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# STEM Project-Based Learning: A Pathway of Partnerships

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**The Chicago Learning Exchange (CLX) is a backbone organization that connects and supports our city's array of 200+ out-of-school time organizations in order to better prepare youth, youth workers, and our city for the future.**

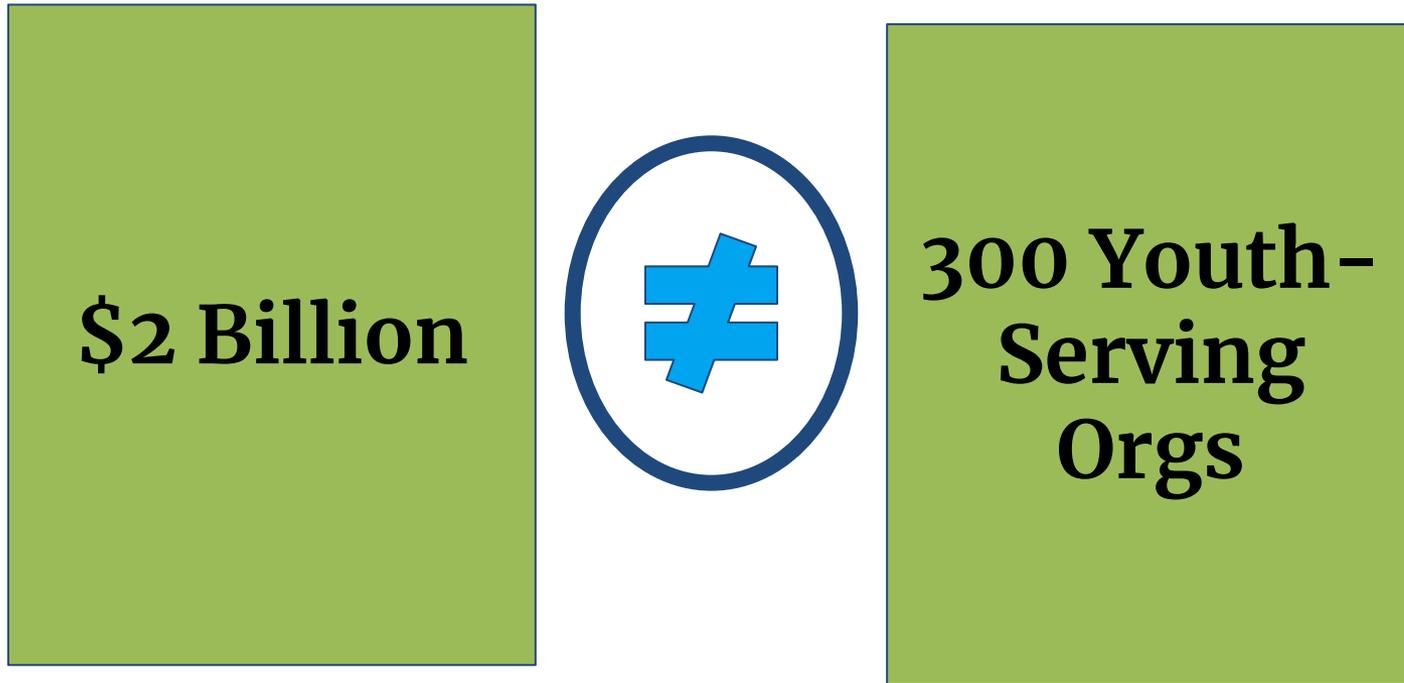


The Chicago Learning Exchange's mission is to *catalyze* racial equity, access, and quality in Chicago's out-of-school time (OST) ecosystem.

We envision an equitable learning ecosystem that nurtures youth brilliance across Chicago.

