

**Evanston Community Consolidated School District 65**  
**Broadening and Deepening a STEM Learning Ecology Framework in Evanston**  
**Three Years to “Infinity and Beyond”**  
**May 14, 2015**

## **I. Overview**

Developing science, technology, engineering, and math (STEM) interests and skills is a gateway to opportunity. Given that STEM and healthcare careers represent the fastest growing career sector in the U.S. economy, engaging students so that they can pursue and master STEM skills, content, and creative thinking approaches can have a profound impact on their futures. However, achieving STEM literacy is particularly challenging in urban school districts, where significant numbers of youth live in low-income households and come from backgrounds not typically represented in STEM careers. There is a critical need to reach these youth and foster their STEM learning in order to open the array of growing STEM career opportunities.

Imagine a city landscape where STEM classroom learning is transformed by the interest-based pursuits of students in their after-school programs; where students pursue pathways to master STEM skills that begin in the classroom and continue in the after-school or summer program setting; and where educators coordinate thematic units across the in-school and out-of-school settings to pique and foster STEM engagement among the under-represented and hardest-to-reach youth. This proposal aims to build upon existing and create new approaches to in-school/out-of-school STEM learning, specifically targeting youth in Evanston Community Consolidated School District 65 (D65) and Evanston Township High School District 202 (ETHS) who have been traditionally under-represented in STEM-related fields.

The work described here will help 1) understand how low-income youth access out-of-school STEM programming and assess the longer-term impacts on their learning, 2) build unique partnerships between teachers, out-of-school providers, and STEM professionals to develop coordinated approaches to extend and enrich STEM learning for at-risk populations, and 3) expand successful STEM programs to better engage under-represented populations. This work is part of a strategic effort by D65 and key community stakeholders to create the infrastructure and provide preliminary data for future scale-up funding opportunities. Lessons learned from a small urban community like that served by D65 and ETHS will be broadly applicable to the field and could inform efforts to narrow the achievement gap in other, similar and larger urban centers.

## **II. Introduction**

Evanston, Illinois is an urban, mid-size college town and a top-rated city<sup>1</sup> to live in this country – rich in diversity, ecology, institutions, and commercial resources. But Evanston is

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<sup>1</sup> “America’s 50 best cities to live in”, 24/7 Wall St., USA Today, 9/18/14

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also home to many extreme contrasts. Blocks away from the hundreds of beautiful mansions, there are thousands of families living in poverty. Despite multiple, thriving commercial districts, there are economic deserts in two of the city's neighborhoods. In a town with wonderful neighborhood elementary schools, children from one community are bussed to four different schools located in other communities far from home. And while the city's high school boasts of numerous national awards for scholarship and academic attainment, it also has the largest cumulative achievement gap in the entire state of Illinois<sup>2</sup>.

D65 is Evanston's K-8 school district and serves over 7,000 elementary and middle school youth. D65 feeds into ETHS (administered by District 202), which serves close to 3,000 students. Like many urban school districts, a significant number of students are from disadvantaged households. Approximately 41% of Evanston students come from low-income families and 43% come from backgrounds typically underrepresented in STEM-related fields. Despite going to high-quality schools, low-income youth face early and persistent deficits in achievement. By the third grade, the percentage of low-income students who meet or exceed state math (40%) and science (62%) standards is far below the comparable percentages for non-low-income students in math (85%) and science (92%), respectively.<sup>3</sup> By the time they reach 11<sup>th</sup> grade, Evanston students living in low-income households score 57.9 percentage points below their non-low-income peers on the math portion of the Prairie State Achievement Examination (PSAE) – the largest gap in the state. These gaps in academic achievement have profound impacts on high school and college graduation rates, and career success rates between residents by race, ethnicity and family income level.

STEM literacy and advancement is one key lever that can alter this persistent, disparate citywide issue. According to the U.S. Department of Commerce,

- STEM occupations are projected to grow by 17.0 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations,
- STEM workers command higher wages, earning 26 percent more than their non-STEM counterparts,
- More than two-thirds of STEM workers have at least a college degree, compared to less than one-third of non-STEM workers, and
- STEM degree holders enjoy higher earnings, regardless of whether they work in STEM or non-STEM occupations.<sup>4</sup>

By engaging under-represented students in relevant, engaging and accessible STEM experiences and pathways, they will develop the skills necessary for future school and career success. STEM programming can expand children's capabilities to create and problem solve. In the process, their minds are primed to master the technical and critical thinking skills inherent in science and engineering design work.

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<sup>2</sup> ISBE Website: 2014 ISAT & PSAE data

<sup>3</sup> ISBE Website: [www.illinoisreportcard.com/District.aspx?source=Trends&source2=AchievementGap&Districtid=05016065004](http://www.illinoisreportcard.com/District.aspx?source=Trends&source2=AchievementGap&Districtid=05016065004)

<sup>4</sup> Langdon, David et.al, (2011) *STEM: Good Jobs Now and for the Future*. Washington D.C., US Dept. of Commerce.

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Evanston wants to ensure that, in reality, it is the best place to pursue a successful career for every resident. The ultimate goal is to achieve STEM literacy for all youth through the creation of a coordinated and collaborative in-school/out-of-school STEM learning ecology framework. As a first step, this grant proposes to build the infrastructure, establish the relationships, and collect the data that will set up all D65 students for future STEM success.

What does this entail? We specifically will:

- Target the youth populations that are under-performing, under-resourced, and under-represented within the STEM fields.
- Create a coordinated STEM network of teachers, out-of-school providers, community centers, and university researchers.

Our focus will be to:

- **Understand** how youth (particularly low-income students) navigate through available STEM out-of-school opportunities and how those STEM programs impact academic success.
- **Build** new collaborations between teachers, out-of-school providers, and STEM professionals, resulting in novel curricula and activities.
- **Expand** the capacity of STEM providers and educators—both in the classroom and in out-of-school settings—to increase participation and engagement of our targeted populations.

### **D65 STEM Education Vision:**

In District 65, the purpose of STEM education is to provide all learners with experiences that take advantage of the clear connections between the disciplines and practices of science, technology, engineering and mathematics. These experiences use and reinforce the skills and understandings articulated by the Common Core State Standards for Mathematics (CCSS-M) and the Next Generation Science Standards (NGSS), fostering inquiry-based approaches to learning and problem-solving, in both school and in everyday life.

## II. Children and STEM

Essentially, STEM is the integration of both the disciplines and practices of science, technology, engineering and mathematics to foster inquiry- and interest-based approaches to learning, creation and problem solving.

A vibrant STEM learning ecology framework provides numerous and diverse pathways for children of all ages to become engaged and

active *STEM thinkers* and *STEM doers*. District 65 believes *STEM thinkers* are critical thinkers. They ask questions and seek evidence to understand and explain things. *STEM doers* are able to apply science, technical, engineering, and mathematics skills and knowledge to understand and solve problems in school and life.

### **Clarifying STEM Terms**

**STEM learning ecology:** the formal and informal STEM learning that an individual student experiences. A student's unique background, interests and experiences determine their personal STEM learning ecology.

**STEM learning ecology framework:** the comprehensive set of STEM learning opportunities available to students, provided in-school and out-of-school by numerous STEM partners.

**STEM pathway:** A set of STEM learning opportunities that are typically defined and coordinated by a STEM program provider but may be defined by an individual student to achieve a personal goal. A STEM pathway typically leads to a learning "destination," such as mastery of a particular set of skills, for example, computer programming. Multiple pathways may comprise a student's personal STEM learning ecology.

Every youth develops STEM knowledge and awareness differently. A personal STEM learning ecology is an organic learning experience that begins with informal exposure to STEM in the home, the backyard, the lakefront, the parks and neighbors' homes. It is augmented through trips to the library and museum visits under the direction of adults. A personal STEM learning ecology also includes pre-school through 12th grade classrooms and school-based supplements such as field trips, after-school programs and summer camps. A child's STEM learning ecology is:

- shaped and influenced by the child's interests, the home environment and pivotal early school experiences,
- broadened by access to formal and informal STEM opportunities in the community, and
- deepened by the child's ability to pursue and build upon STEM pathways through the course of his or her development.

### **III. STEM in Evanston: Target Populations for this Proposed Project**

Historically, the STEM learning ecology framework for Evanston youth has been sporadic, limited, disjointed and exclusive. Depending upon a student's family, economic and community situation, in-school STEM experiences beyond science and math classes have been sometimes available, though often limited, traditional, and un-engaging. Outside of school, STEM opportunities have been largely available only to families with the resources to seek them out and/or pay for them.

Achievement and geographic data highlight STEM disparities in children who under-perform in math and science, who are under-resourced to access available out-of-school STEM learning opportunities, and who are under-represented in STEM-related high school courses and electives.

#### **A. Under-performing**

Analysis of math and science achievement in D65 schools highlights persistent achievement gaps between the community's populations along racial and income levels. Evanston Township High School (ETHS) has the highest math achievement gap between low-income and non-low-income students in the entire state and the elementary school district (D65) is close behind. Given the connection between this achievement gap and the disparities between graduation rates and later career success, the achievement gap can be seen as an opportunity gap.

Research has shown that poverty is a key driver of this opportunity gap for D65 students. Data from the 2013-14 school year show that 53% of students from low-income households met Illinois Student Achievement Test (ISAT) Math standards versus 89% from non-low-income households. (Illinois Report Card, 2014). The gaps for black and Hispanic students are equally pronounced with a high majority of these students coming from low-income households.

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When disaggregated by income, white and African American students also exhibit significant differences in academic performance. Even amongst non-low-income students, 94% of white students meet ISAT math standards while only 65% of African American students perform at the same level (Figure 1). Similar performance gaps can be found when looking at achievement of 50<sup>th</sup> percentile ISAT scores, “on-track” indicators (Figure 1), and percentage of students meeting benchmarks for college readiness (Figure 2), indicating that race is also a key factor in D65 school success.

