STEM Pathways Cooperative Learning Ecosystem
NSF Grant Abstract
4-28-16 Convening
Peggy Notebaert Nature Museum

This project will use a collective impact approach to develop Pre K - college STEM learning pathways for Chicago Public School (CPS) students from communities traditionally underrepresented in the sciences. Specifically, the Chicago STEM Learning Ecosystem will address the STEM learning environment in up to four neighborhoods in Chicago, with CPS populations composed primarily of African Americans and Latinos. To do so, the Chicago STEM Learning Ecosystem will work alongside local stakeholders - including parents and youth - to map the assets and existing opportunities in Demonstration Community neighborhoods.

Broadening participation of diverse groups in the STEM enterprise is a necessary effort to bolster the country’s long-term competitiveness in global business. According to the CADRE brief released in April 2016, “Members of underrepresented groups report not being encouraged to pursue STEM fields… regardless of where points of intervention lie, broadening-participation initiatives are typically designed under the assumption that there exists a ‘dominant pipeline’ toward STEM careers.”

The STEM Learning Ecosystems, built on a decade of research and collaboration, was launched in 2015 as a national effort to nurture and scale a network of STEM learning opportunities. As one of 27 communities to pilot the national initiative, Chicago is uniquely positioned to demonstrate the effectiveness of cross-sector collaboration and collective impact towards broadening inclusion and access to STEM learning opportunities. In 2012, Project Exploration (PE), a science education nonprofit organization, began laying the foundation for the Chicago STEM Learning Ecosystem by leading a survey to understand the STEM landscape of the city. The data and findings from this “State of STEM in Out-of-School Time in Chicago” survey were made publicly available and shared at a convening of more than 100 organizations. This landscape study revealed several relevant Chicago-specific trends:

- More than 2,032 STEM out-of-school-time (OST) programs were run by more than 500 organizations in 2011, serving an estimated 88,576 students;
- There is relative under-participation of Latino youth and shortage of programming in Latino communities;
- There is a low percentage of engineering-focused programming for youth (roughly 0.9% of all programs);
- There is a disproportionate concentration of activity during the school year and located on-site at schools;
- There is a lack of citywide coordination and common language around OST STEM programs; and;
- Programs are generally available throughout most, but not all, Chicago neighborhoods.

Through 2014, a leadership team of stakeholders from across Chicago’s youth development and STEM funder community came together as the Chicago STEM Pathways Cooperative (STEM Coop) to wrestle with critical questions about access and equity in STEM OST programming: Who is being served and who is not? How many opportunities are available, where and when, and what content is being offered? How can organizations cooperate to keep young people involved with science, technology, engineering and math? How can the City make it easier for young people from populations historically underrepresented in STEM professions to access STEM programs?

In March 2014, Chicago’s Office of the Mayor launched a citywide strategy to increase Chicago students’ access to high-quality STEM learning experiences from early childhood through college and career. Virtual
STEM opportunities and digital badging through the Chicago City of Learning initiative broadened access to all students. In support of this citywide strategy, the cross-sector STEM Coop, led by PE, convened funders and STEM program providers to share data and recommendations from the 2012 landscape survey. Building upon years of collaboration, data collection, and cross-sector collaboration, the STEM Coop developing the Chicago STEM Learning Ecosystem, one of the pilot communities of a national effort to enhance STEM programming for youth.

The Chicago STEM Learning Ecosystem will bring together disparate STEM education-focused organizations to create equitable and accessible pathways to STEM learning opportunities for students from traditionally underrepresented groups by addressing the identified gaps in availability, access, participation, and opportunity based on geographic location, age, gender, and socioeconomic status. These data highlighted the need for a shared language; a common agenda, goals, and outcome measures; and intentional collaboration and coordination among all STEM education providers in the city. The Chicago STEM Learning Ecosystem will address these challenges through key priority areas (see below).

The knowledge, findings, best practices, and tools developed through this INCLUDES project will be shared locally across the STEM Coop, to PE’s partner STEM ecosystem in Evanston, Illinois and across nationally to improve the development of STEM pathways and learning opportunities for students from underrepresented groups and contribute to the knowledge base of the community of practice.

**Strategic Plan**

The Chicago STEM Learning Ecosystem will use a collective impact approach to address the challenge of broadening access and participation of African American and Latino CPS youth in STEM programming, both in-person and virtual. As the backbone organization, PE will continue to guide vision and strategy for the Chicago STEM Learning Ecosystem, convene partners, build public will, and mobilize funding from foundations and corporations. Over the past two years, the STEM Coop has convened diverse stakeholders in STEM programming, such as funders, nonprofit organizations, businesses, City agencies, museums, parents, and youth to begin development on a common agenda for STEM in Chicago, focusing on African American and Latino CPS youth. Data from the 2012 landscape survey have been instrumental in driving this agenda. In summer 2016, the Chicago STEM Learning Ecosystem will disseminate a second landscape survey to determine new gaps and opportunities, and to further hone shared vision and goals.

Our strategic plan identifies five priority areas in service to the common agenda: 1.) Effective communication strategies; 2.) Outreach to diverse stakeholders; 3.) Broadening professional development in the OST community; 4.) Developing an evaluation strategy and collecting data; and 5.) Developing STEM learning pathways. These priority areas reflect the multi-faceted challenge of broadening participation of African American and Latino youth in quality STEM experiences. Each of these priority areas will be led by a cross-sector leadership team; these teams will regularly convene to discuss and determine actionable items and align resources to the common agenda of building a coherent network of high quality in-person and virtual STEM programs for youth. The work of this INCLUDES project will address these priority areas by developing up to 4 *Demonstration Communities*.