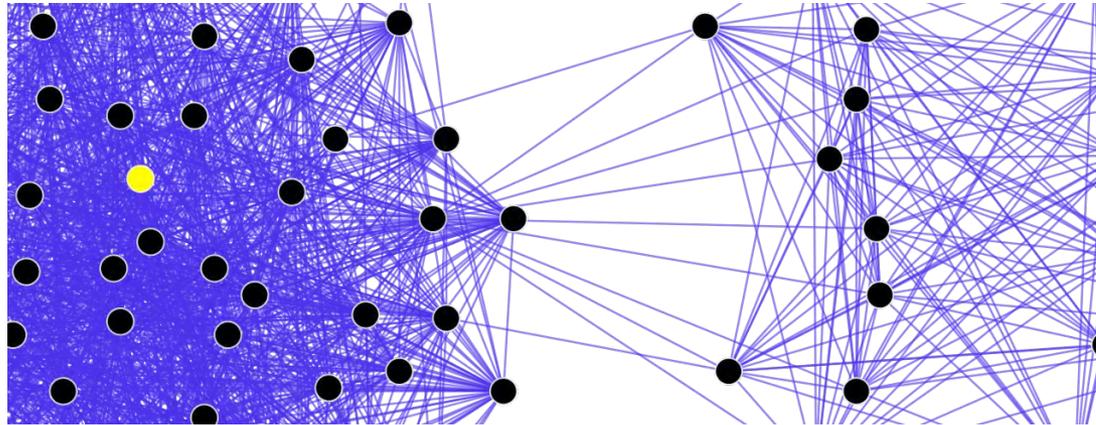
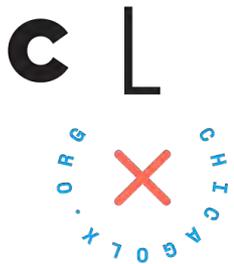
# What's the problem?

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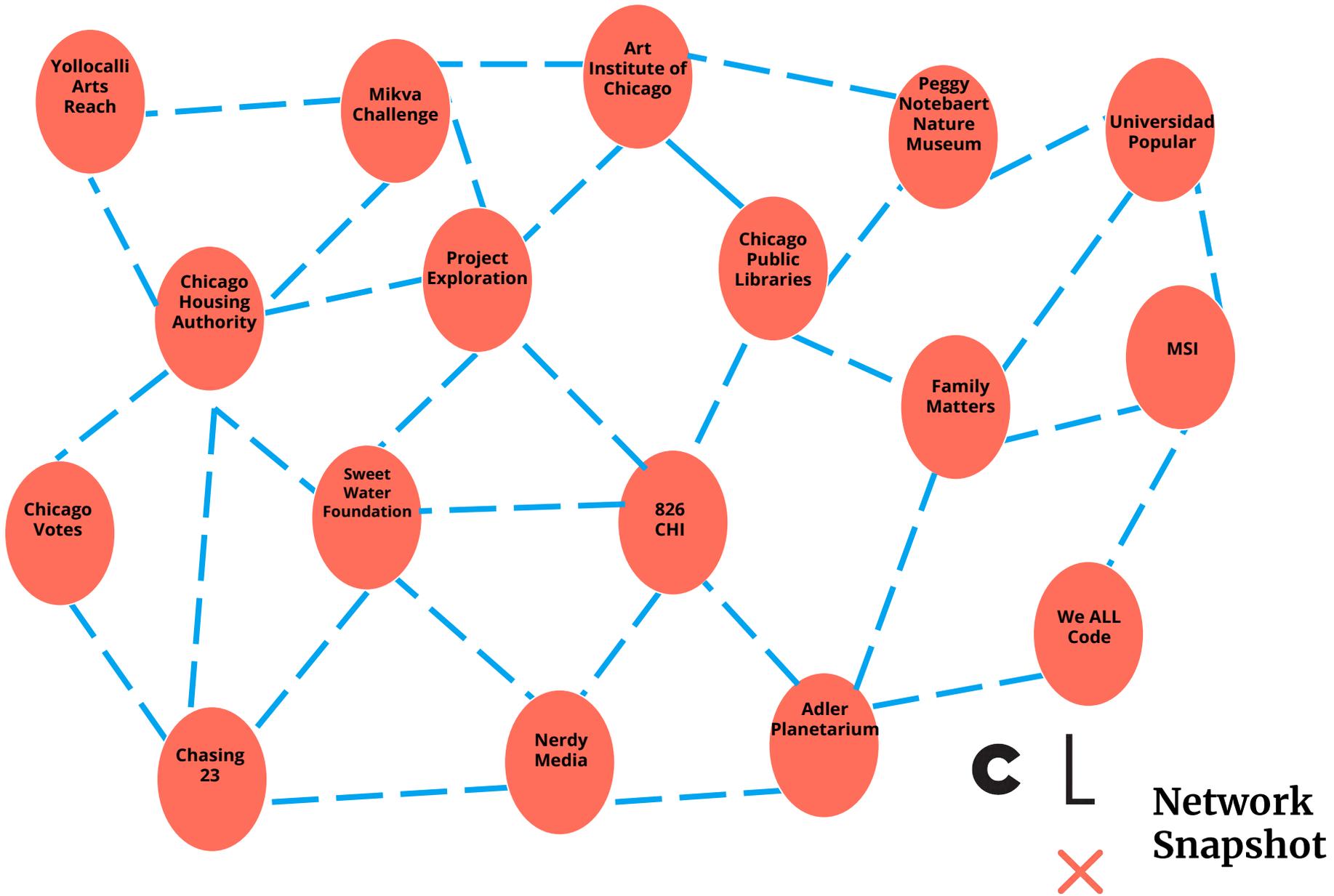


