

STEAM with a Capital A

One of the most frequently asked questions of the Cambridge STEAM Initiative team is: What exactly is STEAM? And why did Cambridge decide to add in the A—why STEAM instead of STEM? One reason is that the Arts provides another accessible entry point to STEM. Another is that the Arts provides the creativity that traditional STEM programming can oftentimes lack. We also believe that true innovators are able to evaluate the world and problem solve through the multiple lenses of a scientist, technologist, engineer, mathematician, *and* artist. And that's what we would like to inspire and cultivate in our young people—the ability to think innovatively and fluidly by using all of their skills and knowledge from all the areas of STEAM.

So how do we do this? How do we engage students in STEAM programming that allows them to value all areas of STEAM equally? How do we use engaging and impactful STEAM programming to inspire ALL of our young people to see themselves as capable scientists, technologists, engineers, artists, and mathematicians? How do we inspire them to be innovators?

This interdisciplinary approach is not new but a foundational pillar of design and innovation. However, even though most people understand the importance of STEM content and practices in the creation of new innovations, the A in STEAM often does not get equal billing—and you see this reflected in activities that are described as STEAM. Often these are activities that incorporate some arts (and crafts) in service to STEM goals—activities such as creating a model of planet during a unit on astronomy or making leaf-rub placemats after learning about plant parts. But integrating the Arts is not just about adding creativity and creating another entry point to STEAM—the Arts empowers young people with its own kind agency and voice. In addition, the Artist Habits of Mind are very much aligned with STEM practices (as outlined in the Next Generation Science Standards and Common Core)—the ways of thinking and seeing the world that underly the creativity, problem-solving and explorations of scientists, engineers, mathematicians and artists are much more similar than different.

As a way to make more explicit connections between STEM and the Arts, and to honor the needs expressed by the OST educator community, the Cambridge STEAM Initiative is in the process of creating a STEAM curriculum that puts Arts at the forefront. We have hired Natacha Meyer, an experienced K-8 STEM educator, curriculum developer, and illustrator as well as Kyle Browne, an experienced Arts educator and artist, to collaborate on developing a series of lessons that will focus on how artists use STEM as a part of their creative process—in other words, STEM in service of the Arts.

Currently, we are in the early phase of curriculum development. Natacha and Kyle have built off of the initial work of the STEAM Program Quality Working Group (see next page) to create the STEAM Habits of Mind which will guide young people's journey through this unit. After leading a brainstorm to generate a number of curriculum theme ideas, they have narrowed their focus to building out a project idea focusing on eco-art with a particular focus on young people creating their own sculpting, painting and drawing materials by extracting pigments from natural/found materials and modifying them. As we move forward in this work, we plan to:

- Collaborate with educators from three OST programs—Community Art Center, Moses Youth Center, and Margaret Fuller Neighborhood House—in the design, development and writing process.
- Test a few of the activities during April vacation week with our OST partners.
- Pilot and evaluate the unit during summer vacation (again, with our OST partners)



Top photo:
Making
turmeric paste
Bottom photo:
Turmeric paint
and modeling
material

March 20th Cambridge STEAM Initiative Advisory Committee Meeting

The STEAM Initiative Advisory Committee met on Wednesday, March 20th to continue our collaborative work on effective and purposeful partnerships. So far, our work has centered on building off of CPS Strategic Initiatives 2.1 and 3.3 which focuses on expanding integrated, hands-on, real world learning opportunities and providing relationship building professional learning for all students. Our next meeting will be in mid-June.

STEAM Initiative Quality Working Group

The STEAM Quality Working Group has grown! We currently have 23 members representing a diverse cross section of youth/adult serving programs from across the city and beyond.

Multiple level representation from agencies listed has allowed for broad and diverse perspectives that inform the direction of the STEAM Initiative's ongoing quality focused work. It is important to note that not all members of the group are STEAM "experts". They are STEAM curious, value STEAM, and all have experience in quality programming assessment as well as quality professional development in OST. All members of this group were also recruited due to their understanding of the importance of quality, accessible and culturally sensitive opportunities that will help traditionally STEAM marginalized groups see themselves as able to access and pursue a vast array of opportunities.

The group has been building on its 2017-18 foundational work and is focusing on outlining shared definitions of effective STEAM learning experiences and professional development, tackling questions around what is needed to foster STEAM within existing learning opportunities, and how to create shared understanding that STEAM is everywhere.

Building on 2017-18 work:

- The group has spent time revisiting the history of the STEAM Initiative and the work of the previous year and took a deeper look into the question, "Why STEAM?". The discovery, that STEAM is indeed everywhere, is accessible & relevant, and that STEAM practices are strongly connected to social emotional learning models, has allowed the group to fully see themselves as both part of and leaders within the STEAM ecosystem. The group has also developed some shared understanding as to why STEAM is important. All of this understanding is aligned with the goals of the STEAM initiative focus on equity and access.
- Last year's group was starting to develop a set of pillars that will hold up quality STEAM experiences. The work of the group this year is to build understanding and brainstorm supports that will strengthen each of these four pillars. The pillars are: Professional Development Supports, Integration into Culture, Upper Level Support and Messaging, Materials Management. These pillars are integrated into and guide the conversation/work of each monthly meeting.
- A habits of mind document was developed by the STEAM curriculum team and shared with the group. The document drawn from the quality tool and habits of mind cross walk documents the 2017-18 STEAM Quality Group co-created. This living document is being used to deepen understanding around quality youth outcomes and professional development. Some questions we have grappled with:
 - What are the habits we want to foster and support through youth development that are directly related to STEAM? Communication, collaboration, curiosity, discovery, persistence etc.
 - What types of support do we need to provide for staff so they can model and support these habits? How can these supports become actionable?

