Supporting OST Staff in STEM Curricula

An ACT Now STEM Webinar
January 19, 2022
Agenda

○ Welcome and Introductions
○ Level Setting
  ◦ Who is ACT Now?
  ◦ What is STEM?
  ◦ Why STEM in OST?
○ Panelists’ Presentations
○ Panel Discussion + Q&A
○ Breakout Room Activity
○ Closing and Evaluation
Learning Goals

1. Learn about specific resources (and organizations) that aid OST staff in teaching STEM
2. Discover ways of reframing science curricula and questions to make the material more accessible for staff
3. Explore available curricula and analyze it for your own program
Introductions

Lesley Fisher Chapman  
she/her  
Program Coordinator  
Moderator

Nichole Pinkard, PhD  
she/her  
Associate Professor, Learning Sciences  
Northwestern University

Marwah Saleh  
she/her  
Education Programs Specialist  
Chicago Academy of Sciences / Peggy Notebaert Nature Museum

Melissa Siska  
she/her  
Student Programs Manager  
Chicago Academy of Sciences / Peggy Notebaert Nature Museum

Brianne Caplan  
she/her  
Executive Director, Code Your Dreams
ACT Now

ACT NOW!
Afterschool for Children and Teens

Click here to sign up for our newsletter!
Why focus on STEM?

Science, Technology, Engineering, and Math

Life Skills

College & Career Prep

Job Growth

Economic Sustainability
Why STEM in afterschool?

- Exposure to wide range of STEM topics and activities
- Hands-on, minds-on learning in an informal environment
- Lack of knowledge is not a barrier to high-quality programming
STEAMbassadors

Updated 1/13/21
Nichole Pinkard is testing software she developed, based on playground songs, for effectiveness in improving children’s reading skill. Photo by Bob Kuhlbach.
The purpose of STEAMbassadors is to offer an opportunity for Chicago and Evanston area college students to be trained to mentor youth in STEAM fields. STEAMbassadors serve as mentors in Chicago and Evanston organizations supporting programming for Black and brown youth.

This offers a STEAM education to both the youth and mentors involved.
STEAmassadors is a workforce initiative supported by a collaborative partnership between Northwestern University and Chicago Community Colleges.

**Founding Partners**

- City Colleges of Chicago
- Northwestern University
- Digital Youth Network

**Launch Partners**

- City Colleges of Chicago
- Harry S Truman
- Northwestern Office of Community Engagement Partnerships

**Launch Villages**

- Evanston Public Library
- Aerostar
- Avon Institute
- Metamickers
- Project SYNERGE
- Project Discovery

**Camp Partners**

- Evanstan Public Library
- Aerostar
- Avon Institute
- Metamickers
- Project SYNERGE
- Project Discovery

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**STAKEHOLDERS**

- Community college students and community educators trained to facilitate Summer of STEAM
- Families engaging in the Summer of STEAM challenge
- Decision-makers in the community STEM network engaging in community of practice around data-driven ecosystem equity design

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**SOFT INFRASTRUCTURE**

- STEAmassadors training model
- OST community of practice
- Summer of STEAM parent supports
- STEAMville regional activities
- Camp HoMaGo

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**INFORMATION INFRASTRUCTURE**

- STEAMville learning platform
- Dashboard and related practices to support intentional planning
- Opportunity landscape interactive GIS maps

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**HARD INFRASTRUCTURE**

- Training and camps in community hubs
- Summer planning utilizing local transportation and internet access opportunities
Implementation Sites

1. Austin Town Hall
2. Clark Park
3. Columbus Park
4. Douglas Park
5. Ellis Park
6. Franklin Park
7. Garfield Park
8. Homan Square Park
9. Kennicott Park
10. Lafollette Park
11. Moore Park
12. Taylor Park
13. Fuller Park
14. Tilton
15. Open
16. Virtual (Online)
The STEAMbassadors
STEAMbassador Timeline

**Phase 1: Applicant Recruitment**
- February
  - VISIT SV TO SUBMIT APPLICATION

**Phase 2: Hiring Process - Access to training requirements and resources**
- February-April
  - COMPLETE APPLICATION BOOTCAMP (STEAMville access and Intro to Social)
- April
  - Payment Partner Application Requirements (i.e. One Summer Chicago, UMichigan)
- May
  - + Comprehensive Orientation and Required Engagement (C.O.R.E.)
- June-August
  - *Summer Camps Launch* STEAMville STEAM Camps, Socials, and Tech Support
STEAMbassador Training

<table>
<thead>
<tr>
<th>Phases</th>
<th>Timing</th>
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<tbody>
<tr>
<td>Application Activities</td>
<td>March 19 - April 9</td>
</tr>
<tr>
<td>Foundational Training</td>
<td>May 16 - 29</td>
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<tr>
<td>Placement Training</td>
<td>May 30 - June 12</td>
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<tr>
<td>Camps &amp; Facilitation Support</td>
<td>June 13 - August 20</td>
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<tr>
<td>Post-Facilitation</td>
<td>August 20 - onward</td>
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STEAMbassadors

Over Two years **103 total mentors** have led STEAMbassadors camps.