# What's the opportunity?

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**Until, CLX there is no organization whose mission it is to connect and support these 300-youth+ youth sector organizations in order to develop and coordinate strategies to better serve youth in Chicago.**



# To meet this goal, we have 3 core strategies

If we.....



- ★ **CONVENE** and **SUPPORT** learners, mentors, leaders to *re-imagine and expand out-of-school time opportunities*

- ★ **AMPLIFY** and **ADVOCATE** for liberating, relevant, experiential learning and work opportunities for both youth and educators

- ★ **INVEST** in expanding experiential learning across contexts for and with youth

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An education nonprofit focused on preparing the future workforce through programs that prioritize mentoring, skill building, and allowing students to see themselves in STEM fields.

We have been leaders in developing impact programming which connects students to mentors to foster **real connections**, create a line of sight to potential **career paths**, and spark a lifelong interest in **STEM**.



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**98%** of teachers reported their students improved their **STEM skills**

**90%** of our students are more **confident** in their STEM skills

**Confidence** in STEM skills is a leading indicator of students' likelihood to **pursue STEM in the future.**

**49** schools

**1800+** students

**58%** students of color

**56%** female-identifying students

**56%** low-income students

**11** counties in Illinois

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“ *Our mentor not only helped the team get some confidence, he was truly a person we could trust and look up to. He helped us find out what we were passionate about and then helped us apply it.* ”

-Student at North Chicago Community High

“ *This program helped me grow within my career. While I coached students to problem solve and to be innovative and thoughtful, I naturally took these skills back to the office and looked at everyday issues with new energy. It feels great to know that corporations are helping shape the leaders of tomorrow and students are helping shape the leaders of today.* ”

-Corporate Mentor

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Real-World Project Based Learning

Out of School Time

# CLX's Current Programs

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★ **Convening+Support = Collective Learning + Collective Action**

- + Monthly Meetups
- + Communities of Practice (CoP): Anti-Racism
- + Youth Mentorship
- Collect Impact Tables



**Amplify + Mobilize**

- + City-wide learning festival



★ **Celebrate Mentorship + Invest**

- + Brother Mike Award
- + OST Pass

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# Illuminating Energy Pathways Programs

# Problem Identification

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There is a growing demand for qualified workers in the electrical utilities industry. This is expected to grow given the age demographics of current employees. Additionally, the current talent pool does not reflect the diversity of the City.

# Work-Based Learning Programs

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Overhead Electrical Line work



Solar Construction work

# Program Overview

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Illuminating Energy Pathways is a summer “learn and earn” employment program focused on building pathways to the energy sector for Black and LatinX youth.

