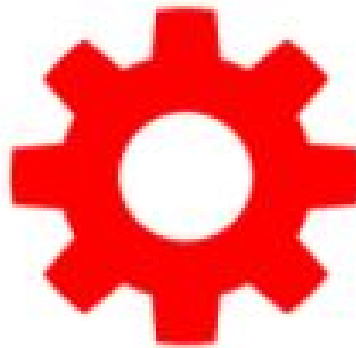
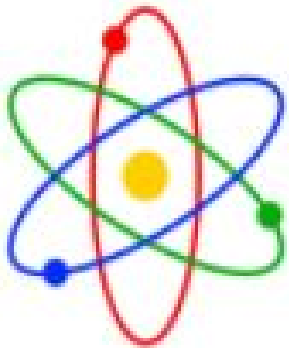
# **STEAM Academy & Program Development**

## **STEAM Academy Offerings**

**Impact on Learning and Dispositions for Students**

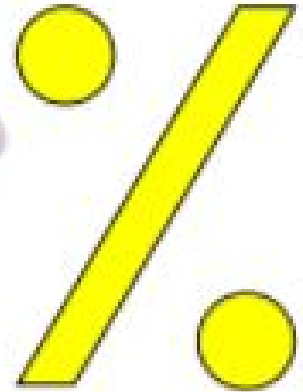
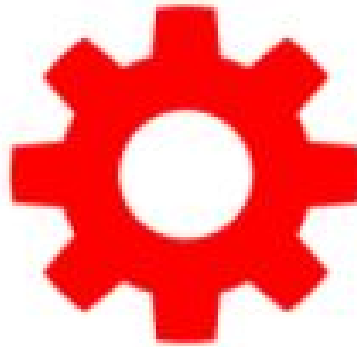
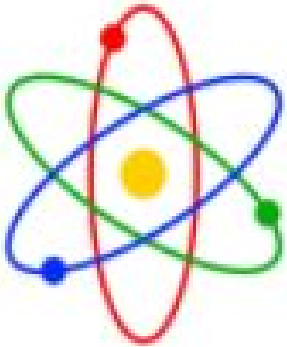
**Expanding STEAM**

**STEAM Resources**



**Canton Public Schools**

**STEAM Academy  
& Program Development**





# Academy Development Purpose

- Support the Canton Community Expectations for Learners
- Engage Students in innovative, active STEAM infused learning
- Engage Teachers in innovative, active STEAM infused learning
- Develop STEAM “Pipelines”



# Academy Development Timing & Resources

- Extended day
- Grant funding and repurposing of existing materials
- Lead by current faculty, often with older students



# Academy Development Process

- Focus on a “grand problem” or opportunity through a challenging, interdisciplinary, approach
- Engage students in logical, technological representation of information through novel, innovative, or reestablished STEAM experiences
- Identify regular opportunities for active learning student, collaboration, and inquiry



# Academy Development Process

- Promote design thinking and inquiry skills through embedded challenges and develop a “maker” mentality to provide accessible learning activities which invite intentional, engaging investigation and risk-taking with the creative expression of ideas
- Provide authentic showcases for student work and learning

