

Highlights from

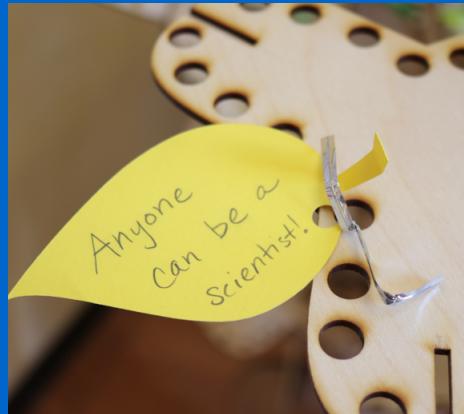


APRIL 13, 2019

MATHEMATICS, SCIENCE
AND TECHNOLOGY
DEPARTMENT

TEACHERS COLLEGE,
COLUMBIA UNIVERSITY

Mission and Vision



The Department of Mathematics, Science, and Technology (MST) held its second STEAMnasium on April 13, 2019, as part of the Teachers College Academic Festival.

The STEAMnasium is an interactive, exploratory STEAM (science, technology, engineering, the arts, mathematics) learning experience designed and hosted by MST faculty and graduate students. A key goal of this initiative is to demystify STEAM concepts and engage the attendees in open inquiry and playful learning experiences.

The STEAMnasium has become a staple of the MST department and a way to harness the connections between MST's three programs (Mathematics Education; Science Education; and Communication, Media & Learning Technologies Design), as faculty and students from each program participated and hosted activities as part of this event.

With support from the Lounsbury Foundation and the Teachers College Provost Investment Fund, the MST department was able to build on 2018's prototype event and grow STEAMnasium into a multi-room immersive experience that included 10 hands-on stations highlighting experiential learning and play, suitable for all ages.

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What's exciting about the STEAMnasium is that people have the opportunity to really just play. Too often in school -- with Mathematics and Science in particular -- kids don't get to play, and adults don't get to play with these concepts in real life. So STEAMnasium is a way for people to learn important things about STEM as part of a playful, fun experience.

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ERICA WALKER,
MST
DEPARTMENT
CHAIR



Passport to STEAMnasium

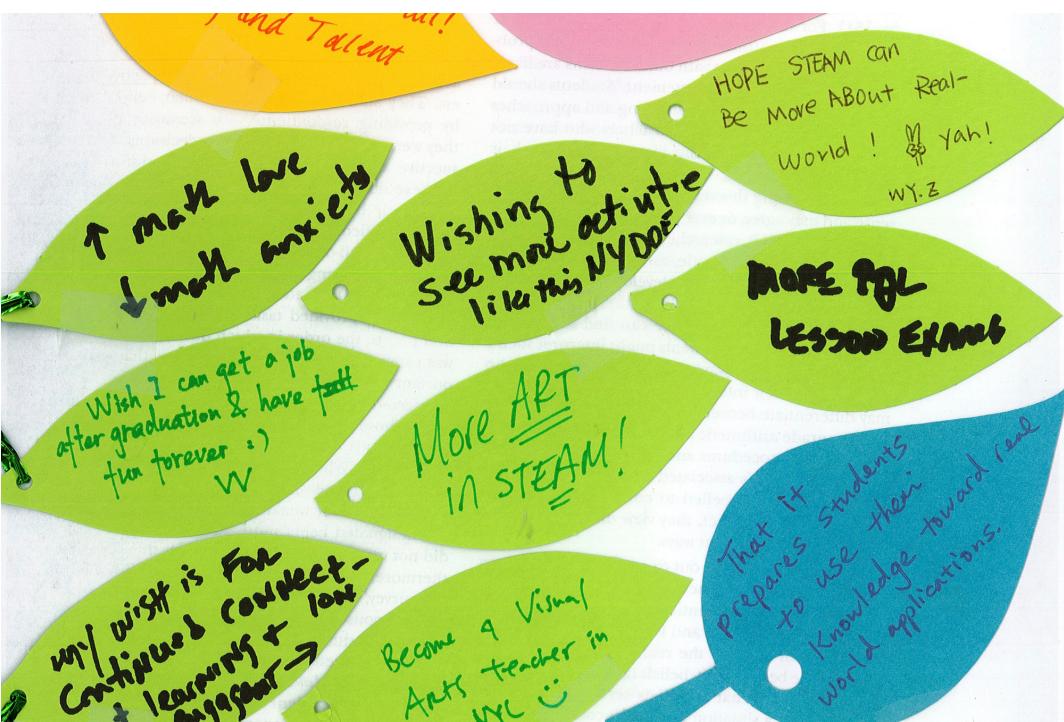
As attendees entered the STEAMnasium, they were given a STEAMnasium passport, where they could keep track of all the stations they visited by collecting a custom designed sticker at each station.



The passports proved to be a hit with adults and kids alike, and those that collected all of the stickers received the STEAM-themed card game EcoChains: Arctic Crisis, designed by MST Professor Joey Lee.

What's your wish for STEAM?