Partners:

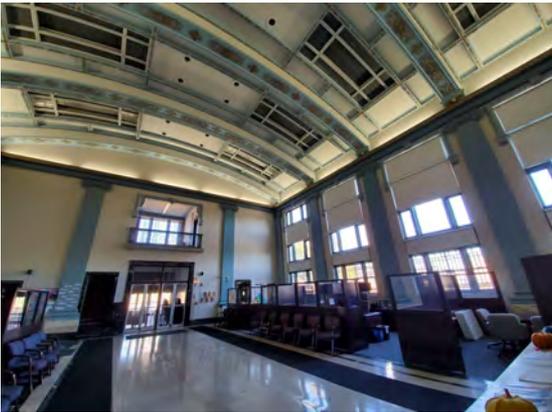


# Learning Concepts & Outcomes

- construction Field Concepts
  - Sustainability
  - Bidding process
  - Job Expectations
  - Safety
  - Building for community good
- Where the Solar industry is at today.
  - Photovoltaics
  - Looking at past and projected growth
  - The science behind energy production
  - Community Solar efforts
- Physical Fitness Education
  - Goal Setting
  - Building routines
  - Accountability
- Soft skills
  - Team building
  - Communication
  - Storytelling
  - Decision Making
- Hard Skills
  - Circuit building
  - Using hand tools
  - Power tools
  - CAD applications
- Career Paths
  - Safety Technician
  - Pole Inspector
  - Rigging
  - Auditor

# Building awareness

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National Bank of Austin



Infrastructure in our communities

### Geothermal Energy

Regardless the temperature outside, you will always feel comfortable inside Grant, Lincoln, and Douglas Halls. However, the process of heating and cooling these UIC buildings was one of the largest consumers of energy with the highest levels of greenhouse gas emissions on campus.

That is why we cut it in half.

The complex block contains a title, a diagram, and two paragraphs of text. The diagram, titled 'Geothermal Energy', shows a cross-section of the ground with buildings on the surface. Below the ground, there are two vertical wells. Red arrows point downwards from the surface into the wells, representing cooling. Blue arrows point upwards from the wells back to the surface, representing heating. The ground is depicted in shades of brown and tan, with some greenery and trees on the surface.

Geothermal in Chicago

# Preparing for Vocational Education

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We learned how to tie 10 different knots. Some were hard others were easier. Some knots could be done in seconds others took about 30 seconds. when first learning how to tie them. My favorite knot todo was the adjustable knot, it has a medium difficulty but is fun to do. It took about 30 minutes to learn all 10 of them.

# Promoting Energy Literacy

### Solar savings estimator

Estimate how much you can save on your electric bill with rooftop solar.



Shady  Sunny

**Estimated savings** \$10,000  
*Over 20 years after solar purchase*

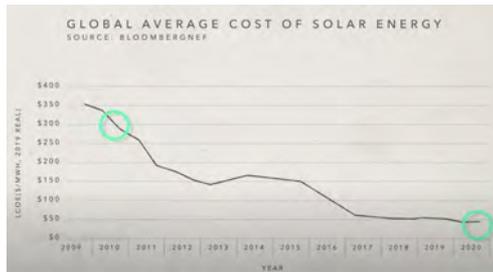
**Up-front cost** \$12,000  
*After incentives*

**Average estimated monthly savings**  
*Assuming a 2021 monthly electricity bill of \$80 and utility prices rising at a rate of 2.2% per year.*