The work of the STEAM Quality Work Group has and will continue to inform actions that support the goals of the STEAM Initiative. One goal is to have multiple systems in place for implementation across multiple programs. We plan to start piloting a rubric-guided coaching support model during the summer of 2019 and implementing roll out during the 2019-20 school year. This implementation will align closely with and be in partnership with the ongoing work of the Agenda for Children OST (AFCOST) professional development and quality improvement support systems.

STEAM Initiative Quality Working Group (continued)

The ways in which we will partner are outlined below:

- Professional development system - needs and opportunities identified
 - Focusing on the A in STEAM
 - Effective Questions and Inquiry
 - Fostering Curiosity and Perseverance
 - Staff STEAM Identity
 - Demystification of STEAM
- Quality programming support
 - Rubric for creation of quality STEAM programming on a continuum (building on 2017-18 work)
 - Self assessment
 - tool aligned with tools already used in OST
 - research based
 - Coaching model
 - Aligned with AFCOST model
- Mapping of STEAM activities/programs across the city
- Mapping of STEAM PD opportunities across the city

Another goal supported by the work of this group is to create a cultural shift around what STEAM is and who STEAM is for. That STEAM is not something that is done at one place at a specific time with a defined group of participants, but that it is ubiquitous and accessible and that all the citizens of the city who have been held at arms-length from STEAM opportunities will be able to know that it's not something they have to reach for or be given, that they can walk through doors using their innovation and creativity, that they can apply mathematical thinking and scientific methods grounded in observation and curiosity, that they can solve problems using design thinking built on empathy, that it's part of what we are and who we are as a city. That they can and, indeed, already do all of this.

STEAM Quality Working Group organizations:

Agenda for Children Out of School Time, Banneker Extended Day, Cambridge Public Library, City of Cambridge Youth Programs, City of Cambridge Community Schools, City of Cambridge Childcare and Family Support, City of Cambridge Office of Workforce Development, City Sprouts, Farrington Nature Linc., Harvard Museum of Natural History Science Club for Girls, King Open Extended Day, Kyle Brown Creative, City of Cambridge Recreation Department, and PEAR.

Rindge Avenue Upper School: STEAM in Mesopotamia



Students engineer a mortar and build a water resistant wall.

Two years ago, Gisele Saillant, Rindge Avenue Upper School's 6th grade social studies teacher reached out to the STEAM Initiative because she wanted to make her unit on Mesopotamia seem more real to her students by having them grapple with a problem that once Mesopotamians faced. One of the problems that Mesopotamians faced was how to control the rivers, both to prevent flooding during rainstorms and to guide the flow of water so that it could be used for irrigation of crops. Through our collaboration, we decided that her students would engage in a modified version of Engineering is Elementary's *A Sticky Situation: Designing Walls* unit to build water resistant walls. Students experimented with different earth materials to engineer and create a mortar, and then used the mortar and river rocks to build a wall prototype in a small aluminum tray.

Rindge Avenue Upper School: STEAM in Mesopotamia (continued)

They then tested how water resistant their walls were by pouring water into the tray one side of their wall and timing how long it took for the water to seep through.

Collaborations in the works:

- **STEAM Initiative, CPS Science, and Birth to 3rd grade Initiative Collaboration**

The STEAM Initiative has begun collaborating with Lei-Anne Ellis, Early Childhood Director (Birth to 3rd grade Initiative at Cambridge Public Schools) and Janet MacNeil, CPS Science Coordinator to support Pre-school, Junior Kindergarten, and Kindergarten teachers in STEM practices and content. Our goal is to create a series of aligned professional development experiences that will engage preschool teachers in STEM activities that they can then implement with their students to build developmentally appropriate foundations in STEM practices.

In addition, we also know that one of the biggest ways to impact children who are underserved is by supporting parents and caregivers so they feel comfortable doing STEAM activities at home. As a part of this work, we also plan to work with the Center for Families and Baby U team to find ways to support their staff in their work with Cambridge families and residents so that STEAM activities become one of the offerings during their playgroups and parent workshops.



A young scientist marveling at the "squishiness" of her slime.

- **STEAM and CPL Teen Garden Project**

This past fall, Maya Escobar, who is Cambridge Public Library's Teen Librarian, shared her wish to create a gardening space by the main library building so she could engage Cambridge teens in food justice through gardening. Through Jen Letourneau's (Department of Public Works and Community Garden Program) and Adam Corbeil's (Department of Recreation) behind the scenes work, we are working on getting approval to install a raised garden plot in a space near the high school and main library building. We are also working with Barb Dorritie, CRLS Biology and Environmental Science teacher and advisor to the Food Justice Club, and Tobe Stomberg, CRLS Biology and Next Generation Farming course teacher. If the space is ready for planting this May, Barb and Tobe will plan to engage their students into starting the garden by integrating seed germination, seedling growth and plant transplant into their Biology and Farming courses' curricula. During the summer, we hope one or two of their students will continue to maintain the garden through a Mayor's Summer Youth Employment Program internship at the library.

- **STEAM It Up Event 2019**

Cambridge STEAM Initiative is planning to organize and host another city-wide K-8 *STEAM It Up!* event during Massachusetts STEM Week (the 3rd week in October). We are aiming to hold the event Thursday, October 24th, 2019 and are hoping to host it at the new King Open-Cambridge Street Upper School space. We hope to get the date officially set by the 2nd week of April so if you are interested in participating in the event by running an activity table, please keep your eyes out for a Save the Date coming soon!