Upon entering the STEAMnasium, guests were also invited to share their wishes for STEAM education by pinning them onto our STEAM Wish Tree, designed and laser-cut by students in MST's Snow Day Learning Lab.



10 Interactive Stations

- 1** Hands-on with Virtual Reality and Interactive Holograms - Merge Cubes
- 2** Craft Circuits
- 3** City Planning: Exploring Measurement, Circuitry, and Design through STEM
- 4** Consulting Booth and Demo of Learning Management Systems in STEAM Classrooms
- 5** Tessellations
- 6** Fun with Geogebra
- 7** Does it Matter? Engaging with Interesting Items
- 8** Christa's Lost Lessons from the Challenger Mission
- 9** Paper Race to Deep Space: Let's Rocket!
- 10** Innovation Award (INA) Showcase



HANDS-ON WITH VIRTUAL REALITY AND INTERACTIVE HOLOGRAMS - MERGE CUBES

The Games Research Lab offered an immersive chemistry lab experience where attendees became a scientist -- lab coats and all! -- and conducted various kinds of experiments. The VR chemistry lab is a collaborative project between the Gizmo EdTech Lab and the Games Research Lab, and supported by Google.



CRAFT CIRCUITS

The Snow Day Learning Lab hosted a Craft Circuits station where families designed light-up cards using paper circuitry tools such as LED stickers and copper tapes. Children made cards for all occasions, and Easter cards were especially popular given the date of the event. One young attendee drew a bunny and used these tools to light up his nose for her Happy Easter card.



CITY PLANNING: EXPLORING MEASUREMENT, CIRCUITRY AND DESIGN THROUGH STEM

The Center for Technology and School Change (CTSC) invited attendees to light up a miniature city, with an embedded lesson on urban planning, circuitry, and design. Students added elements like buildings, traffic lights, and buses to make the city come alive.

CONSULTING BOOTH & DEMO OF LEARNING MANAGEMENT SYSTEMS IN STEAM CLASSROOMS

The Gizmo EdTech Lab interacted with educators across domains and grades to help them identify the barriers and opportunities of using Learning Analytics in their teaching. Researchers listened to educators' perspectives about what they want to achieve in teaching with data, and offered actionable suggestions to leverage educational data in their teaching and curriculum design.



TESSELLATION STATION

The Tessellation Station from the Mathematics Education program allowed attendees to explore and build two and three-dimensional shapes, patterns and tilings through examples from the real world and iPad-based games. Through play, attendees explored mathematical concepts like symmetry, balance, scale and logical reasoning.



FUN WITH GEOGEBRA

The Fun with Geogebra station, also from the Mathematics Education program, engaged attendees with Geogebra software to explore captivating geometry concepts!





DOES IT MATTER? ENGAGING WITH INTERESTING ITEMS

At the "Does it Matter? Engaging with Interesting Items" station, graduate students from the Science Education program invited attendees to make colorful slime.



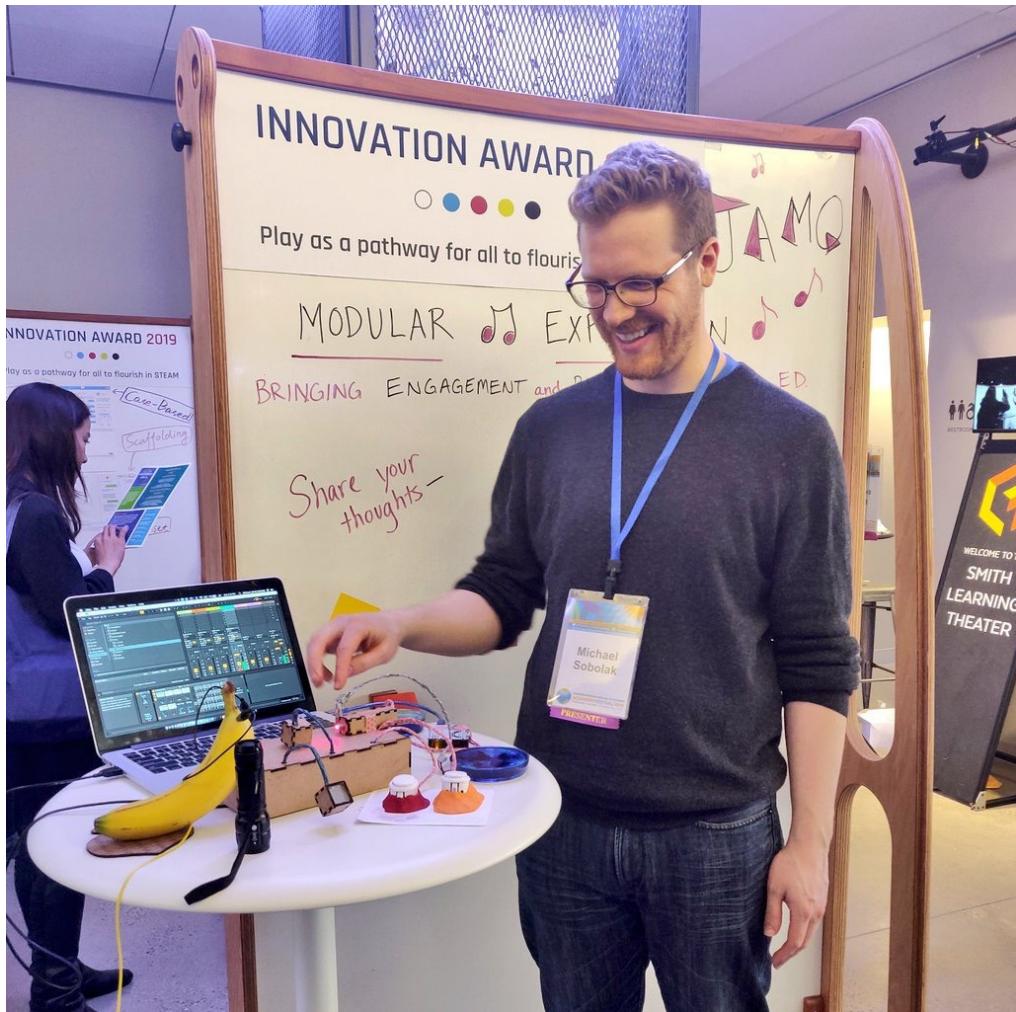
CHRISTA'S LOST LESSONS FROM THE CHALLENGER MISSION