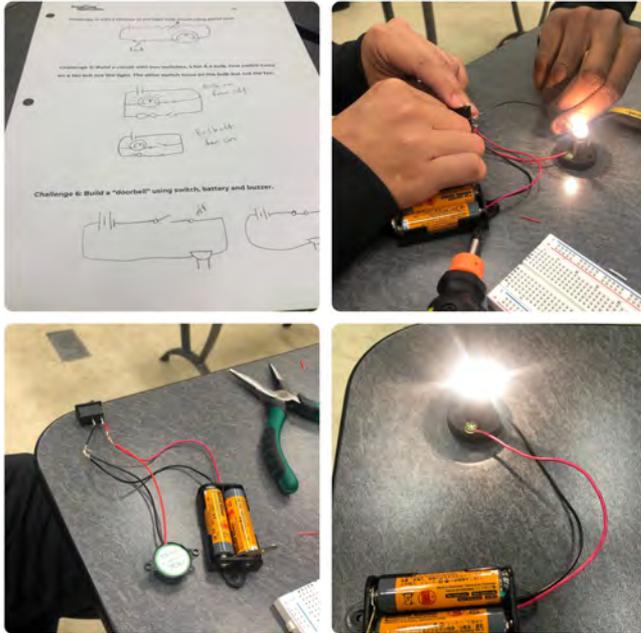
<b>\$96</b> <small>Monthly bill without solar</small>	-	<b>\$30</b> <small>Monthly bill with solar</small>	=	<b>\$66</b> <small>Savings per month</small>
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Solar savings are calculated using roof size and shape, shaded roof areas, local weather, local electricity prices, solar costs, and estimated incentives over time.

Source: Project Sunroof



# Promoting Energy Literacy - cont.

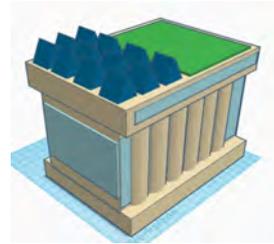


Calvin, Adrian, and I worked as a group to complete the challenges and make circuits. There were many difficulties but the activity was fun. We burned out some of the materials we used from trial and error.  
-Miguel

# Skills, Role Modeling, and Building Pathways

## + Tools

- Hand tools
- Power drills
- Soldering iron
- Measurements
- PPE
- 2D/3D CAD



## + Soft skills

- Communication
- Decision Making

## + Perspective

- Field Experts
- Dawson Admin
- Examples of Success



“My favorite part of the walk was the welding area, I like putting things together and I thought that was really cool that they had a focus on women doing that work.” Kayla on our Dawson Tour

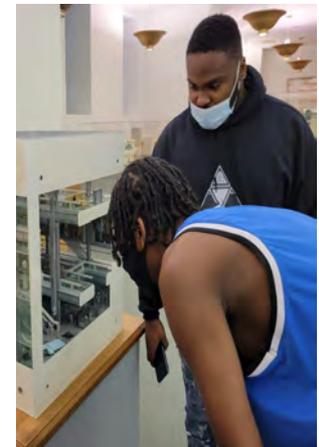
# Students' Perspectives

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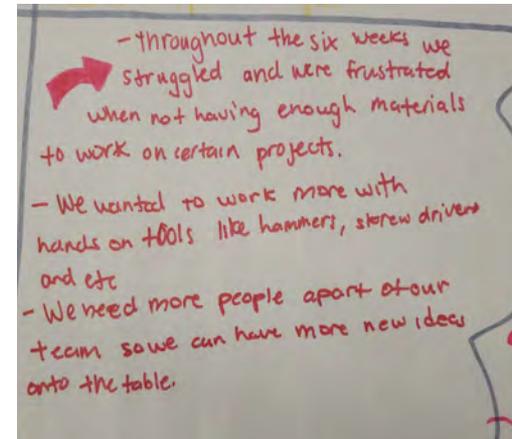
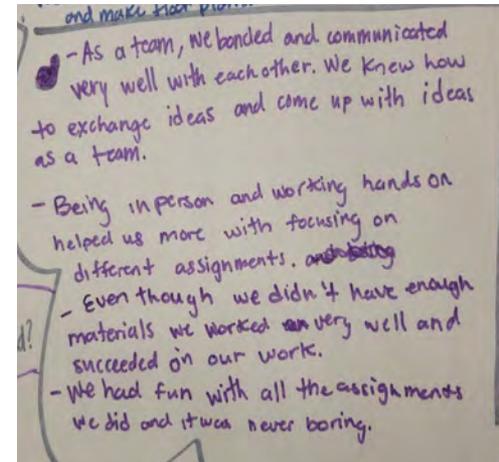
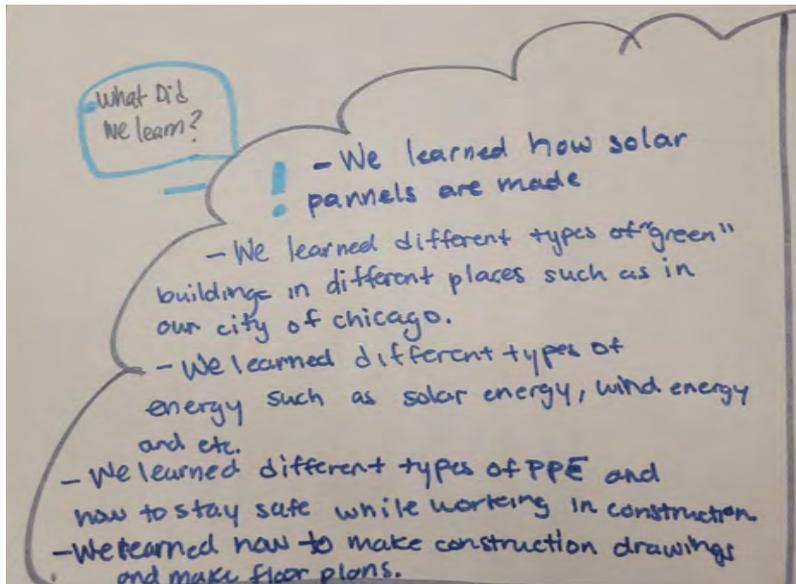
“A time where I felt frustrated is when playing the game, we were reading the scenarios off the cards and some of the cards gave scenarios that people of color or gender or their overall appearance makes other people make them not want to hire them for a job and they discriminate them. Knowing that the scenarios actually happen in our society today is very frustrating.” – Cecilia frustrations