**Figure 1. 2014 Achievement Measures of African-American and White Students**

Source: Evanston Roundtable, November 2014

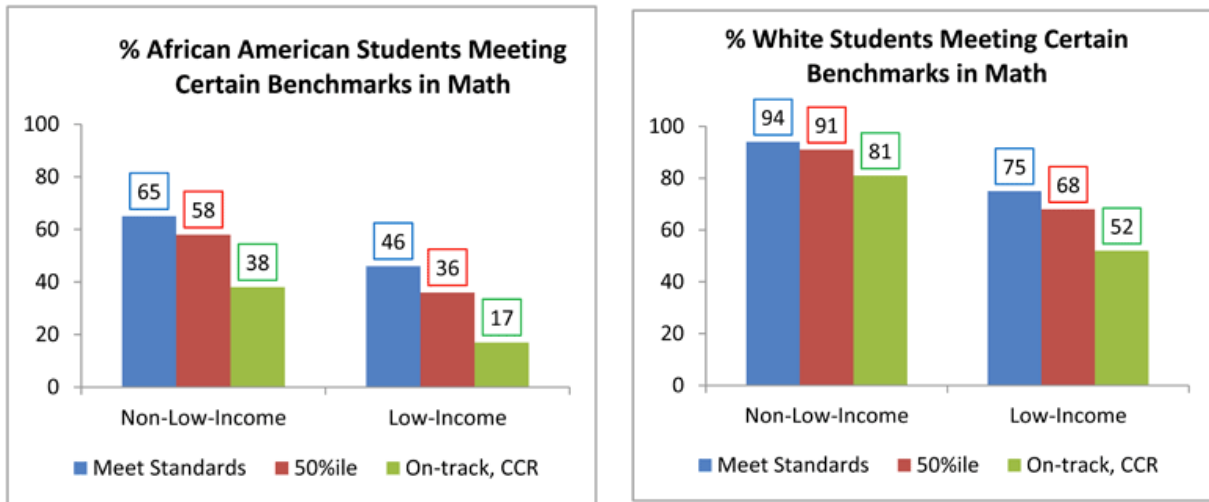


Figure 1 uses the percentages of white and black students, disaggregated by income, who met three different benchmarks on the 2014 ISATs: a) “meet standards” on the ISATs, b) at/above the 50th percentile, and c) on track to ACT college readiness, using the 68<sup>th</sup> percentile in math as the benchmarks.

**Figure 2. Percent Meeting MATH College Readiness Benchmark (MAP), by Race and Income**

	Math	
	Low-Income	Not Low-Income
Black	7.4	24.5
Hispanic	11.4	43.5
White	32.7	63.9
Asian	36.4	64.6
Multi-racial	14.1	57.40

Figure 2 compares Math ISAT achievement scores for whites, African Americans and Hispanics by income level for the 2013-14 school year. The effect of family income level is obvious, but gaps persist between whites, Hispanic and black student populations across all income levels.

To help improve youth performance, new approaches to out-of-school STEM learning need to extend and enrich classroom learning. Close partnerships between District 65 and ETHS teachers, out-of-school providers, and STEM professionals will ensure that youth are practicing and deepening skills needed both in and out of the classroom.

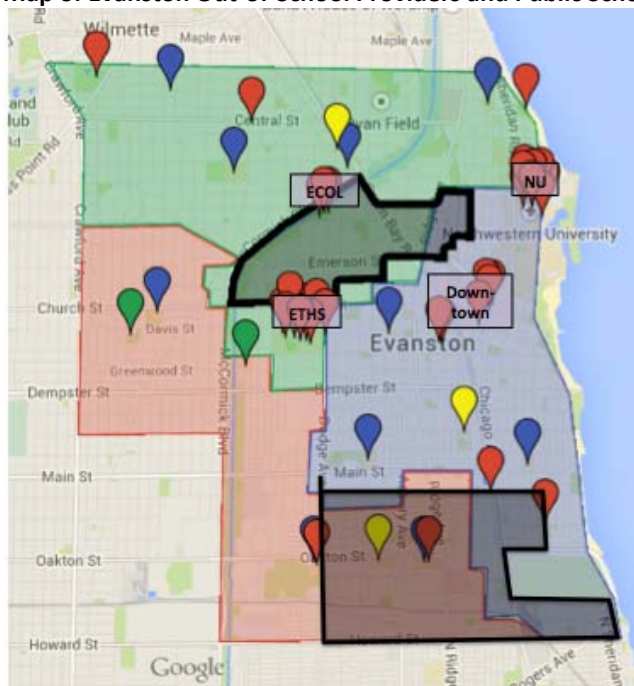
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### B. Under-resourced

Studies have shown that out-of-school learning in STEM programs can improve attitudes toward STEM fields and careers; increase STEM knowledge and skills; and result in a higher likelihood of graduation and pursuing a STEM career.<sup>5</sup> Access to quality out-of-school STEM programming is, therefore, a key factor in academic success. While the Evanston community supports a growing network of STEM learning opportunities, they are not equally distributed. D65 does not currently support a robust out-of-school STEM program and, instead, the majority of the STEM programs for students are localized around Northwestern University, Evanston Township High School (ETHS), the Ecology Center (ECOL) and downtown Evanston, where both the Evanston Public Library and the McGaw YMCA are located (Figure 3). Many of these programs are free and open to the public. However, to participate in quality STEM out-of-school programming and enrichment, youth must travel to one of these central hubs. While many non-low-income students can depend on parents or childcare providers to drive them to out-of-school STEM program sites, low-income families often lack reliable, independent transportation and parents/guardians may not have the time to chaperone youth. Access to STEM out-of-school programming is a major hurdle for low-income D65 youth.

To better serve this under-resourced population, current and new STEM programs need to expand to school-based sites or to locations more proximal to the youth, meeting them where they already spend their time.

**Figure 3. Map of Evanston Out-of-School Providers and Public Schools**

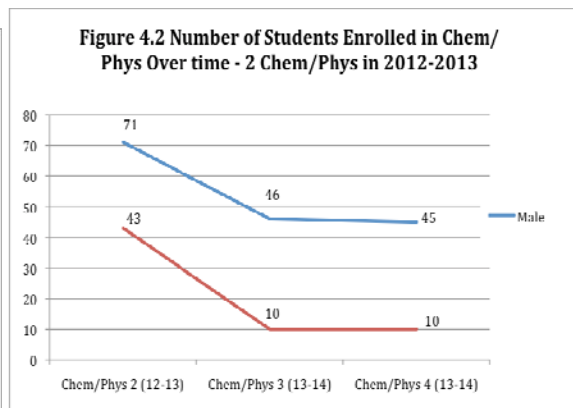
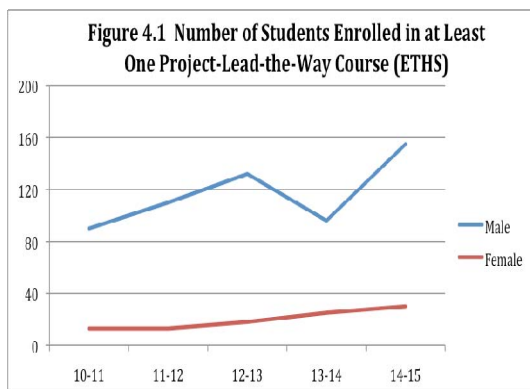


Source: R. Daugherty, Science in Society, Northwestern University, 2015

<sup>5</sup> Afterschool Alliance (2011). STEM Learning in Afterschool: An Analysis of Impact and Outcomes (<http://www.afterschoolalliance.org/STEM-Afterschool-Outcomes.pdf>)

C. Under-represented

Lastly, students under-represented in STEM courses and careers are a focus area for this proposal. In addition to students who under-perform and are under-resourced, this under-represented population also includes girls from all racial and ethnic categories in D65, who show great promise to pursue STEM degrees and careers early on. However, they lose interest in later adolescent years, resulting in decreased STEM course advancement, in comparison to boys in high school. As is shown in Figure 4.1, course enrollment in Project Lead The Way (PLTW) courses at ETHS between 2010 and 2015 shows a widening gender gap over time and a 1:5 female to male ratio for the current school year. Similarly, Figure 4.2 examines cohort integrity within the Chemistry/Physics sequence at ETHS. The initial gender gap in is striking, with a 0.7:1 female to male ratio. However, the percentage of females leaving the program is far higher than males, with a 9:2 ending ratio by senior year.



Source: Evanston Township High School, 2015

The ability of the D65 STEM learning ecology framework to successfully and strategically target under-represented youth will depend on understanding the racial, cultural, and gender-based barriers that prevent youth from participating and thriving in available STEM programs. A strong evaluation plan, including a well-integrated long-term youth tracking mechanism, would inform future plans in STEM programming and youth supports.

IV. **Current Evanston STEM Programs**

Over the past few years, Evanston has begun to shed its traditional and limited STEM learning models. Four key institutions have begun new initiatives that are changing the STEM program landscape. As highlighted in the Table 1 below, efforts by the McGaw YMCA, Northwestern University (NU), Evanston Township High School (ETHS) and the Evanston Public Library (EPL) have begun to broaden the array of available STEM programmatic offerings. In addition, Youth Organization Umbrella (Y.O.U.) has secured funding to build and operate a Maker’s Lab, set to open in 2016, targeted to high school students and located across the street from the high school.