**Year One objectives are:**

- Conduct outreach to STEM asset organizations, people, and institutions within *Demonstration Community* neighborhoods.
- Recruit and engage parent and teen stakeholders for neighborhood and leadership meetings.
- Use the Asset Based Community Development model to map community STEM assets.
- Develop a continuous form of communication and social media presence.
- Distribute an updated survey to map the STEM learning landscape of Chicago.

Year Two objectives are:
- Hold regular *Demonstration Community* neighborhood and leadership meetings.
- Use a data-driven approach from surveys and mapping to connect and expand STEM learning opportunities for African American and Latino youth in *Demonstration Communities*.
- Pilot and evaluate effectiveness of mutually reinforcing activities, such as professional development, to enhance STEM learning for youth in *Demonstration communities*.

**INCLUDES Pilot Project: Building Demonstration Communities**
This INCLUDES project will support the Chicago STEM Learning Ecosystem in piloting these key priorities in *Demonstration Communities* chosen after considering demographics and data from the 2012 STEM landscape survey: Austin, Belmont Cragin, Pilsen, Washington Park and Woodlawn neighborhoods on the south and west sides of Chicago. Neighborhood demographics are as follows:

<table>
<thead>
<tr>
<th>Neighborhood</th>
<th>% of Households Below Poverty Level</th>
<th>% of Individuals who do not have a high school diploma</th>
<th>African American Population</th>
<th>Latino Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austin</td>
<td>27%(^5)</td>
<td>25%(^5)</td>
<td>85%(^6)</td>
<td>9%(^6)</td>
</tr>
<tr>
<td>Belmont Cragin</td>
<td>19%(^7)</td>
<td>37%(^7)</td>
<td>79%(^8)</td>
<td>3%(^6)</td>
</tr>
<tr>
<td>Pilsen</td>
<td>27%(^9)</td>
<td>44%(^9)</td>
<td>78%(^10)</td>
<td>3%(^10)</td>
</tr>
<tr>
<td>Washington Park</td>
<td>39%(^11)</td>
<td>28%(^11)</td>
<td>96%(^12)</td>
<td>0.1%(^6)</td>
</tr>
<tr>
<td>Woodlawn</td>
<td>28%(^13)</td>
<td>18%(^13)</td>
<td>91%(^14)</td>
<td>2%(^6)</td>
</tr>
</tbody>
</table>

Serving African American and Latino populations in the *Demonstration Communities*, the Chicago STEM Learning Ecosystem will use a collective impact approach to network and provide accessible STEM learning opportunities to youth. The key priority cross-sector leadership teams will support mutually reinforcing activities within these communities - communication, outreach, professional development, data collection, and pathway development.

Over the course of two years, the Chicago STEM Learning Ecosystem will convene neighborhood meetings within the *Demonstration Communities* to map assets and collect data on STEM learning opportunities at the local level. The approach will be framed by the Asset Based Community Development (ABCD) model\(^{15}\), drawing upon existing community strengths and priorities. Given that ABCD is concerned with how to connect community's micro-assets to the macro-environment, it provides a rich model to develop and support a common STEM agenda at both the neighborhood and citywide level. For the *Demonstration Communities*, the goals are to a.) shed light on the existing STEM learning infrastructure within communities, b.) support local stakeholders in identifying priority areas for STEM learning within their neighborhoods, and c) help communities tap into STEM learning assets in the city.

Data and effective practices from the *Demonstration Communities* will be shared nationally and will serve as models for how cross-sector stakeholders can be engaged with a common agenda to enhance STEM
learning for youth. As the Demonstration Communities evolve and grow, the effective practices and lessons learned will be shared broadly, particularly with the larger national STEM Learning Ecosystem and the nearby Evanston STEM ecosystem. The Chicago STEM Learning Ecosystem aims to scale the Demonstration Communities to additional Chicago neighborhoods, based on data collected from the landscape survey. Results gathered from two years of work within four Demonstration Communities will position the Chicago STEM Learning Ecosystem to launch a successful NSF INCLUDES project with other STEM communities of practice within the national initiative, thereby building upon and leveraging existing support.

**Intellectual Merit**
This INCLUDES project will collect new data on citywide STEM programming opportunities available for youth and use this data to inform work in the Demonstration Communities. The pilot’s activities open opportunities for research, such as how fidelity of implementation and processes affect outcomes for youth. To this end, the Ecosystem will engage researchers early in the development of Demonstration Communities. The project promises to share effective practices across Chicago and inform the national STEM ecosystem effort, particularly how the ABCD model can be used to frame and support partnerships and collaborations between neighborhood microsystems and the larger Chicago education macro system.

**Broader Impacts**
The STEM Learning Ecosystem will focus on enhancing and developing STEM learning pathways for African American and Latino youth. This project will leverage assets and priorities in up to four Demonstration Communities to map, illuminate, and develop STEM learning pathways. Data and effective practices from the Demonstration Communities will be shared with the national STEM Learning Ecosystems and will serve as models for how cross-sector stakeholders can be engaged with a common agenda to enhance STEM learning for youth.