Nearby, presenting "Christa's Lost Lessons from the Challenger Mission", a team of young scientists introduced science lessons inspired by Christa McAuliffe. McAuliffe was chosen by NASA to be the first teacher in space; however, due to the tragic fate of the Challenger space shuttle, her science lessons never got to be shared with children around the world -- until now.



PAPER RACE TO DEEP SPACE: LET'S ROCKET!

The Science Education program's Paper Race to Deep Space: Let's Rocket! station was especially popular among our young attendees, who had a great time shooting paper rocket down the hallways of Teachers College.



THE INNOVATION AWARD SHOWCASE

Last but not least was the Innovation Award Showcase (INA), taking place in the state-of-the-art Smith Learning Theater. The INA is a university-wide initiative organized by MST's Communication, Media, and Learning Technologies Design Program, which encourages students to come up with research-based solutions to some of today's pressing technological challenges.

"Jam-Q," a tech tool that makes music education more accessible and personalized, took home the Grand Prize, as well as the People's Choice Award.

Research Activities

The STEAMnarium is designed to promote engagement with mobile apps, digital and non-digital games, curricula, and other emergent materials intended to enhance STEM instruction and promote STEM learning. In tandem with these efforts, we are curious about the pedagogical benefits for educators who attend these events.

Thus, we are simultaneously embarking on a set of research activities aimed at addressing research questions about the impact of experiential learning activities on teachers' STEM dispositions and classroom practice.

1. What interactive, experiential learning activities related to STEM concepts are most engaging and productive for teachers' pedagogy and positive dispositions towards STEM?
2. How do teachers incorporate learning in and from an informal STEM environment (STEAMnarium) in their practice?

This exploratory project is framed by a sociocultural theory of learning that defines learning as experiential, situated, and contextual. In other words, through experience - with materials, tools, practices, models - STEM concepts can be contextualized to increase the likelihood that they will be seen as relevant, engaging, and useful for inquiry-based classroom instruction.

To pursue this research, we are pairing innovative uses of digital methods of data collection with strong qualitative traditions of inquiry to pursue a robust set of understandings about how educators experience and continue to engage with STEM concepts they encounter at the STEAMnasium.

Methods of inquiry include:

Observations



Wearable trackers



Exit surveys



Video-based analyses



Multimodal artifact analysis



Spatial analysis



Following the April STEAMnasium, we conducted exit interviews with an initial group of educators who were in attendance, gathered surveys from 50 attendees, and collected a variety of artifacts and documentation that were produced during the event.

We will follow up with more extensive interviews of pedagogical practice with the initial six teachers, and extend that recruitment to reflect teachers across the K-12 spectrum who will attend the November STEAMnasium.

Classroom visits and extended multimodal analysis of artifacts will be conducted in the next phase of research, and together analyses of these data can be used to construct portraits of STEM teacher learning and engagement with an immersive, interactive learning environment like the STEAMnasium.

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[I found] more ways to incorporate technology into the classroom, which can sometimes be difficult... Sometimes technology is just dumped on you and you have to figure out how to use it. [At STEAMnasium] I can see how I can apply this to my curriculum easily, as opposed to having to sit down and figure out how the technology works and figuring out how you can incorporate it into the curriculum.

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MIDDLE SCHOOL
STEM TEACHER

“

STEAMnasium reminded me how important discovery is.

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HIGH SCHOOL
MATHEMATICS
TEACHER

SAVE THE DATE

for the next



Tuesday,
November 5, 2019

Smith Learning Theater

*Teachers College,
Columbia University*

**MATHEMATICS, SCIENCE, AND TECHNOLOGY
DEPARTMENT
2019**

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STEM.TC.COLUMBIA.EDU**

**Photo credits:
Jonathan Zhang, Lori Strauss, Maria Vullo,
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