**Table 1. Type of STEM Learning Opportunities in Evanston**

Location	Media Arts/Digital Technology	Maker/ Engineering Design	STEM Exploration & Experimentation
<b>School</b>	<ul style="list-style-type: none"> <li>Media Arts Classes: D65 Middle Schools</li> </ul>	<ul style="list-style-type: none"> <li>D65 Library Maker Sessions w/EPL</li> <li>ETHS Project Lead the Way, Geometry in Construction, STEM Senior Seminar Courses</li> </ul>	<ul style="list-style-type: none"> <li>D65 Classroom Math/Science Time (K-5)</li> <li>D65 Math/Science Classes (6-8)</li> <li>ETHS Math/Science Classes</li> </ul>
<b>After-School</b>	<ul style="list-style-type: none"> <li>MetaMedia at McGaw YMCA</li> <li>NU FUSE at EPL</li> </ul>	<ul style="list-style-type: none"> <li>NU FUSE at EPL and YMCA MetaMedia</li> <li>ETHS Robotics Club, Math Team, Science Olympiad</li> <li>NU Women Engineers &amp; NU Amer. Women in Science at ETHS</li> </ul>	<ul style="list-style-type: none"> <li>NU SiS Science Club at D65 w/ Y.O.U.</li> <li>Mad Science at two D65 Schools</li> <li>Evanston Ecology Center</li> <li>NU Project Excite</li> <li>NU Jugando con Ciencias @ EPL</li> </ul>
<b>Summer</b>	<ul style="list-style-type: none"> <li>MetaMedia at McGaw YMCA</li> <li>NU FUSE at EPL</li> </ul>	<ul style="list-style-type: none"> <li>Engineering with Legos Camp</li> <li>ETHS Engineering Summer Camp</li> <li>NU FUSE at EPL &amp; YMCA MetaMedia</li> </ul>	<ul style="list-style-type: none"> <li>Camps: Evanston Ecology Center</li> <li>NU CTD Courses</li> </ul>

*Not listed in the table above are the numerous STEM events that round out the D65 STEM learning ecology framework (such as field trips to STEM institutions, exposure to STEM careers, science fairs, etc.) coordinated by Northwestern University, the public schools, and out-of-school providers.*

*Northwestern’s Office of STEM Education Partnerships (OSEP), Segal Design Institute and Department of Biological Sciences also provide a number of STEM professional development opportunities for both classroom teachers and out-of-school providers (OSP) throughout the year.*

Although outcome data from these specific programs are preliminary and limited, initial attendance data from Northwestern’s Fuse programs at EPL and the YMCA’s MetaMedia show very strong, repeated participation levels with a high, targeted population presence. Data from NU’s Science in Society’s (SiS) Science Club, serving a high rate of low-income (98%) students in Chicago, indicate that STEM programs can make a tangible difference in STEM literacy. For example, in a study conducted between 2010-2013, a total of 451 students (n= 98 Science Club, 353 control) at three Chicago public schools were grouped into three different science aptitude levels by their teachers. Each student’s work was judged by independent, scientist judges. Science Club participants outperformed their non-Science Club peers across all three aptitude categories. The effect size was 0.7—an effect that is equivalent to bumping youth up an entire aptitude category. Appendix D provides more detail about these results.

A look at the current K-12 in-school/out-of-school learning ecology framework by age group (Table 2 below) highlights several key gaps and a need for greater coordination.

- For K-5 students (yellow), there are minimal opportunities to tinker or explore STEM programs within the Media Arts/Digital Tech or Engineering Design STEM categories.
- Conversely, middle school (green) and high school (blue) students have little offerings in programs dealing with science exploration and experimentation.
- There also exists a wealth of programs for middle school students related to media arts and digital technology, suggesting a need for coordination by these providers to maximize their impact with the target populations and consider future STEM endeavors in other program categories.



Table 2. Type of STEM Learning Opportunity by Age Group-group Served

Location	Media Arts/Digital Technology	Maker/Engineering Design	STEM Exploration & Experimentation
School	<ul style="list-style-type: none"> <li>Media Arts Classes: D65 Middle Schools</li> <li>ETHS Media/Tech Courses</li> </ul>	<ul style="list-style-type: none"> <li>Maker Sessions: EPL/D65 Library</li> <li>ETHS Project Lead the Way, Geometry in Construction, STEM Senior Seminar Courses</li> </ul>	<ul style="list-style-type: none"> <li>D65 Classroom Math/Science Time</li> <li>D65 Math/Science Classes</li> <li>ETHS Math/Science Classes</li> </ul>
After-School	<ul style="list-style-type: none"> <li>MetaMedia at McGaw YMCA</li> <li>NU FUSE at EPL</li> </ul>	<ul style="list-style-type: none"> <li>NU FUSE at EPL and YMCA MetaMedia</li> <li>ETHS Robotics Club, Math Team, Science Olympiad</li> <li>NU Women Engineers &amp; NU Amer. Women in Science at ETHS</li> </ul>	<ul style="list-style-type: none"> <li>NU SIS Science Club at D65 w/ Y.O.U.</li> <li>Mad Science at 2 D65 Schools</li> <li>Evanston Ecology Center</li> <li>NU Project Excite</li> <li>NU Jugando con las Ciencias @ EPL</li> <li>NU Project Excite</li> <li>NU Women Engineers &amp; NU Amer. Women in Science @ ETHS</li> </ul>
Summer	<ul style="list-style-type: none"> <li>MetaMedia at McGaw YMCA</li> <li>NU FUSE at EPL</li> </ul>	<ul style="list-style-type: none"> <li>Engineering with Legos Camp</li> <li>ETHS Engineering Summer Camp</li> <li>NU FUSE at EPL &amp; YMCA MetaMedia</li> </ul>	<ul style="list-style-type: none"> <li>Camps: Evanston Ecology Center</li> <li>NU CTD Courses</li> <li>NU CTD Courses</li> </ul>

Color Code Key: K-5<sup>th</sup> Grade Middle School High School

Looking at program offerings by target population served, as exhibited in Table 3, below, the programs that target under-performing, under-resourced and under-represented children are few indeed. This highlights the need to alter and expand Evanston’s existing STEM learning ecology framework to better engage and serve the highest need children.

Table 3. Type of STEM Program by Target Population

Location	Media Arts/Digital Technology	Maker/ Engineering Design	STEM Exploration & Experimentation
School	<ul style="list-style-type: none"> <li>Media Arts Classes: D65 Middle Schools</li> </ul>	<ul style="list-style-type: none"> <li>D65 Library Maker Sessions w/EPL</li> <li>ETHS Project Lead the Way, Geometry in Construction, STEM Senior Seminar Courses</li> </ul>	<ul style="list-style-type: none"> <li>D65 Classroom Math/Science Time</li> <li>D65 Math/Science Classes</li> <li>ETHS Math/Science Classes</li> </ul>
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Color Code Key: Target: Under-performing Target: Under-represented Located in Under-resourced

### Summary of Current Evanston STEM Programs

Given that there are approximately 4,000 under-performing, under-resourced, and under-represented K-12 students in D65 and ETHS, the focus for this proposal and a new Evanston learning ecology framework, then, is to:

- **Understand** how D65 youth (particularly low-income students) navigate through available out-of school STEM opportunities and how those STEM programs impact academic success using evaluation, long-term youth tracking, and regular meeting of STEM providers.

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- **Build** new collaborations between teachers, out-of-school providers, and STEM professionals, resulting in novel curricula and activities that extend and enrich classroom and out-of-school learning.
- **Expand** the capacity of STEM educators—both in the classroom and in out-of-school settings—to ensure the targeted populations have access to and are engaged in successful programs.

The efforts described in this proposal lay the foundation for future STEM plans across Evanston. The information collected from this pilot phase will help the community plan strategic new efforts to further reach these target populations and ensure that all D65 and ETHS students achieve STEM literacy.

Evanston’s STEM learning ecology framework has great potential and good momentum for growth, despite today’s reality that highest-need populations remain largely under-served. The time is ripe, then, for Evanston STEM providers to coordinate efforts, target new initiatives, and amp up the capacity to engage and inspire all of Evanston’s children.

### VI. Theory of Action

Achieving STEM literacy for all Evanston youth requires teachers, out-of-school providers, and STEM professionals to coordinate their efforts and strategically target interventions to the youth that need it most. Therefore, this proposal aims to create and support a collaborative network of Evanston STEM educators with the specific goals of 1) building strategic working groups to transform in-school/out-of-school learning experiences, 2) expanding programming to meet areas of high need and high demand, and 3) understanding and evaluating the access, participation, and long-term impacts of STEM programs. Through aligned, strategic and targeted programming, we expect to see increased program accessibility, better integration of skills in- and out-of-school, and increased participation rates by underserved youth.

The underpinnings of the vision for this work are girded in the Connected Learning principles<sup>6</sup> of relevant, interest-based pursuits within a production-centered environment. They are academically aligned to the Next Generation Science Standard’s science and engineering practices and crosscutting concepts and the Common Core State Standards for Mathematics. They are inspired by the recent formation of the Cradle to Career Initiative in Evanston, which is a collective impact effort to mobilize the community’s assets to make a lasting difference in the lives of the community’s children, youth and families. And they are exemplified by successful STEM learning ecology frameworks such as the *Kids+Creativity Network* in Pittsburgh and both HIVE and the Center for the Advancement of Science (CASE) at the Museum of Science & Industry in Chicago.

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<sup>6</sup> Digital Media Learning Research Hub and the Connected Learning Alliance, 2013. (<http://connectedlearning.tv/what-is-connected-learning>)

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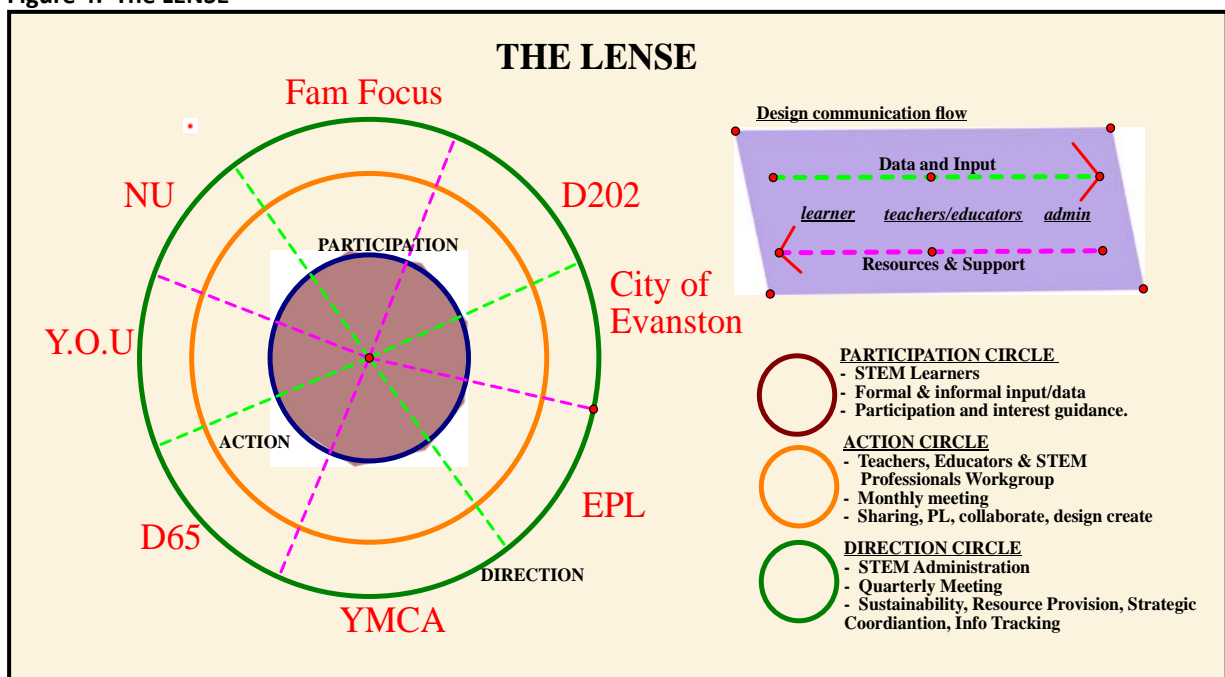
The vision, then, for a learning ecology framework in Evanston capitalizes on the collective and coordinated efforts of STEM providers to grow engaging STEM opportunities for our targeted youth populations. Purposeful interventions will include:

- new program expansions supported to specifically serve the targeted youth,
- new STEM in-school/out-of-school experiences to inspire and develop STEM pursuits,
- aligned curricula, programs and pathways, and
- STEM educator trainings/in-services to build capacity and change teaching practices.

The expected informal developments from the framework include those synergies that evolve from openly networked environments to link and reinforce STEM learning opportunities in accessible settings for the targeted youth. These outcomes may take the shape of coordinated workshops, a series of exhibitions and talks, new programs formed by partnerships, joint field trips, classrooms that take on the appearance and experience of an after-school environment, summer educators using classroom teacher techniques to differentiate activities and many other organic developments.

Our proposed work will be shaped by the LENSE – the Learning Ecology Network of STEM in Evanston. The LENSE has a three-tiered structure as exhibited in Figure 4. Tier 1, the DIRECTION CIRCLE, is made up of the administrative leaders from Evanston schools, libraries, community centers, and the university. The Direction Circle guides the collaboration, supports the implementation, and supervises the evaluation. The second tier is the ACTION CIRCLE, an in-school and out-of-school educator workgroup charged with driving STEM professional development and developing innovative approaches to STEM education. The STEM learners represented in Tier 3 – the PARTICIPATION CIRCLE – will benefit from the work of the Direction and Action Circles.

Figure 4: The LENSE



## **Evanston STEM Learning Ecology Framework Proposal**

The LENSE tiered model represents each participating organization as a distinct piece of a pie. When connected through the Direction and Action Circles, the LENSE members collaboratively build a STEM learning ecology framework focused on D65's STEM learners. The LENSE is also designed with communication channels from the learners to the educators to the directors and vice versa, allowing for informed program design.

### **A. DIRECTION CIRCLE**

Led by District 65's STEM Department, the Direction Circle will consist of key STEM providers, supporters, designers, participants and professionals in Evanston. The committee's overall goal – to broaden and deepen STEM literacy for Evanston youth – will be accomplished through three main functions:

#### **1. Coordination**

- a. Catalog current Evanston STEM pathways to align and identify effective approaches for STEM content and skill development across the learning spectrum.
- b. Collect and share data to track extent of STEM program participation, identify needed STEM opportunities and address issues of access.
- c. Guide targeted expansion of three existing STEM programs to better serve under-represented youth. Includes program identification, determination of guidelines and criteria, funding approval, and continued monitoring.
- d. Oversee the work of the Action Circle, including identification of community need, releasing requests for mini-proposals, reviewing Action Circle proposals for new programs/activities to target underserved youth, selection of six proposed Action Circle work groups per year, and funding approval.
- e. Create a communication/marketing plan and central vehicle (such as a website) for STEM providers, Evanston residents, funders and other users to promote and communicate STEM learning opportunities.
- f. Evaluate the LENSE impact to determine if target populations are learning and our collaborations are improving STEM literacy.

#### **2. Collaboration**

- a. Form targeted partnerships to expand effective STEM program participation to the under-performing, under-resourced and under-represented populations.
- b. Plan for the sustainability of the LENSE.

#### **3. Sharing and Learning**

- a. Lead and participate in joint professional development opportunities for members and related staff/educators for each partner organization.
- b. Share best practices for urban STEM education and enrichment. Identify challenges to successful implementation in community settings.

## Evanston STEM Learning Ecology Framework Proposal

The Direction Circle will operate accordingly:

- a. Hold quarterly meetings to share and coordinate efforts.
- b. Host site visits to highlight each other's STEM efforts.
- c. Assign and oversee work of subcommittees to carry out separate proposals and/or projects.
- d. Be organized under the auspices of District 65 and staffed by the LENSE Project Director.
- e. Membership will be Evanston STEM providers, funders, thinkers, and designers. After year one, we envision including STEM youth-leaders within the Direction and Action Circles to provide key youth insights and voice to better shape STEM program expansion. This aspect of the LENSE was suggested by the Museum of Science and Industry, who includes active youth STEM leaders in their leadership circles to guide plans.

### Direction Circle Membership

Initial meetings of the Direction Circle occurred in February and March of this year. Appendix A lists the current members and corresponding descriptions of each LENSE organization. Summaries of both meetings are included in Appendix B.

A review of best practice learning ecology frameworks<sup>7</sup> highlights the need for productive learning ecology frameworks to include the following STEM-related institutions:

- School Districts
- Out-of-school Providers (OSP)
- Libraries
- City Departments
- Universities
- Museums
- Corporations

### **Museum of Science & Industry (MSI)**

While Evanston does not have a science museum, one of the model, STEM-engaging museums in the country is just 20 miles south in Chicago. The Museum of Science and Industry has been working to coordinate a STEM learning ecology in Chicago between in-school and OSPs through extensive educator training and curriculum development. MSI's Center for the Advancement of Science Education (CASE) has a Teaching & Learning department to work with school science faculty and a Community Initiatives department to train and develop curricula with more than 100 OSPs. The two departments collaborate to align the science and learning across both providers.

At MSI, the connection between in-school and out-of-school learning is tied to the *Next Generation Science Standards' Framework*. The Framework expresses a vision in science education that requires students to operate at the nexus of three dimensions of learning: *Science and Engineering Practices*, *Crosscutting Concepts*, and *Disciplinary Core Ideas*. While the structure and environment to learn about NGSS' *Disciplinary Core Ideas* may differ for in- and out-of-schools, both worlds share the other two dimensions; *Science and Engineering Practices* and *Crosscutting Concepts*. As Nicole Kowrach, Director of CASE's Teaching & Learning, states, "these two NGSS themes are relevant in both in-school and out-school spaces interested in STEM because they center around the STEM habits of mind."

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<sup>7</sup> Traphagen, K. & Trail, S. (2014) *Report from the Field: How Cross-Sector Collaborations are Advancing STEM Learning*. Los Altos, CA: The Noyce Foundation.

## Evanston STEM Learning Ecology Framework Proposal

Our initial list of participants does not include representation from the STEM workforce, corporate or museum sectors. Including these institutional perspectives within the Direction Circle is a priority for the upcoming year.

### Targeted Program Expansion

The Direction Council will identify and support new programs and expansion of existing STEM programs that are designed to impact the targeted populations. To do this, guidelines will be developed to prioritize and support the programs taking into consideration cost, research-based proven practices, alignment with the NGSS Framework (see MSI Text Box) and impact on the targeted populations. For example, options might include expansion of the OSEP's FUSE program or SiS's Science Club to be located in under-resourced communities, or the creation of a proven female, STEM peer-based mentoring program between NU, ETHS and D65 female students.

### B. ACTION CIRCLE

While the DIRECTION CIRCLE will provide the *direction* in broadening and deepening STEM learning opportunities for targeted students, the ACTION CIRCLE will provide the *action* to grow. Modeled after Chicago's HIVE network and made up of Evanston K-12 teachers, out-of-school educators and STEM education professionals, this workgroup will convene regularly to innovate, collaborate and build capacity of the hands-on STEM leaders in Evanston.

Within the Action Circle, small workgroups will form around themes identified by the Direction Circle to craft engaging STEM experiences in classrooms and out-of-school venues guided and inspired by the NGSS framework, the Maker Movement and/or the Connected Learning Principles. Outcomes from these workgroups could include:

- the development of engaging STEM learning experiences that are integrated across disciplines, providers and schools,
- the coordination of joint activities and the piloting of new lessons and programs, and
- coordinated professional development between STEM professionals and youth educators on authentic practices.

The Action Circle will also promote educator professional development through activities such as:

### **What will the Action Circle do?**

Case Example #1: Week-long Middle School Maker Faires are happening now at two D65 schools as a result of:

- i. An inspiring STEM Professional Development session attended by school librarians and OSP educators last year.
- ii. A connection and conversation between a school librarian at one middle school and the Young Adult Librarian/STEM specialist at Evanston Public Library.
- iii. The submission and subsequent approval for grant funds to bring STEM activities to the middle school library.
- iv. Targeted lesson development training by the STEM specialist to the school librarian.
- v. Active, hands-on professional support by the STEM specialist during the actual in-school STEM activity – the Maker Faire.
- vi. Then, the STEM specialist and the middle school librarian inspired and supported the librarian in another middle school to also hold a Maker Faire.

Case Example #2: An in-school/out-of-school partnership is in the works between a D65 Middle School Math Teacher and educators at the YMCA's MetaMedia Lab to create STEM-based design explorations to replace part of the current Geometry curriculum. The team of educators reviewed the numerous existing class-based projects and revised two of them from an OSP-Maker's perspective. Projects were then co-taught by the OSP and classroom teacher at MetaMedia. Students could also earn extra-credit by completing extension projects during after-school hours at MetaMedia.