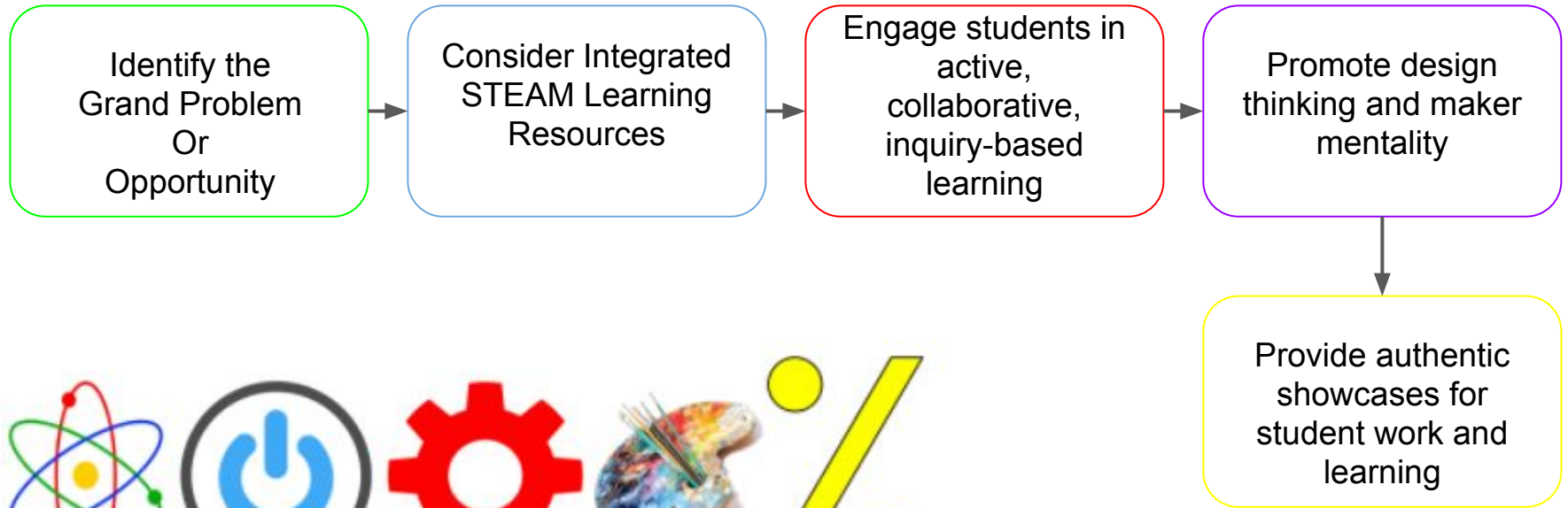


# Academy Development Process

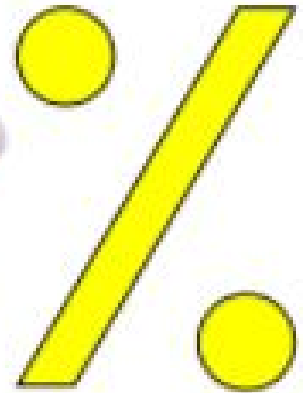
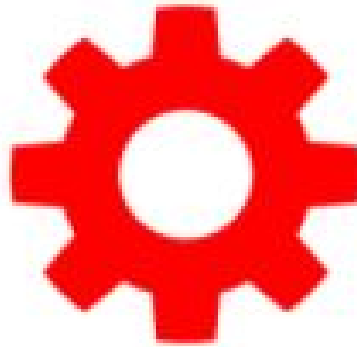
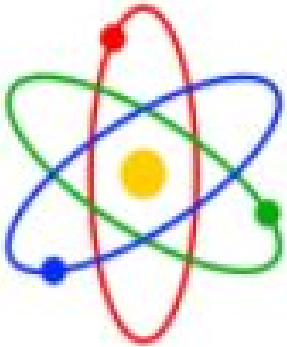
- \*Design and use of new types of learning spaces which are flexible and technology-enabled to provide incubation spaces to pilot new resources and practices
- Engage all students in an effort to eliminate gaps of access to STEAM learning



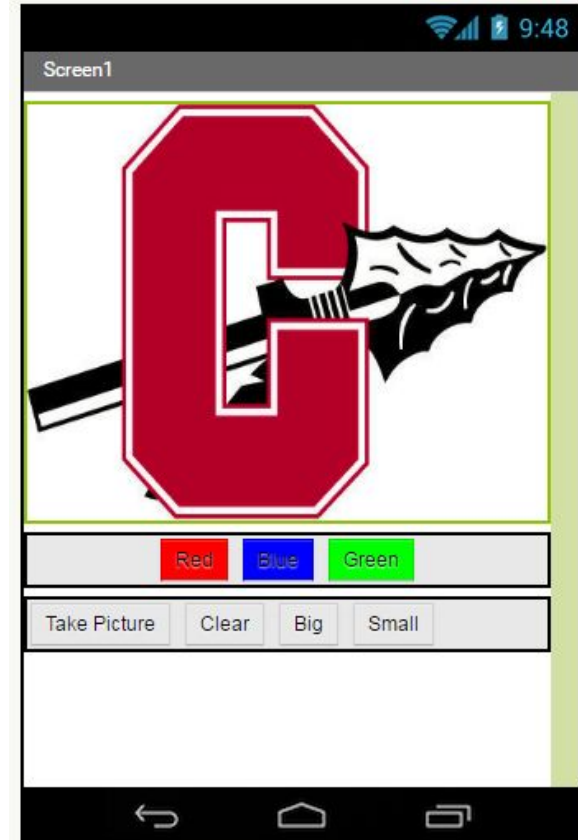
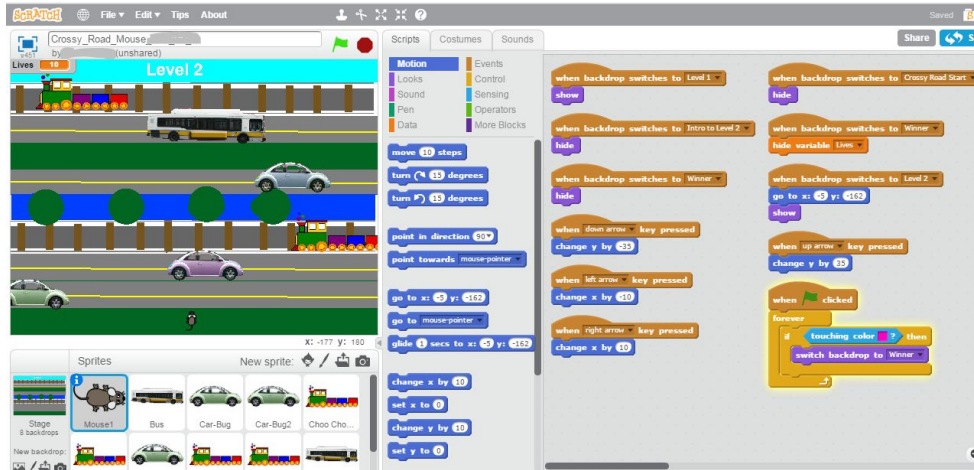
# Academy Offering Development Process