“I would chose to see if someone inside the group can take the MEP's place. Someone inside the group would have the skills and [we were already set to] the finish the project on time.” Derrius on decision making

“Architects use geometry to study and divide spaces as well as draft detailed building plans. Builders and engineers rely on geometric principles to create structures safely.” – Tyrese on construction drawings



# Students' Perspectives - cont.

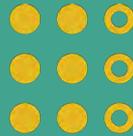


Student's Program Evaluation

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6 weeks, 3 diverse organizations, 1 amazing high-impact program.

Always innovating



# The 6x3

## PROJECT

The **6X3 Project** is a collaborative experience that supports student discovery. Students navigate their world and the pathways available within STEM to form powerful outcomes. This program is designed to spark creativity, celebrate wonder, and build student capacity with relevant and real world skills.

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# Teacher Externship

## PROGRAM



- Externships are a critical link between the context of industry and the content of a classroom
- This experience will provide educators with relevant, real-world professional learning through an innovative collaboration.
- Externship programs create lasting partnerships between workplaces and local schools which as a result, give students real-world career information about career possibilities locally.
- Teachers get the opportunity to experience and use the latest real-world applications of STEM disciplines to better inform their teaching practices and prepare students to enter the STEM talent pipeline after high school.

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Real-World Project Based Learning

**During School Time**

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STEM

## Challenge

**STEM Challenges** are real-world projects that create opportunities for high school students to work alongside STEM professionals as mentors. Students and mentors from STEM Challenge industry partners collaborate over the course of six months to explore, create, and build innovative solutions.

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STEM

Challenge

- Problem statement authentic to a company's mission
- Ongoing skills based volunteering for employees
- Impact up to 50 high school students
- Work-based learning model
- Future workforce development
- Life changing



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STEM

Challenge



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## Mentor Matching

ENGINE

**Mentor Matching Engine** is an online collaboration tool that links students and mentors anytime, anywhere

- providing direct access to communicate with mentors in a safe and secure virtual environment.

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<https://www.istcoalition.org/mme-mentorship-signup/>



MME students gain insight, world-learning, letters of a recommendation, grants, undergraduate level research opportunities, and new career awareness. It's a world of endless possibilities!

- Ongoing **skills-based volunteering** for employees
- **Synchronous and asynchronous connection** for all busy schedules
- Connect with students **across the state** without the constraints of traditional mentoring

## Become a Mentor