## Evanston STEM Learning Ecology Framework Proposal

- site visits to learn about and from varied STEM offerings in Evanston and Chicago,
- professional development workshops and activities to expand STEM educator knowledge and experiences, and
- coordinated observations between out-of-school and in-school educators.

Initial interest in joining the Action Circle has been very positive. A list of interested individuals can be found in Appendix C.

### Design and Roll-out Plan

The Action Circle's primary focus will be the development of engaging STEM learning experiences via the cross-collaboration of the classroom and OSP educators. The process will include small teams of classroom teachers, OSP educators and STEM professionals and/or STEM researchers, as needed and appropriate. The process will be as follows:

1. Professional development of classroom and OSP educators: Designing engaging STEM learning experiences will require trained classroom and OSP educators to capably review, revise and supplement curricula infused with the Connected Learning principles.
2. Idea Generation and Proposal Development. As in the two case examples previously described, ideas for engaging STEM learning experience can come from professional development sessions, experience of other STEM professionals, or just the simple review of the existing curriculum to "blow-up" traditional projects into Maker-designed activities.
3. Direction Circle approval of proposed design and budget allotment. Design and roll-out of STEM learning experiences will be funded in the form of stipend pay for educators and STEM professionals and substitute coverage, as needed. The Direction Circle will establish guidelines to set funding priorities and consider student-voice, interest-driven, open-structured, and production-centered aspects of each proposal.
4. Collaborative Design: Teams will meet to design engaging STEM learning experiences, guided by the Connected Learning principles. School-based learning experiences will be aligned with Common Core/NGSS standards. Designs must also include an evaluation plan to determine overall effectiveness and impact with the under-performing, under-resourced, and/or under-represented target populations described in this proposal.
5. Pilot: The first implementation of the STEM learning experience will be considered a pilot. The pilot may also include embedded professional support. Afterwards, the team will participate in a formal review and revise the learning experience design accordingly.
6. Formalized Plan: Teams will present learning experience designs to the Action and Direction Circles via various forums to disseminate and inspire. Further implementation and roll-out of the piloted STEM learning experiences will rest with the respective participating organizations, but will require added professional development and embedded STEM professional support.

7. **Research:** The development of each STEM learning experience offers opportunities to conduct design-based action research to determine overall impact on STEM learning and engagement.

The critical component of successful designs and implementation will come from the STEM professional(s) included within the development process. Through the support of this proposal, STEM professionals in the educator-training and curriculum-design fields will be matched with the development teams to ensure high-quality learning experiences are created and piloted. These STEM professionals will be:

- Staff at Northwestern’s Office of STEM Education Partnerships, who conduct STEM teacher trainings throughout the year and can support STEM learning experience design.
- Staff at Northwestern’s Science in Society, who can support STEM learning experience design and conduct educator training on authentic science practices and urban STEM education strategies.
- Staff at the Museum of Science & Industry’s CASE, who have extensive STEM training and curriculum design experience within both in-school and out-of-school environments. They also conduct training sessions for educators to develop high-quality NGSS-based lessons.
- Independent and proven STEM teachers-in-residence who work with teachers to design and teach new curricula.

### C. PARTICIPATION CIRCLE

At the core of the LENSE are the participants – the STEM learners. As a result of the increased program capacity and the improved integration between in- and out-of-school STEM learning experiences, we expect underserved and underrepresented youth to achieve academic gains and increased engagement in STEM. The long-term success of the Evanston STEM collaboration will depend on a deep understanding of the Participation Circle, particularly understanding youth participation rates, barriers to participation, effects on academic achievement, and impact on youth engagement. The Evaluation Plan (see Section IX) describes these efforts in more detail.

#### **LENSE Summary**

With the Connected Learning principles in mind, the design of the LENSE structure offers a powerful vehicle to form organic, product-centered STEM learning experiences within the classroom, in the out-of-school space, and across the two environments. Many details remain to be determined by the Direction Circle, including:

- the Action Circle’s infrastructure,
- forming the teams of educators,
- the funding mechanism and timeline,
- determining and assessing the outcomes,
- the sustainability plan for all of these new STEM learning experiences,



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- compiling STEM learning experiences into an educator's resource, and
- the dissemination plan for the new STEM learning experiences.

### **IX. Evaluation**

To measure the impact of a coordinated STEM learning ecology framework, a mixed-methods approach will be used to investigate the following questions:

- Youth – How do youth (particularly from underserved and underrepresented backgrounds) participate and engage with the Evanston STEM learning ecology framework? What are the impacts on academic achievement and attitudes about, and engagement in, STEM?
- Educators – How does a coordinated and integrated STEM learning ecology framework affect educator knowledge, awareness, and efficacy in STEM education?
- Collaborations and Partnerships – How does a coordinated and strategic STEM learning ecology framework impact STEM literacy? What are the key design elements of the framework that can be replicated to other, similar municipalities across the country?

The LENSE will draw upon the many existing evaluation efforts performed individually at each partnering organization, where possible, to form baseline measures and synthesize data sets over the proposal period to form a picture of the changing Evanston STEM landscape as a whole.

#### **A. Youth Tracking and Academic Achievement**

Tracking youth participation in STEM programs will provide key insights into areas of need and identify specific populations underserved by available programs. To track the youth as they navigate through the Evanston STEM learning ecology framework, out-of-school providers will systematically collect program attendance information, including youth name, grade, school, the number of times they attend programming and their respective STEM pathway progressions. Attendance data will be tracked and the LENSE Project Director will assemble quarterly attendance information.

With this data, analyses will be conducted to determine the correlation between levels of participation in out-of-school STEM programs and academic achievement. District 65 and ETHS will support compilation of student-level data, including free/reduced price lunch status, ethnicity/race, standardized test scores, GPA, and school attendance. In accordance with school district policies, district staff will conduct data analysis with identifiable information. When needed, student-level data will be aggregated to protect youth information. Given the size of the districts, a case/control study can be run, using a well-matched comparison group of students who do not participate in STEM programs.

#### **B. Youth Engagement and Identity**

In addition to tracking the youth and establishing correlations with academic achievement, surveys and focus groups will be conducted with youth participating in out-of-school STEM

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programs. From these instruments, youth engagement, interest, and identity in STEM will be assessed, with a particular focus on the underrepresented populations in Evanston. The surveys and focus groups will occur in two phases: a formative data collection phase in the first year of the granting period and a summative phase in the last two years. The formative phase will include information gathering regarding the state of STEM education in Evanston, the major barriers to youth participation, and youth input to drive future STEM program developments. This formative evaluation will guide the Targeted Program Expansion and the Action Circle mini-grants. The summative surveys and focus groups will examine impacts of in- and out-of-school STEM experiences.

Survey and focus group design will be based on validated instruments. Questions will be drawn from instruments such as the Views of Science Survey, Modified Attitudes Towards Science Inventory, and Science Motivation Questionnaire. Additional questions will be developed as needed. Survey and interview design will be guided by the expertise of LENSE partner organizations, such as NU's Science in Society and Office of STEM Education Partnerships, which both have significant experience evaluating informal STEM education.

Prior to the surveys and focus groups, parental consent will be acquired for each youth. The out-of-school providers, in collaboration with the LENSE Project Director, will collect parental consent forms.

### **C. Educator Knowledge and Awareness**

The Action Circle aims to bring together collaborative groups of educators, out-of-school providers, and STEM professionals. As a result of their work on integrated curriculum/ activities and participation in professional development, educators' knowledge and passion about STEM content and skills will be assessed through interviews, surveys, and/or focus groups. In addition, the LENSE Project Director will conduct observations to assess the impact of implemented STEM activities and curricula. Observation protocols focused on program quality and STEM learning, including the Youth Program Quality Assessment- STEM from the Weikert Center for Youth Program Quality, already exist and will serve as the basis for these observations.

### **D. Learning Ecology Framework Design and Efficacy**

Facilitated meetings of the LENSE partners should lead to greater numbers of formalized collaborations and an expansion of the STEM network in Evanston. To better quantify this STEM network, a pre/post network map, detailing the connections between organizations over the life of the grant, will be developed. Software programs, such as Gephi, allow for social network visualization and quantitative analysis. This approach will help evaluate the number of collaborations, the strength of the collaborations, how partnerships are related to each other, and assist with identification of central players in the Evanston STEM learning ecology framework. Comparison of the pre- and post-maps will provide insight into the growth of the network over the three-year period.

Additionally, we will conduct a summative survey with Direction Circle partners to determine how the LENSE impacted their work and to assess the quality of the collaborations. The survey will also assess the efficacy of the LENSE structure and the principal roles and

## **Evanston STEM Learning Ecology Framework Proposal**

responsibilities of the Direction and Action Circles in meeting the overall goal to grow STEM literacy among Evanston's youth.

### **E. Evaluation Timeline**

- Formative Phase (2015): Baseline data collection
  - Youth STEM engagement (interest, pathways and pathway progression, achievement, youth surveys)
  - Launch Youth Attendance Tracking
  - Educator STEM knowledge, skills, & passion (Action Circle member survey)
  - Framework Design & Efficacy (STEM asset map, partnership network map, Direction Circle member survey)
- Annual Collection Phase (2016-2018):
  - Youth STEM participation and engagement (attendance, frequency, interest, pathways and pathway progression, achievement)
- Summative Phase (2018):
  - Youth STEM participation and engagement (attendance, frequency, interest, pathways and pathway progression, achievement, youth surveys)
  - Educator STEM knowledge, skills, & passion (Action Circle member survey)
  - Framework Design & Efficacy (STEM asset map, partnership network map, Direction Circle member survey)
- Annual report submission to D65, the Direction Circle, and the Noyce Foundation at the end of each program year with a final report submission in July, 2018.