**Canton Public Schools**  
**STEAM Academy**  
**Offerings**

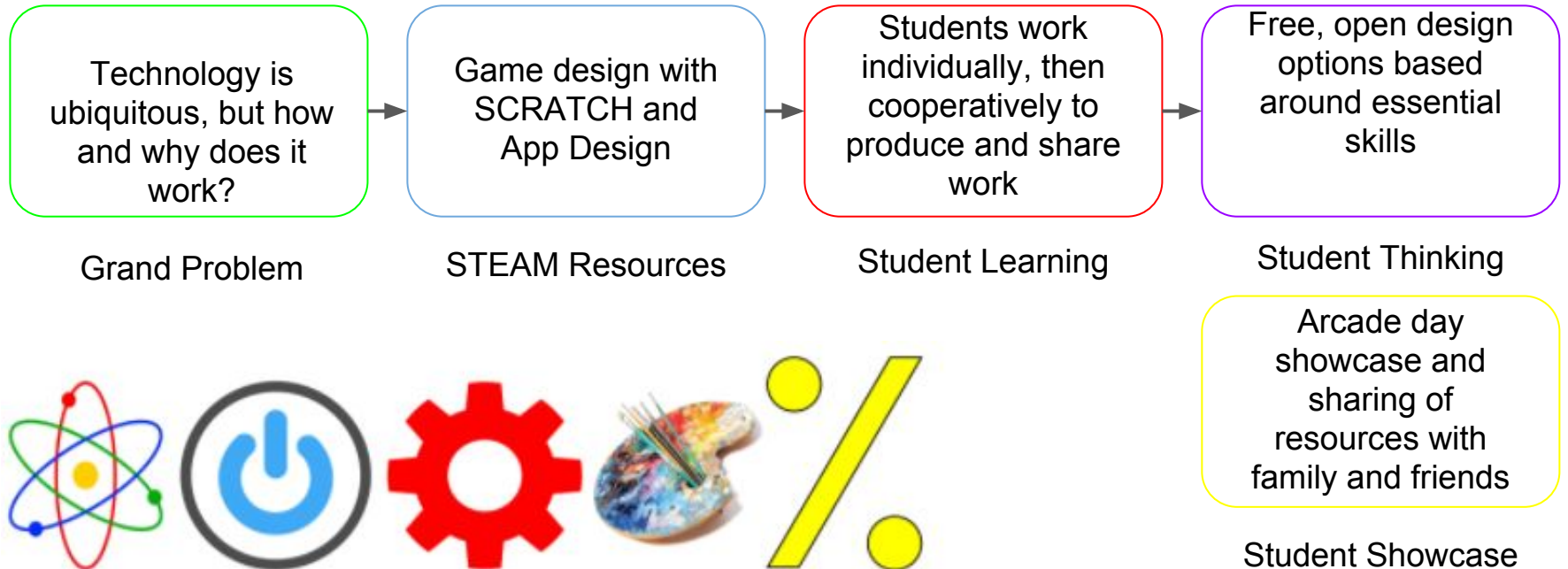


# Game and App Design





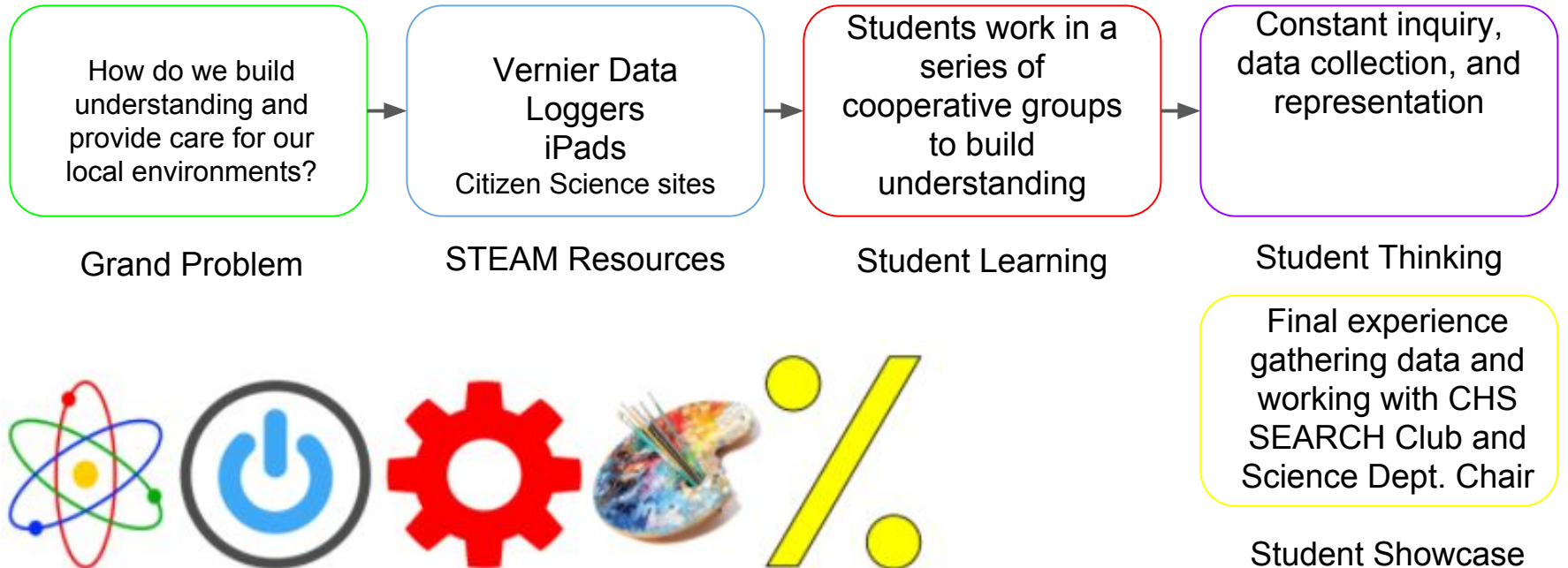
# Game and App Design Development Process