*According to the “STEAMbassadors Post Survey 2020” Qualtrics Survey—not every STEAMbassador filled out this survey. 28 total STEAMbassadors responded to this survey. This background information represents ~60% of all STEAMbassadors.*
Youth Camper Experience
Camp HoMaGo: Live Virtual STEAM Schedule

**July 6 - August 7**
For 5th-8th Graders

**MONDAY/WEDNESDAY**

**Block A | 10:30-12 PM**
- Minecraft
- Silhouette Swag
- ProjX Launch

**Block B | 1:30-3 PM**
- App Design
- SportSense

**TUESDAY/THURSDAY**

**Block A | 10:30-12 PM**
- FUSE Studio
- PVC Carnival
- Redesign Play

**Block B | 1:30-3 PM**
- Coded Beats Club
- Interactive Storytelling

**FRIDAY**

**10:30-12 PM**
All campers are invited to join Freedom Fridays. Every week we will highlight campers’ work and celebrate each other.

Camp HoMaGo: STEAM Program Partners

![Program Partners Logos]
# Camp HoMaGo 2021: Snapshot of Summer STEAM Offerings

**App Design**
In Partnership with CECSE

Campers will design and develop an App using the Swift coding language. We do not anticipate a fully functioning app at the conclusion of a 6-week session, but it is expected that everything on the app is applied using Swift coding.

**Digital Media**
A HOMAGO Original

Digital Media will focus on projects that encourage campers to develop and express ideas through video, photography, music, and drawing.

**Interactive Storytelling**
In Partnership with 826 CHI

826CHI seeks to amplify young voices by exploring endless possibilities through the power of writing. Throughout the summer, campers will use their creativity to respond to a number of prompts blending writing and digital media.

**PVC Carnival**
In Partnership with Project Exploration

Step right up, step right up! This is no regular carnival! Campers will be given weekly engineering challenges and will have to complete builds using PVC pipes. Your camp mentor will assist you with tutorials and incorporating technology, such as sensors or lights, as you create a blueprint, description, and visual documentation.

**Silhouette Swag**
A HOMAGO Original

Silhouette Swag will encourage STEM identity by designing, creating, and re-imagining everyday artifacts and activities.

**Ariela’s Drone Squad**
A HOMAGO Original

KITS Included: Become skilled coders and drone-fliers in Ariela’s Drone Squad! Campers will learn the fundamentals of coding using Swift and by coding fun and challenging routines for a digital drone. By the end of summer, campers will know how and when to apply their knowledge of essential coding concepts and understand the power code has to significantly make a difference in the! Become a part of the Squad this summer-there’s a whole new coding universe waiting for you! Note: You’ll need an iPad to participate in this camp.

**Digital Music**
In Partnership with McGaw YMCA

In Digital Music, campers will explore different recording and producing methods that popular artists use to make music. In addition, campers will also explore the use of music and sound within different digital mediums, such as film, television, and more.

**Minecraft Mazes**
In Partnership with TiLT Lab

Campers will play in and design various world and challenges in the Minecraft Education Edition virtual environment. As part of this experience, campers will be introduced to concepts from computer science that can help them create puzzles for their peers to solve. The focal challenge that campers will interact with is an escape room house where each room features a different puzzle.

**Redesign Play**
In Partnership with NU/ETHS Partnership

In Redesign Play, campers will use a process of design thinking to reimagine and improve sports, games, and everyday activities. Mentors leading this offering will bring out campers’ creativity and collaboration, while exploring identity, empathy, and agency as youth design their world as they envision it could be.

**Fuse Studio**
In Partnership with FUSE

Using the FUSE website to complete a set of STEAM challenges, campers will create projects of interest to them while learning the tools and skills of STEAM professionals.

**ProX Launch**
In Partnership with Project Exploration

Blast off! During this camp you will learn more about the relationship between earth and space, explore the universe, and understand the innovation and creativity behind space travel. You will also apply your knowledge and build a rocket of your own.