## **VII. Actions: Three-Year Plan**

### **Year I: July 1, 2015 – June 30, 2016**

- A. Formation of DIRECTION CIRCLE: Quarterly Meetings
  - 1) STEM data collection for baseline data
  - 2) Centralized Evanston STEM program resource & Communication Plan
  - 3) One targeted-population program intervention
  - 4) Program evaluation
- B. Formation of ACTION CIRCLE: Monthly Meetings
  - 1) Professional development (Connected Learning, STEM curriculum development, etc.)
  - 2) Professional learning plan(s)
  - 3) Professional practice and observation exchange

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- 4) STEM learning experience design and pilot projects (3-6)

### Year II: July 1, 2016 – June 30, 2017

- A. DIRECTION CIRCLE: Quarterly Meetings
  - 1) STEM data collection and evaluation
  - 2) Continued targeted population program support
  - 3) Two targeted population program expansion
  - 4) Program evaluation
  
- B. ACTION CIRCLE: Monthly Meetings
  - 1) Professional practice and observation exchange
  - 2) STEM learning experiences design and pilot projects (3-6)

### Year III: July 1, 2017 – June 30, 2018

- A. DIRECTION CIRCLE: Quarterly Meetings
  - 1) STEM data collection and evaluation
  - 2) Continued targeted population program support
  - 3) Program evaluation
  
- B. ACTION CIRCLE: Monthly Meetings
  - 1) Professional learning plan(s)
  - 2) Professional practice info and observation exchange
  - 3) STEM learning experiences design and pilot projects (3-6)

## **VIII. Management**

The project will reside under the auspices of District 65, specifically housed within the STEM department, directed by Jesch Reyes. Dr. Goren and Mr. Reyes will hire a project director (0.60 FTE) who will have the following responsibilities:

1. Facilitate and serve as staff to the Direction Circle. Duties will include scheduling, agenda setting, documentation, and meeting facilitation.
2. Coordinate professional development opportunities and site visits for the Direction Circle.
3. Manage and supervise dispersal of the Targeted Program Expansion funds.
4. Coordinate and facilitate the Action Circle. Duties will include meeting coordination and facilitation, oversight of approved and funded projects, and support in coordinating professional development activities.
5. Lead the evaluation and youth tracking efforts, including data collection, survey/interview instrument design, and data analysis.
6. Supervise creation of the website to serve as the central communication tool between STEM providers and the Evanston community.
7. Fulfill reporting requirements for D65 and the Noyce Foundation.

## **X. Budget Narrative & Assumptions**

See Appendix E.

## **XI. Infinity & Beyond: Sustainability**

A vibrant, sustainable STEM learning ecology framework in Evanston can be a game changer for the future lives of our under-performing, under-resourced and under-represented populations. It also has the possibility to be a model for similar cities across the nation that face high achievement gaps and limited STEM options for families who are under-resourced.

This three-year proposed project lays the foundation to pull multiple levers at multiple levels regarding the power of in-school and out-of-school partnerships at a coordinated, citywide scale. After successful completion of the proposed three-year granting period, we plan to use this preliminary data to target other funding opportunities that include:

- The National Science Foundation (NSF), which invests in a wide-range of research-based and research-generating approaches to understanding STEM learning; to designing, testing, and studying curricular change and innovation; to disseminating and implementing best practices; and to broadening participation of individuals and institutions in STEM fields.

The NSF's Advancing Informal STEM Learning (AISL) program seeks to advance new approaches to and evidence-based understanding of the design and development of STEM learning in informal environments; provide multiple pathways for broadening access to and engagement in STEM learning experiences; advance innovative research on and assessment of STEM learning in informal environments; and develop understandings of deeper learning by participants.

- The U.S. Department of Education's (DOE) Committee on STEM Education (CoSTEM) seeks to reorganize STEM education programs and increase the impact of federal investments in five areas: P-12 STEM instruction; increasing and sustaining public and youth engagement with STEM; improving the STEM experience of undergraduate students; better serving groups historically underrepresented in STEM fields; and designing graduate education for tomorrow's STEM workforce.

Through the i3 granting process, the DOE provides competitive grants to applicants with a record of improving student achievement and attainment in order to expand the implementation of, and investment in, innovative practices that are demonstrated to have an impact on improving student achievement or student growth, closing achievement gaps, decreasing dropout rates, increasing high school graduation rates, or increasing college enrollment and completion rates.

These grants (1) allow eligible entities to expand and develop innovative practices that can serve as models of best practices, (2) allow eligible entities to work in partnership

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with the private sector and the philanthropic community, and (3) identify and document best practices that can be shared and taken to scale based on demonstrated success.

- Motorola's Innovation Generation Collaborative Grants support medium- to large-scale STEM education collaborations between two or more non-profit organizations, schools and/or school districts.
- Additional corporate and foundation grants and/or program sponsorships from local and national STEM supporting organizations such as Abbot Labs, Baxter Healthcare, Toyota, Honda and the Gates and Walton Family Foundations.
- Evanston local foundations, businesses and individuals.

**Appendix A. Participating LENSE Members and Organization Descriptions**

<b>Listing of Direction Circle Members</b>	
<b>Name, Title, Organization</b>	<b>STEM Classification</b>
<b>Youth Umbrella Organization (Y.O.U.)</b> Seth Green, <i>Executive Director</i> Maria Rassiwalla, <i>Director</i>	Out-of-School Provider
<b>McGaw YMCA</b> Mark Dennis, <i>CEO</i> Monique Parsons, <i>Chief Operating Officer</i>	Out-of-School Provider
<b>Evanston Public Library</b> Karen Danczak Lyons, <i>Director</i> Renee Neumeier, <i>Young Adult Librarian</i>	Out-of-School Provider
<b>Family Focus Evanston</b> Dorothy Williams, <i>Executive Director</i>	Out-of-School Provider
<b>City of Evanston</b> Joe McRae, <i>Deputy City Manager</i> Robert Dornecker, <i>Assistant Director</i>	Out-of-School Provider
<b>Science in Society Program, Northwestern University</b> Dr. Michael Kennedy, <i>Director</i> Rebecca Daugherty, <i>Assoc. Director</i>	University Partner and Out-of-School STEM Program Designer and Provider
<b>Office of STEM Education Partnerships, Northwestern University</b> Dr. Kemi Jona, <i>Director</i>	University Partner and Out-of-School STEM Program Designer
<b>Evanston School District 65</b> Dr. Paul Goren, <i>Superintendent</i> Jesch Reyes, <i>Director of STEM</i>	Elementary School District STEM Provider
<b>ETHS District 202</b> Peter Bavis, <i>Assistant Supt. for Curriculum &amp; Instruction</i>	High School District STEM Provider
<b>Lewis-Sebring Foundation</b> Chuck Lewis, <i>Chairman</i>	STEM Supporter and Funder

**Organization Descriptions**

**McGaw YMCA**, 600 Grove Street, Evanston, IL

The McGaw YMCA (Y) is located in the heart of downtown Evanston and is an open, charitable membership association that promotes growth in spirit, mind and body through programs and services for all. The Y does this by welcoming everyone and inspiring, activating and impacting all in spirit, mind, and body.

**The Y has four core values:**

- **Caring**: Demonstrating sincere concern for others, their needs and wellbeing.
- **Honesty**: Telling the truth and demonstrating reliability and trustworthiness.
- **Respect**: Treating others as we would want to be treated and valuing the worth of every person.
- **Responsibility**: Doing what is right and being accountable for our choices and actions.

A critical focus of the Y is Youth Development, with a goal of nurturing the potential of every child and teen. The Y believes that all kids deserve the opportunity to discover who they are and what they can achieve. For this reason, they work to cultivate the values, skills and relationships that lead to positive behaviors, better health and educational achievement.

The Y opened the **MetaMedia Lab** in March 2015. MetaMedia is a maker space for middle-school-aged youth that focuses on media, engineering, technology and the arts. As an open- and interest-based learning environment, MetaMedia engages youth after hooking them into the environment

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with creative expression and engaging technology opportunities. Returning youth are challenged to master skills by taking workshops in various STEM pathways that build towards high-level skill development.

### **Youth Organizations Umbrella, Inc. (Y.O.U.)** 1027 Sherman Ave. Evanston, IL

Y.O.U. is a youth development agency that provides services and leadership to meet the emerging needs of young people and their families in the Evanston community. Its vision is that all young people acquire the skills, self-confidence, and opportunity to participate fully, freely, and responsibly in the life of the community.

Y.O.U. has a three-part approach toward youth development: Engage, Support, Sustain. Y.O.U. has a site coordinator and runs after-school programs in 6 Evanston elementary schools, two middle schools and the high school.

Y.O.U. received grants in 2014 to design, build and operate a new makers space in central west Evanston across from the Evanston Township High School. The space will be geared to serving high school students.

### **Family Focus** 2010 Dewey Ave, Evanston, IL

Family Focus helps Chicago-area families living in low-income communities give their children the best possible start in life. We help families gain the confidence and skills to be the parents they want to be. By offering customized classes, support groups and referral services in a welcoming and caring environment, Family Focus helps families help themselves while building a relationship based on equality and respect.

Family Focus hires staff from within the communities served and doesn't charge for most services. This contributes to the community-building process and helps them forge strong collaborations with families, community agencies, health care providers, etc.

### **Science in Society at Northwestern University,** Evanston, IL

Science in Society (SiS) is a Northwestern University office dedicated to science education and community outreach. Through partnerships with Chicago-area schools and community groups, they train Northwestern researchers to share their expertise and creativity in a community-centered way. Their focus is to develop sustainable educational initiatives that deliver proven results for groups with the greatest need.

SiS's award-winning **Science Club**, an afterschool, mentor-based program for urban middle school youth, makes a striking difference in the science skills and engagement of its participants. Science Club takes place at the Boys & Girls Clubs of Chicago and at Dawes Elementary School in southwest Evanston.

### **Office of STEM Education Partnerships at Northwestern University,** Evanston, IL

The Office of STEM Education Partnerships (OSEP) supports K-12 students and teachers by connecting them with the world-class science, technology, engineering and mathematics (STEM) resources of Northwestern University. Formed as a unique partnership between the School of Education and Social Policy and the Office of Research, OSEP brings expertise in curriculum, technology, and program design to create effective outreach and programs. Through new learning technologies, focused teacher professional development, and student programs, OSEP brings both time-tested and cutting-edge research from the university to the K-12 learning community.



## **Evanston STEM Learning Ecology Framework Proposal**

In Evanston, OSEP supports **FUSE programs** at the Evanston Public Library and YMCA's MetaMedia. OSEP also funds a partnership coordinator housed at Evanston Township High School and provides extensive STEM educator professional development workshops throughout the year.