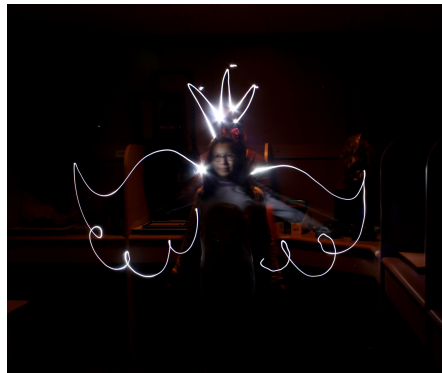
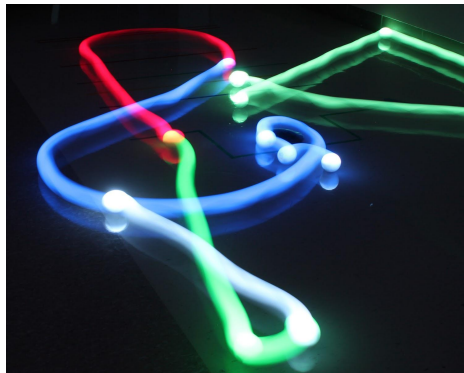
# Citizen Science



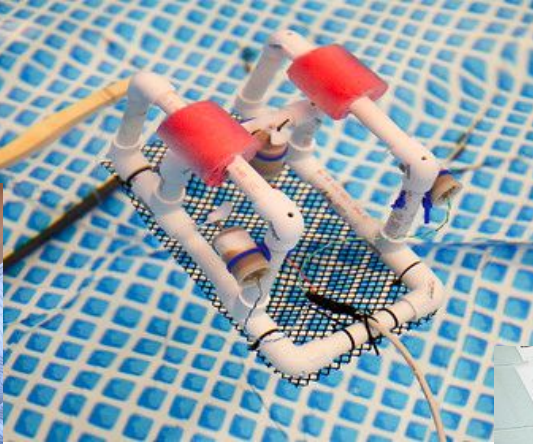
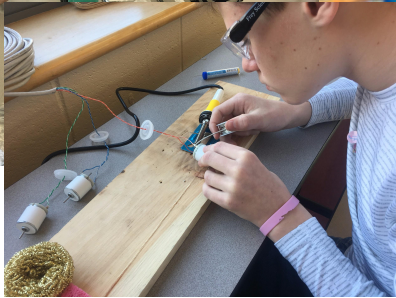
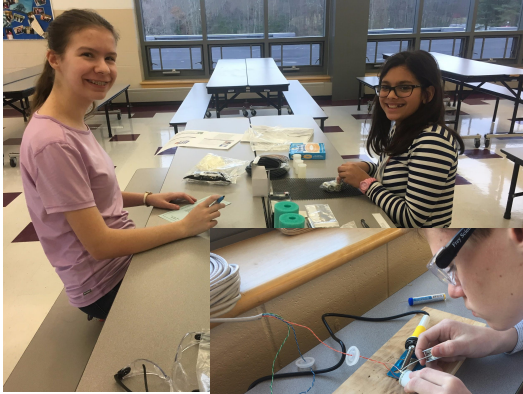
# Citizen Science Development Process