**Coded Beats Club**
In Partnership with TiLT Lab

Coded Beats Club will encourage campers to explore creative musical expression through computer coding using the Python programming language.

**SportSense**
In Partnership with TiLT Lab

SportSense highlights the ways that sports and technology can work together to improve learning and athletic performance. Campers will test, design, and critique sports related technologies. Campers will also create their own sports related app or wearable.
STEAMville is an online platform that curates content such as challenges and activities in a group space for not only STEAMbassadors to complete their training and use during the lesson, but also for youth to engage in activities from various camps.
STEAMbassadors & Youth usage of STEAMville

1. Campaign Page
   - Youth select camps & join groups
   - Mentors access Freedom Friday Playlist

2. Profile & Groups
   - Profile recommended other activities on SV
   - Youth accessed Mentors to train as learners & teach content
   - Youth to access content, resources, & zoom links

3. Showcases
   - Mentors used #FreedomFriday reaction as admins
   - Youth viewed artifacts through playlist
Communal Activities

- Conversational; Using prompts
- Encourages group work
Individual Activities

- Platform specific (TunePad, FUSE Studio, iMovie, etc.)
- Encourages individual work
- Mentor-led introductions
Camp Work on STEAMville

Youth Work

- Work submitted to STEAMville (Redesigning Play, Cardboard Carnival, 826 Chi, and FUSE)

STEAMbassador Work

- Work submitted to the STEAM Playground
Camp Work on STEAMville

cupcakes
Submitted to: Create Your Own Remix - Alternate Prompts
Tue Jul 21 2020

Ellen
My song created in Edm loops its awesome

Charlotte Andry
Ellen! It was so nice to meet you and to hear your creative process with the songs you submitted! This is definitely a bop, and would be added to my dance playlist if I could LOL:) 16 days ago

View All Comments (2)

Add a comment... POST
The Research & Documentation
Core Research Questions

Social & Program
How are STEAMbassadors engaging with the camps and youth?

● How do mentors’ interests and identities develop as a result of participating in the SB program?
● How do informal educators learn from their peers in a professional development event?
● How do informal educators reflect on their experiences (especially peer interactions) from professional development to make decisions on their programs, organizations, and students?
● What are mentors’ trajectories through multiple STEAM mentoring experiences, and how does their expertise shift over time?

Platform
How are STEAMbassadors and youth engaging with the platform?

● How are people using villages and groups on STEAMville?
● How do people go about using activities to teach content to learners on STEAMville?
● How do people go about using activities to create content for learners on STEAMville?
● What are some best practices for implementing STEAM content on the STEAMville platform?

Ecosystem
How does the STEAMbassador initiative impact the opportunity landscape (opportunities and participation patterns) in our host communities?
SUPPORTING OST STAFF IN STEM CURRICULUM

Code Your Dreams

Empowering the next generation of community-minded tech leaders
Brianne Caplan
Executive Director @ Code Your Dreams
The value of a computer science education

- $0.58M lifetime earnings of a high school graduate*
- $1.19M lifetime earnings of a college graduate*
- $1.67M lifetime earnings of a computer science major*

A computer science major can earn 40% more than the college average.

*Net present value
What inspires our curriculum?
Students are not just coders.  
They are activists, builders, change-makers, advocates and disruptors.

#1: COMMUNITY DEVELOPMENT
Example 1:

COMMUNITY CENTERED DESIGN THINKING

- Classroom conversations
- Community values inventories
- User interviews with community members

![Community-based Problem Solving table]

List communities you are a part of and why they are important to you:

Examples include: family networks, sports teams, interest groups, friend groups, school groups ...

My Communities:

<table>
<thead>
<tr>
<th>Hispanic</th>
<th></th>
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<tbody>
<tr>
<td>Teen</td>
<td></td>
</tr>
<tr>
<td>Gen Z</td>
<td></td>
</tr>
<tr>
<td>DJ</td>
<td></td>
</tr>
<tr>
<td>Volleyball player</td>
<td></td>
</tr>
<tr>
<td>Cubs fan</td>
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</table>

Choose one of these communities. Identify some of the defining characteristics of this community:

You can use the rows provided as a starting point but feel free to add or change row labels to reflect what you think is most important in this community. You can work with a fellow member of your chosen community to complete.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>Age Range</td>
<td>varies</td>
</tr>
<tr>
<td>Language</td>
<td>english and spanish</td>
</tr>
<tr>
<td>Location / Setting</td>
<td>worldwide</td>
</tr>
<tr>
<td>Nationality</td>
<td>varies</td>
</tr>
<tr>
<td>Race or Ethnicity</td>
<td>varies</td>
</tr>
<tr>
<td>Mottos or tag-lines</td>
<td></td>
</tr>
<tr>
<td>Important symbols</td>
<td></td>
</tr>
<tr>
<td>Gender Identity</td>
<td></td>
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Example 2:

UI/UX DESIGN AND TESTING

- User Personas
- Wireframing and user testing activities
- Allows students to quickly mock-up their ideas and show them to peers and community members
#2: DIVERSE CAREER EXPLORATION
Program Overview

- Design Thinking
- UI/UX Design
- App Development
- Web Development
- Branding/Marketing
- Data Analytics/Science
# Career Pathways

<table>
<thead>
<tr>
<th>Product Manager</th>
<th>UX Researcher</th>
<th>Product Designer</th>
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<tbody>
<tr>
<td>Software Developer</td>
<td>Data Analyst/Scientist</td>
<td>Marketer</td>
</tr>
<tr>
<td>Sales Associate</td>
<td>Enterpreneur</td>
<td>Activist</td>
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</table>
How do we support staff who might not consider themselves coding experts?
Bring Industry Experts In
Prioritize Online Support Resources
Empower Teachers as Learners
"THERE IS NO GREATER POWER THAN A COMMUNITY DISCOVERING WHAT IT CARES ABOUT."

-Margaret Wheatley
Goal Setting Examples

- Do we want students to have a finished product at the end of the program?
- Or, are we more interested in empowering students with the skills/resources to continue learning after the program (and potentially create finished products after the program)?
- Are there certain careers that we want students to have exposure into?
- Are there certain skills (technical and non-technical) that we want students to gain experience/confidence with?
- What is the challenge level for this program?
  - Can students of diverse backgrounds/experience levels be in the same program?
  - Are there programs for students to enter after the program?
Create a positive relationship between people and nature through collaborations, education, research and collections, exhibits and public forums that fosters urban connections to our region’s nature and science.
How do we design our curricula?

**Youth development**
(critical thinking, cooperative learning, Interest in science, self-efficacy student discourse)

**Museum education**
object-based learning
(living & preserved collections, PNNM grounds)
& out of school STEM

**PK-12 Science education**
(NGSS) +
Environmental education
best practices
(including place-based)

Inquiry-based, participant-driven science education

**Midwestern and urban ecology**
Examples of topics we like to cover

Illinois Butterflies

Urban Birds

Local Habitats
“Objects can easily spark questions, which can be fairly simple such as ‘what is that?’ but can act as a stepping stone to critical thinking."¹

Objects are not age, language, or literacy-level specific.

Learning through objects, particularly museum objects, is therefore a democratizing endeavor that can help students gain confidence and express their curiosity.

OST Programming Components

- Museum educator taught lessons with unique museum specimens at your location
- STEM curriculum with hands-on materials prepped and ready to go
- Professional development workshop
- Community and family engagement through a Field Trip to Nature Museum with bus reimbursement
How do we support our OST staff?

- Teacher PD workshop to support with teaching pedagogy
- Modeling lessons in a we teach, you teach model
- Ready to go materials
Written curricula with prepped and ready to go materials
Field Trip to the Nature Museum to connect learning in and out of school
What do you notice & wonder?

4 Pillars of the Education Department
Questions? Comments? Stay in touch!

- Visit us at naturemuseum.org/SES
- Marwah Saleh, msaleh@naturemuseum.org
- Melissa Siska, msiska@naturemuseum.org

Let your imagination take flight
Questions for our presenters?
Breakout Activity!

In small groups, focusing on one letter of STEM, choose 1 resource that you want to explore more

- Are the topics relatable/interesting?
- Do they use accessible materials/objects?
- Are there built-in supports?

Explore the STEM Curricula Matrix
SEL Webinar: Creating an Intentional SEL Framework in Afterschool Environments
Tuesday, 2/8 from 10 am - 11 am on Zoom

Quality Standards Training 101
Thursday, 2/17 from 10 am - 1pm on Zoom

February Membership Exchange
Tuesday, 2/22 from 10 am - 11 am on Zoom

STEM Webinar: Big, Blue Rock (Integrating Geosciences into STEM Afterschool)
Thursday, 4/7 from 10 am - 11 am on Zoom
Additional Resources

- Afterschool STEM Guidebook
- STEM Curricula Matrix
- Equity and Inclusion Assets for Afterschool and Summer Programs

Access code: MGM2021
THANK YOU!

Don’t forget to fill out the evaluation so we can continue to offer free PD and training opportunities to our members!

Questions?
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