### **Evanston Public Library, 703 Orrington Ave, Evanston, IL**

The Evanston Public Library (EPL) provides access to vital services every day within and beyond its walls. EPL supports literacy, creation, education, collaboration and civic engagement. EPL is also committed to the whole Evanston community, continually adapting to community needs with a vast array of free services and resources.

The library is a key STEM advocate for children, hosting the FUSE program, offering STEM professional development to District 65 teachers, and supporting librarian's and teacher's work via in-school activities.

### **City of Evanston's Parks, Recreation and Community Services Department**

Through its Youth Engagement Initiative, staff provide opportunities for all Evanston youth and young adults to become active and productive citizens of the community through strengthening existing youth services, establishing a network of service partnerships, increasing participation within the available opportunities, creating marketable job training and placement and increasing the opportunities for social and recreational outlets for disengaged youth.

### **Evanston Township High School – District 202**

Evanston Township High School (ETHS) District 202 is a four-year (9-12), comprehensive high school occupying a 62-acre campus and serving almost 3,200 students. Established in 1883, ETHS has 275 certified staff members, a majority of whom have a Master's degree or beyond. ETHS is fully accredited by the State of Illinois. In 2014, Evanston Township High School was ranked #17 in the state of Illinois by The Washington Post, and #21 in Illinois by U.S. News & World Report.

ETHS has an extensive array of STEM course offerings, using the Project Lead the Way design. It boasts four STEM labs, including an engineering lab, a digital photography lab, and a Geometry in Construction lab. In 2015, ETHS will open a state-of-the-art advanced manufacturing lab. The school is also designing a new year-long STEM-design senior seminar course. Lastly, ETHS houses STEM after-school initiatives in partnership with Y.O.U and NU and hosts a summer engineering camp for middle school-aged students.

### **Evanston Community Consolidated School District 65**

District 65 is a pre-K through 8th grade school district serving more than 7,000 students from the City of Evanston and a small neighboring section of the Village of Skokie. The district represents a wide range of diverse ethnic, economic and cultural backgrounds. Throughout the course of the school year and during the summer months, the district partners with many community organizations in providing resources and support for students.

Nearly 1,400 educators and support staff work within 10 attendance-area elementary schools (grades K-5); three attendance-area middle schools (grades 6-8); two magnet schools (grades K-8); an early childhood center; and a school for students with special needs.

In 2014, District 65 hired a Director of STEM to lead math and science education, adopted a STEM Vision for the district as a whole and is actively developing existing faculty in STEM and pursuing STEM partnerships to enhance its STEM offerings.

## Appendix B. Notes from February and March, 2015 Direction Circle Meetings

### February 5<sup>th</sup>, 2015 EVANSTON STEM Learning Ecology Meeting

Key points from meeting:

1. All are in.
2. Meeting went a bit long with mid-meeting conversation but discussion was important.
3. Some want to do stuff right away -- catalyze us into action and jump on the Noyce \$:
  1. Put together a summer of learning here in Evanston
  2. Take what we do small here and make it bigger
  3. Must be do-able and small scaled.
4. Others want to set up the structure of group, define goals, determine needs and assets, and pursue actions aligned to the goals.

Round-up:

- **YOU** is STEAM but focused on developing Soc./Emotional capacity. Out-of-school programs in Robotics, hip-hop, science lab with future 2016 H.S. Maker's Lab. YOU likes the BADGE idea.
- **D65**: Work to complement each organization in STEM Ecosystem. Focus on Staff capacity and create opportunities to Design. Like hybrid of Badge and Hillsborough County.
- **NU-SiS**: Work with ETHS, YOU, B&GC and EPL. They believe in structured settings that are well-planned out but "invisible" to students. Key is to take away or minimize intimidating barriers to entry.
- **ETHS**: Provide STEAM but through courses, which means quite structured. Key is to develop curiosity and let students be in control. Also critical to provided various access points to entry (e.g., image biology for non-readers).
- **NU OSEP**: Works with YOU, YMCA, ETHS, and EPL. Badges provide data opportunities to track student interest, needs, access, etc.
- **YMCA**: Focus on Middle school, MetaMedia is FUSE designed by middle school, Not STEAM, but TEAM-Tech, Engineering, Arts and Music.
- **EPL**: Loft is Creative Teen space -- creative, self-directed learning which includes FUSE. Working to make it portable to the City Park buildings. Also conduct Maker-training sessions for future STEM guides (educators), including the D65 Librarians. And have created Kits to send to Librarians at schools to create mini-maker lab experiences at schools.
- **Parks & Rec.**: Potential to offer a diverse set of programs. Needs partners to complement/supplement what they have and offer (space). Likes the Badge concept.
- **Family Focus**: Has STEM-related programs but they come and go. Seeks continuity and program partner(s) to create and stay.

Chuck Lewis offered three ending insights: (1) a question of who is on top (driving the programs)? Students (learners) or adults (educators), (2) this network should exist organically -- Venn diagram vs. Org chart, and (3) identify actual programs that are already operating, and build on them by encouraging collaboration.

**Appendix B. Notes from February and March, 2015 Direction Circle Meetings (cont.)**

**March 5<sup>th</sup> LENSE Meeting Outcomes:**

- a) Plan for Noyce Grant
  - a. Develop, define, identify, create common professional learning opportunities.
  - b. National model for how OSP can interact and impact with classroom teaching and learning
  - c. Seed funding to build long-term sustainable model
  
- b) STEM Tensions
  - a. Structure: Interest ← ----- → Curricular
  - b. Instruction: Guided ← ----- → Taught
  - c. Environment: Free ← ----- → Standardized
  - d. Constraints: Ecology ← ----- → Economy
  - e. STEM Growth: Organic ← ----- → Pilot/Trial
  
- c) Ideas
  - a. Summer Programs
  - b. Data Collection
  - c. Expand STEM
  - d. Professional Learning Collaborations: Develop and Pilot STEM IS-OSP Units

**Noyce Proposal Outline**

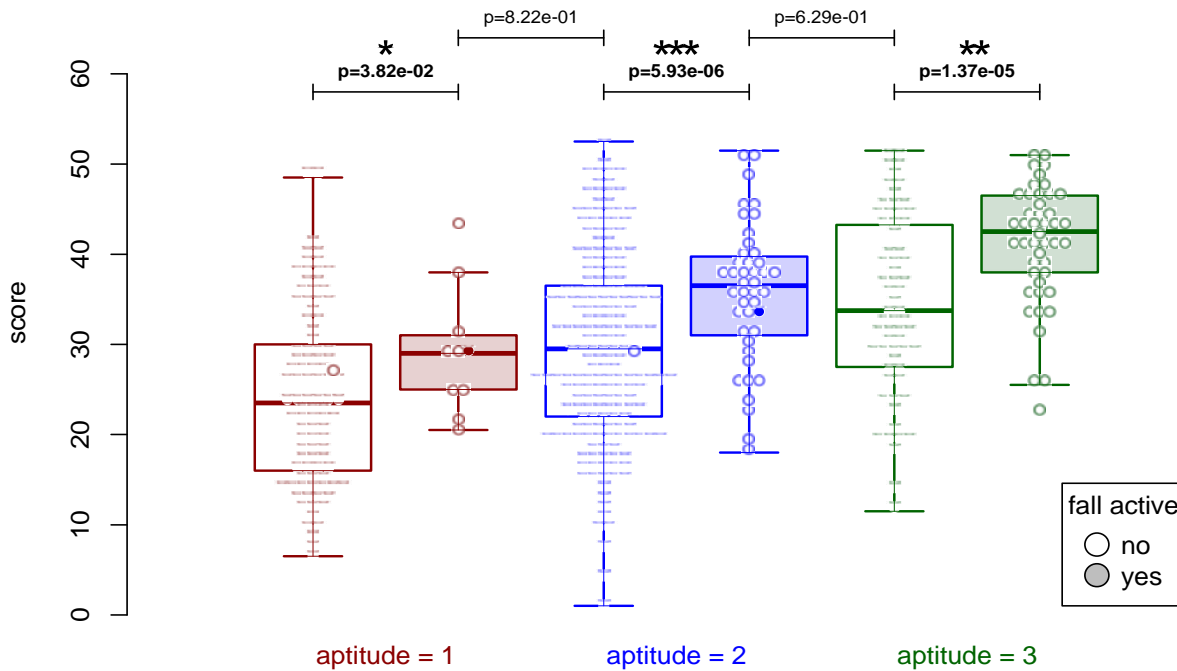
1. Foundational Work:
  - a. Asset map
  - b. LENSE Expansion: Business, Museum
  - c. Input of Kids/community
  
2. Creating the model structure for in-school to engage with out-of-school
  - a. Not Just Field Trips
  - b. Building Units Together: STEW – Teacher/OSP educator Workgroup
  
3. Expand Capacity of STEM OSP
  - a. Elementary
  - b. Range of STEM activities/programs (more than Media/Tech/Arts)
  - c. Geographical
  - d. Summer

**Appendix C.**

<b>Interested Action Circle Members</b>	
<b>Name, Title</b>	<b>Organization</b>
Rebecca Daugherty, Associate Director	Science in Society, Northwestern University
Renee Neumeier, Young Adult Librarian	Evanston Public Library
Sam Phillips, Maker Guide	MetaMedia, YMCA
Megan Wall-Orleans, Assoc.Dir, Afterschool Programs	Y.O.U.
Kefira Philippe, Librarian	Nichols Middle School, D65
Nicole Nava, Media Arts Teacher	Nichols Middle School, D65
Sherri Kushner, Media Arts Teacher	Chute Middle School, D65
Gary Cipinko, Tech Educator Specialist	King Arts School, D65
Carla Stone, Sixth Grade Science Teacher	King Arts School, D65
Sachin Jhunjuwhalla, STEM Math Teacher	Evanston Township High School
Jamie Thome, D65 Artist in Residence	D65 Teacher/Consultant
Kristen Perkins, ETHS STEM Coordinator	OSEP, Northwestern University
STEM Curriculum Designer/Researcher	OSEP, Northwestern University
Elory Rozner, STEM Professional	Uncommon Classrooms