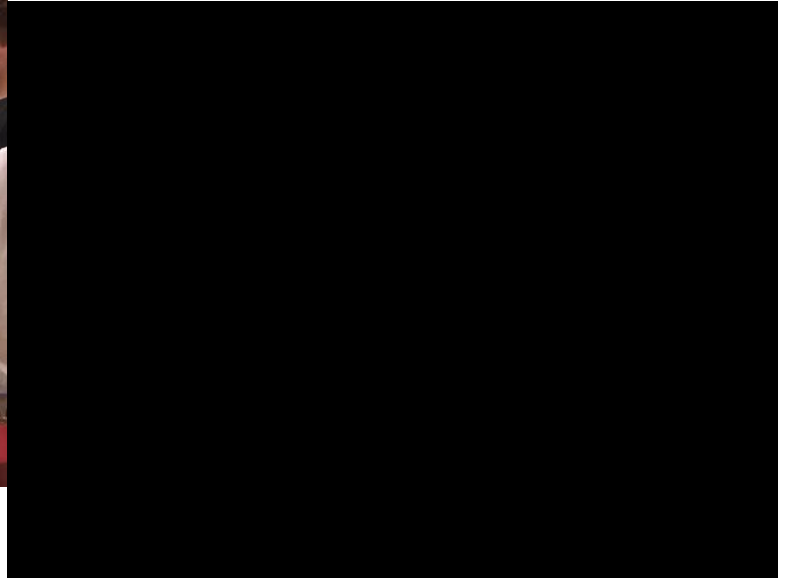
# Digital Photo and Video



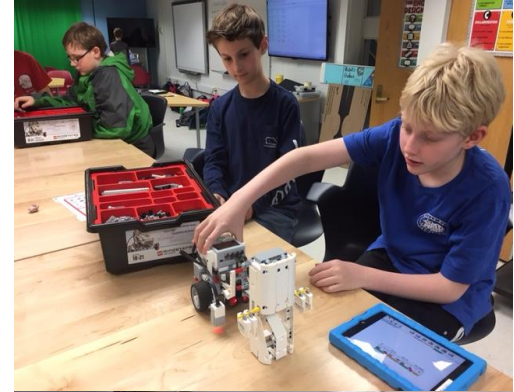
# Submersible Robotics



# Aerospace Engineering



# Robotics Bootcamp



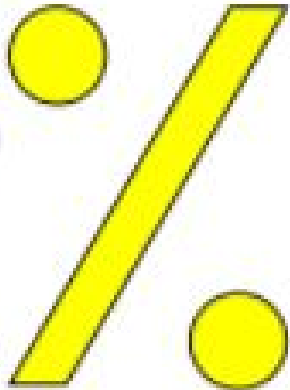
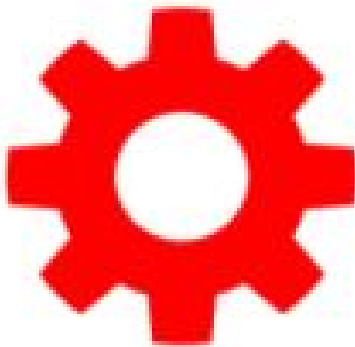
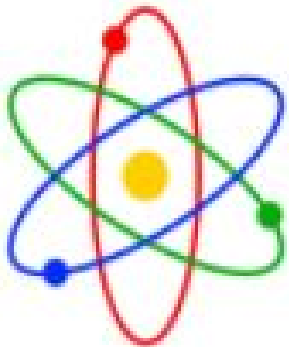
# Impact on Student Learning and Dispositions

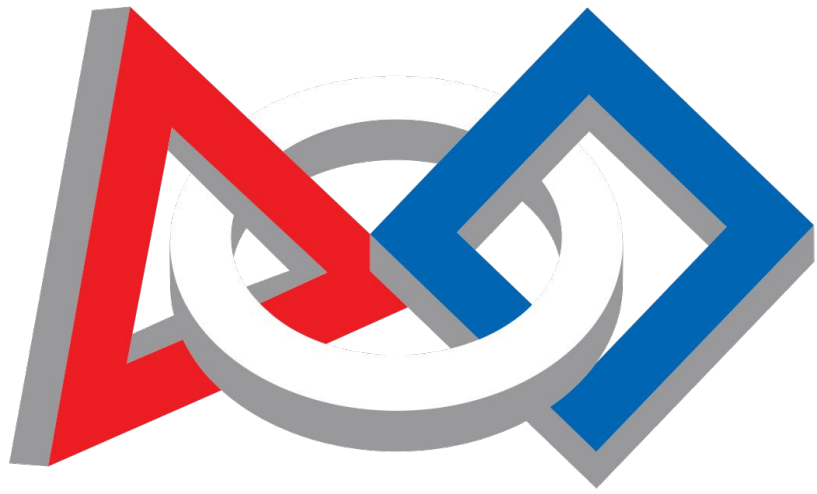
**Ms. Shelby Raymond**  
**9th Grade Student**



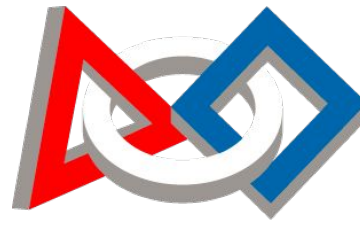


**Canton Public Schools**  
**STEAM Offerings**  
**Expand**

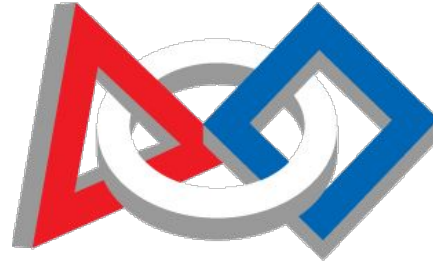




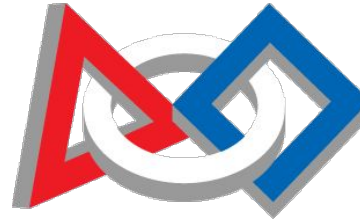
**FIRST**®



**FIRST**®  
**LEGO**®  
**LEAGUE JR.**



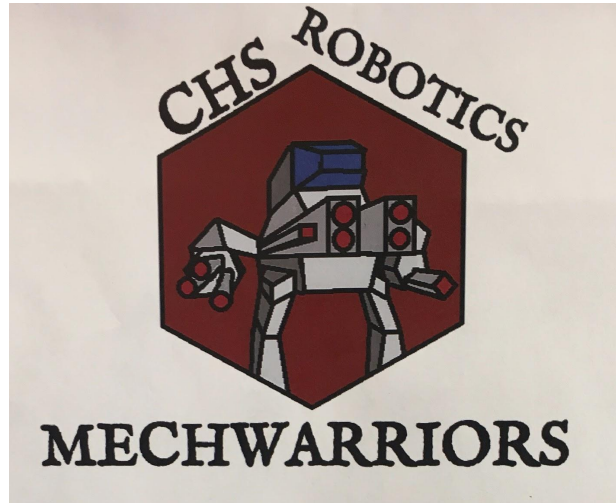
**FIRST**®  
**LEGO**®  
**LEAGUE**



**FIRST**®  
**TECH**  
**CHALLENGE**

**AGES 6 TO 18**

# Canton High School FTC Mechwarriors



# Canton Intermediate & Middle School FLL



# Cherrybrook Primary School

## FLL Jr.



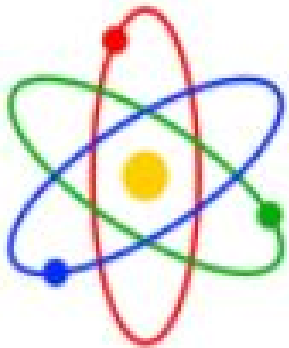
# Impact on Student Learning and Dispositions

Mr. JR Rottkamp  
8th Grade Student










**Canton Public Schools**

**Making STEAM  
Across the District**











# Making STEAM Across the District

 Cherry Brook Primary School, K-3	Canton Intermediate School
Library Media Space Redesigned to Learning Commons	In addition to redesigned Media Center, New Instructional Space Designed along with several common STEM Experiences including 3D design, the engineering design process, computer coding, and digital media.
Additions of Robotics to 3rd Grade Media 	Science Investigations - A collaboration with CHS Science National Honors Society Teacher and Students providing opportunities in Biology, Chemistry, and Physics 
FIRST LEGO League Jr Pilot Team Developed with Future Expansion 	FIRST LEGO League - Pilot team developed with future expansion for grades 4-8 
	Tinker Club - Project based club for innovation, engineering and creativity 
	Robotics Bootcamp - An Introduction to Basic robotic programming and computer science concepts. 
	FLL Spring Training - A cooperative, project-based engineering, design, and programming challenge.





# Making STEAM Across the District

Canton Middle School	 Canton High School
STEAM Academy Offerings: Submersible Robots - Students created underwater robots in order to compete in a model competition.	Computer Science Principles course developed, promoting a pathway to AP Computer Science Principles 
STEAM Academy Offerings: Digital Photo and Video - Students use analog and digital photo and video to create and document learning	Computer Programming provides students with an introduction to object oriented programming, developing a pathway for AP Computer Science 
STEAM Academy Offerings: Aerospace Engineering - Students developed a series of rockets as they tested aerospace and physics concepts	FIRST Tech Challenge - High school robotics team with increasingly advanced mechatronics and programming. 
Computer Coding Experiential for ALL Seventh Grade Students 	CT Electrathon - High school electric car building competition 
Robotic Engineering offered as an option for ALL Eighth Grade Students 	
FIRST LEGO League - Pilot team developed with future expansion for grades 4-8 	



# Canton STEAM

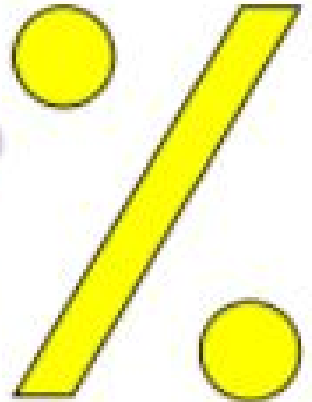
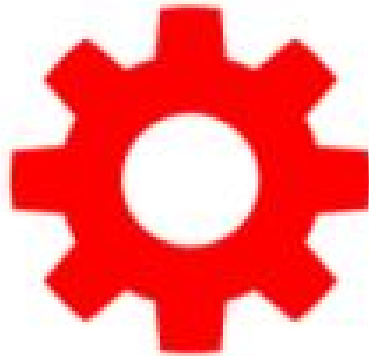
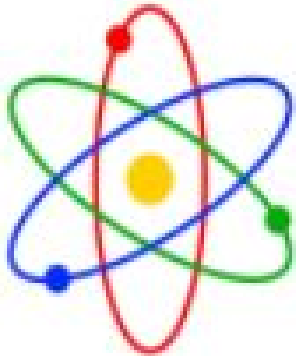


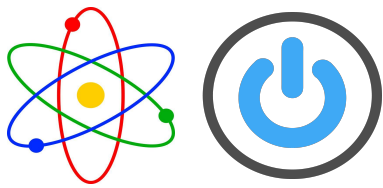
## By the numbers:

- >200** Number of students participating in after school sessions
- 19** Number of Canton STEAM Offerings
- 12** Number of Teachers Participating Canton STEAM Offerings
- >90** Percentage of participating students interested in additional STEAM Academy offering
- >90** Percentage of participating students who shared a desire to continue to take further technology or computer courses
- 100** Percentage of parents of participating students desiring further STEAM Academy offerings
- ALL** Students in grades 1 through 8 receiving CS, Engineering, and Technology Instruction

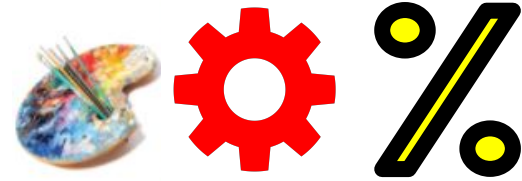
# STEAM

in the  
**Canton Public Schools**  
Looking Forward





# Canton STEAM



## Future Implementation

- Growing partnerships with leading STEAM education organizations
- Further workspace redesigns for a future ready classrooms and student needs
- Continued K-12 Computer Science program development
- Continued purposeful integration of technology across curricula, particularly leveraging Library Media as well as current STEAM courses
- Expand FIRST and STEAM Academy offerings
- Expand cross age and school learning opportunities

# STEAM Resources

[goo.gl/2N9qJ8](https://goo.gl/2N9qJ8)



Resource Name	Description	Link	STEAM Field
Code.org	An excellent resources for computer science lessons for students from Kindergarten through High School.	<a href="http://www.code.org">www.code.org</a>	Computer Science
CS First	A Google-based resource of computer science lessons which teach concepts through themes such as fashion and game design.	<a href="https://www.cs-first.com/en/home">https://www.cs-first.com/en/home</a>	Computer Science
Mobile CSP	A course developed at MIT teaching computer science principles	<a href="http://mobile-csp.org/">http://mobile-csp.org/</a>	Computer Science
SeaPerch	An integrated STEAM learning experience using remotely operated vehicles (ROVs) in the form of student built submarines.	<a href="http://www.seaperch.org/index">http://www.seaperch.org/index</a>	Science & Engineering
FIRST	A world-wide, multi-leveled robotics competition.	<a href="https://www.firstinspires.org/">https://www.firstinspires.org/</a>	Computer Science, Techn & Engineering
Engineering is Elementary	Integrated engineering units ready to embed in school or after school in grades K-8 from the Boston Museum of Science	<a href="https://www.eie.org/">https://www.eie.org/</a>	Science & Engineering
Citizen Science Center	A repository of outstanding citizen science opportunities	<a href="http://www.citizensciencecenter.com/">http://www.citizensciencecenter.com/</a>	Citizen Science

# STEAM Resources

[goo.gl/2N9qJ8](http://goo.gl/2N9qJ8)



Resource Name	Description	Link	STEAM Field
Project Noah	A crowd sourced tool to explore and document wildlife	<a href="http://www.projectnoah.org/">http://www.projectnoah.org/</a>	Citizen Science
Project Learning Tree	An environmental education program designed for schools	<a href="https://www.plt.org/">https://www.plt.org/</a>	Science
Rocketry Challenge	National rocketry competition	<a href="http://rocketcontest.org/">http://rocketcontest.org/</a>	STEM
Stanford Design Loft	Design thinking curriculum from Stanford which incorporates multiple STEAM fields	<a href="https://dloft.stanford.edu/dloft-curriculum-units">https://dloft.stanford.edu/dloft-curriculum-units</a>	STEAM
Purdue Epics	Engineering lessons and units developed through Purdue University	<a href="https://engineering.purdue.edu/EPICS/k12">https://engineering.purdue.edu/EPICS/k12</a>	Engineering
Yourduino	Electronics and programming through a fun, engaging platform	<a href="http://yourduino.com/sunshop/">http://yourduino.com/sunshop/</a>	Tech, Engineering, Art
STEM Challenge	A yearly challenge competition for students	<a href="http://stemchallenge.org/">http://stemchallenge.org/</a>	STEM
Try Engineering	Excellent repository of engineering activities	<a href="http://tryengineering.org/">http://tryengineering.org/</a>	Engineering

# STEAM Resources

[goo.gl/2N9qJ8](https://goo.gl/2N9qJ8)



Resource Name	Description	Link	STEAM Field
Hummingbird Kit	An easy to use robotics and programming kit to infuse STEAM concepts	<a href="https://www.hummingbirdkit.com/">https://www.hummingbirdkit.com/</a>	STEAM
Tinkercad	Free 3D design software for engineering, artistic expression, and 3D printing	<a href="https://www.tinkercad.com/">https://www.tinkercad.com/</a>	Technology, Engineering, Art
Sparkfun	An outstanding electronics resources with excellent educational offerings for both technical and artistic fields	<a href="https://www.sparkfun.com/">https://www.sparkfun.com/</a>	Technology, Engineering, Art
Sharespace	Buzz Aldrin's non-profit aimed at increasing student access to and interest in STEM	<a href="https://sharespace.org/steam-resources/">https://sharespace.org/steam-resources/</a>	STEAM

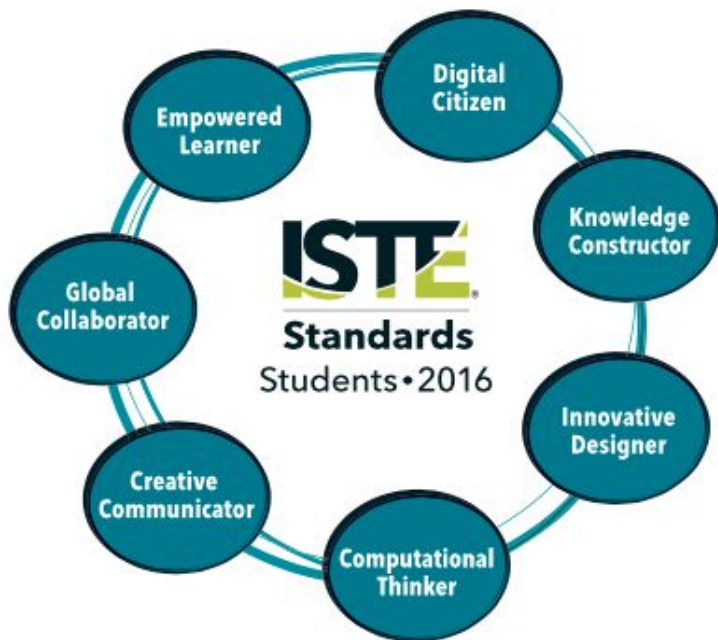
# STEM and the Standards

Practices in Mathematics, Science, and English Language Arts*		
Math	Science	English Language Arts
<b>M1.</b> Make sense of problems and persevere in solving them.	<b>S1.</b> Asking questions (for science) and defining problems (for engineering).	<b>E1.</b> They demonstrate independence.
<b>M2.</b> Reason abstractly and quantitatively.	<b>S2.</b> Developing and using models.	<b>E2.</b> They build strong content knowledge.
<b>M3.</b> Construct viable arguments and critique the reasoning of others.	<b>S3.</b> Planning and carrying out investigations.	<b>E3.</b> They respond to the varying demands of audience, task, purpose, and discipline.
<b>M4.</b> Model with mathematics.	<b>S4.</b> Analyzing and interpreting data.	<b>E4.</b> They comprehend as well as critique.
<b>M5.</b> Use appropriate tools strategically.	<b>S5.</b> Using mathematics, information and computer technology, and computational thinking.	<b>E5.</b> They value evidence.
<b>M6.</b> Attend to precision.	<b>S6.</b> Constructing explanations (for science) and designing solutions (for engineering).	<b>E6.</b> They use technology and digital media strategically and capably.
<b>M7.</b> Look for and make use of structure.	<b>S7.</b> Engaging in argument from evidence.	<b>E7.</b> They come to understanding other perspectives and cultures.
<b>M8.</b> Look for and express regularity in repeated reasoning.	<b>S8.</b> Obtaining, evaluating, and communicating information.	

\* The Common Core English Language Arts uses the term “student capacities” rather than the term “practices” used in Common Core Mathematics and the Next Generation Science Standards.



# STEM and ISTE



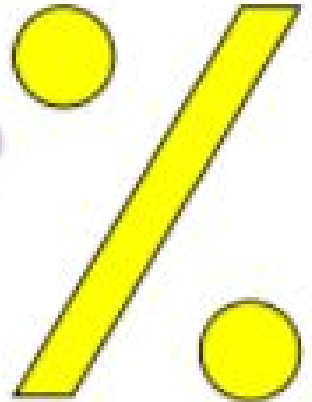
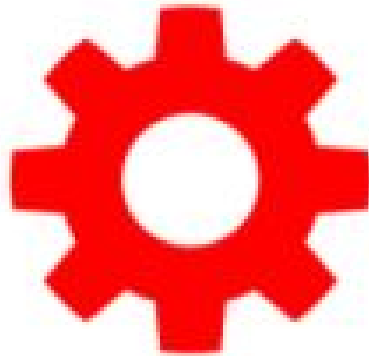
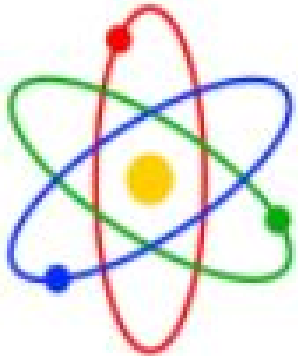
1	<b>Empowered Learner</b>	Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.	<a href="#">VIEW INDICATORS</a> +
2	<b>Digital Citizen</b>	Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.	<a href="#">VIEW INDICATORS</a> +
3	<b>Knowledge Constructor</b>	Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.	<a href="#">VIEW INDICATORS</a> +
4	<b>Innovative Designer</b>	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.	<a href="#">VIEW INDICATORS</a> +
5	<b>Computational Thinker</b>	Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.	<a href="#">VIEW INDICATORS</a> +
6	<b>Creative Communicator</b>	Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.	<a href="#">VIEW INDICATORS</a> +
7	<b>Global Collaborator</b>	Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.	<a href="#">VIEW INDICATORS</a> +

# STEAM

in the

**Canton Public Schools**

**Making 1 Degree of Difference**



[sites.google.com/cantonschools.org/canton-steam/resources](https://sites.google.com/cantonschools.org/canton-steam/resources)

# Thank You!

# Questions?