### Appendix D. Science Club Improves Youth Science Skills

Science Club Impact Data, R. Daugherty and M. Kennedy, Science in Society, Northwestern University



#### Science Club Improves Youth Science Skills.

From 2010-2013, a total of 451 science fair projects (n= 98 Science Club, 353 control) at three Chicago public schools were judged by independent, scientist judges. Two judges independently scored each student’s presentation, with judges’ scores averaged to determine a final score (53 pt maximum). To account for the strong relationship between science fair scores and entering student aptitude, each student’s science teacher provided an “aptitude score” for each student: a 1-3 ranking of the child’s academic strength in science (3=highest ability; 1=lowest ability). Given that Illinois only administers standardized science tests in the 4th and 7th grades, the teacher aptitude score represents the best means to group youth by aptitude. **Science Club participants (shaded circles) outperformed their non-Science Club peers (open circles) across all three aptitude categories (p<0.001). The effect size is 0.7- a very strong effect. It is equivalent to bumping youth up an aptitude category.**

#### Science Club Participation Data

<b>Total Participants (2009-2015)</b>	<b>198</b>
% Male	46
% Female	54
% African American	29.5
% Hispanic	22.5
% Free/Reduced Price Lunch	96
<b>Average Time in Program</b>	<b>1.3 Years</b>
<b>Average Daily Attendance Rate</b>	<b>84%</b>
<b>Average Retention Rate</b>	<b>96%</b>

**Appendix E. Budget and Narrative**

The three-year proposed budget essentially funds five key areas to drive the work of creating a coordinated learning ecology framework in Evanston.

1. To manage the proposal, one-third of the budget will be used to hire a project director and support administrative oversight responsibilities at D65. Also, five percent of Dr. Goren's time and 10% of Jesch Reyes, STEM Director, will be devoted to the work of this proposal via direction, planning, and priority setting. District 65 will also contribute space, equipment and supply support for the project director. Lastly, District 65 will manage all proposal management-related duties, including accounts, budgets, payments, and reporting.
2. The work of the Direction Circle will be done via participatory volunteers from each member organization. Funds will be used to support Direction Circle responsibilities, including meetings, the creation of a central website and communications plan, and a contractual arrangement with an outside agency to support the design and data collection for the project's evaluation.
3. The Direction Circle will also direct project funds to support three, targeted program expansion efforts, one to begin in 2015 and the two others to begin in 2016. Each project is estimated to cost \$35,000 a year and is based on typical costs for coordination, staffing, supplies, materials -- assuming space is provided in-kind in existing schools or community center locations.
4. The work of the Action Circle will be supported via meeting logistics support. Professional development, site visits, and in-services to build the capacity of each Action Circle educator will be performed through contractual arrangements with STEM professional development providers.
5. Lastly, the development of STEM learning experiences by the Action Circle will require stipend payments to members and STEM education professionals for development plus support to pilot, produce and disseminate the learning experiences to D65, ETHS, and/or OSPs. Each produced learning experience will also have access to funds to support materials, supplies and student transportation as needed.

# APPENDIX E

## B U D G E T: Learning Ecology Network of STEM in Evanston (LENSE)

14-May-15

July 1, 2015 - June 30, 2018

	YEAR I	YEAR II	YEAR III	TOTAL	Assumptions
<b>MANAGEMENT</b>					
1 Project Director	\$ 60,000	61,339	62,566	\$ 183,905	Salary + Benefits
2 D65 Project Administration (in-kind)	\$ 22,500	\$ 22,500	\$ 22,500	\$ 67,500	5% Superintendant, 10% STEM Director
3 Related Overhead (in-kind)	3,000	3,067	3,128	9,195	Space, equipment, secretarial
<i>subtotal Program Management</i>	\$ 85,500	\$ 86,906	\$ 88,194	\$ 260,600	
<b>DIRECTION CIRCLE</b>					
4 Meetings	\$ 800	800	800	\$ 2,400	4 Meetings @ \$200 ea. per year
5 Communications					
6 Project Marketing (in-kind)	5,000	5,000	5,000	15,000	
7 Web Design & Development	8,000	-	-	8,000	One-time set-up fee
8 Web Maintenance	1,000	1,000	1,000	3,000	Annual contracted maintenance fee
9 Data Collection & Evaluation	20,000	20,000	20,000	60,000	10% of budget
10 <i>subtotal Direction Circle</i>	\$ 34,800	26,800	26,800	\$ 88,400	
11 Targeted Program Expansion Yr. I - III	\$ 35,000	35,000	35,000	\$ 105,000	1 @ \$35,000 ea. per year
12 Targeted Program Expansion Yr. II - III		70,000	70,000	140,000	2 @ \$35,000 ea. per year
<i>subtotal Targeted Program Expansion</i>	\$ 35,000	105,000	105,000	\$ 245,000	
<b>ACTION CIRCLE</b>					
13 Meetings	\$ 2,000	2,000	2,000	\$ 6,000	10 @ \$200 ea. per year
14 Prof Learning Support	5,000	5,000	5,000	15,000	STEM Curric. Design & external PD sessions
15 Unit/Lesson/Activity Design Pilot Cycle					
16 Stipends for Action Circle Educators	18,000	18,000	18,000	54,000	50 staff hours @ \$60/hour for 6 U/L/As/yr.
17 STEM Curriculum Professionals	12,000	12,000	12,000	36,000	20 Consultant hrs @ \$100/hr for 6 U/L/As/yr.
18 Substitute Teacher Pay	4,500	4,500	4,500	13,500	30 sub days @ \$150/day
19 Material & Transportation Support	3,000	3,000	3,000	9,000	\$500 per U/L/A
20 U/L/A development & dissemination	6,000	6,000	6,000	18,000	\$1,000 to produce and disseminate each U/L/A
<i>subtotal Action Circle</i>	\$ 50,500	\$ 50,500	\$ 50,500	\$ 130,500	
<b>TOTAL LENSE</b>	\$ 205,800	269,206	270,494	\$ 745,500	
<b>TOTAL Noyce Request</b>	\$ 170,800	\$ 234,139	\$ 235,366	640,305	<b>Evanston Learning Ecology Framework Proposal</b>
<b>TOTAL D65 Support</b>	\$ 35,000	\$ 35,067	\$ 35,128	105,195	

## Appendix F. FEEDBACK SUMMARY ON PROPOSAL ELEMENTS

We appreciate the feedback provided by Cary Sneider and Kathleen Traphagen as it pushed us to think a little deeper and round out some edges of this proposal. It also helps define some of our first year actions as we don't have all the answers yet, but plan to use the initial stages of the project to nail them down. Below is a summary of the feedback provided by Cary and Kathleen and our current thinking – whether as a detailed response or as a plan for how we will address the stated concern.

1. What is the vision and what will it look like over the course of the three years.

*We added the below text to the Theory of Action section to expand and clarify the vision of the LENSE:*

*The underpinnings of the vision for this work are girded in the Connected Learning principles of relevant, interest-based pursuits within a production-centered environment. They are academically aligned to the Next Generation Science Standard's science and engineering practices and crosscutting concepts and the Common Core State Standards for Mathematics. They are inspired by the recent formation of the Cradle to Career Initiative in Evanston, which is a collective impact effort to mobilize the community's assets to make a lasting difference in the lives of the community's children, youth and families. And they are exemplified by successful STEM learning ecology frameworks such as the Kids+Creativity Network in Pittsburgh and both HIVE and the Center for the Advancement of Science (CASE) at the Museum of Science & Industry in Chicago.*

*The vision, then, for a learning ecology framework in Evanston capitalizes on the collective and coordinated efforts of STEM providers to grow engaging STEM opportunities for our targeted youth populations. Purposeful interventions will include:*

- *new program expansions supported to specifically serve the targeted youth,*
- *new STEM in-school/out-of-school experiences to inspire and develop STEM pursuits,*
- *aligned (new and existing) STEM curricula, programs and pathways, and*
- *STEM educator trainings/in-services to build capacity and change teaching practices.*

*The expected informal developments from the framework include those synergies that evolve from openly networked environments to link and reinforce STEM learning opportunities in accessible settings for the targeted youth. These outcomes may take the shape of coordinated workshops, a series of exhibitions and talks, new programs formed by partnerships, joint field trips, classrooms that take on the appearance and experience of an after-school environment, summer educators using classroom teacher techniques to differentiate activities, and many other organic developments.*

2. Is the evaluation plan comprehensive enough and how will the budget provide enough?

*The Evaluation Section has been re-written and the budget has been doubled to \$20,000 a year.*



3. There is a need to integrate workforce STEM-focused institutions into work of the Direction and Action Circles; would want to see how/when they are going to do that.

*We do need to integrate science museum expertise and workforce STEM-focused institutions into the work of the Direction Circle and the Action Circle. We have signed up CASE at the Museum of Science and Industry to provide trainings and guidance. We will also be targeting major Evanston and Chicago corporations actively involved in the STEM fields, including Northshore Healthcare, Boeing Corporation, Abbott Laboratories, and Motorola. Also, the recent opening of the UI LABS and the Digital Manufacturing and Design Innovation in Chicago offers a number of workforce STEM partnership opportunities and we will actively seek those out within the first year of the proposal period. Our vision is to include these partners in an advisory role to meet several times a year to review the work of the LENSE and provide guidance and support.*

4. There is a need for a more detailed and in-depth report about the size/scope/details of the equity-related gaps and a clear connection from that data to the Action Circle so that we know the data is strategically informing the development of the Units/Lessons/Activities.

*As discussed in the Evaluation Section, data collection efforts will provide baseline information and help set beginning priorities for the targeted program expansions and the design and focus of the STEM learning experiences. We will also prioritize and support only those proposed STEM learning experiences that target the STEM needs of our targeted populations*

5. Is developing U/L/A's a bold enough strategy to carry this vision? I need more information about the breadth, depth, scope, and scale of these. Are they going to reach a sufficient number of underrepresented kids in a comprehensive way? It seems that the process is set up to put the Direction Circle in reactive mode – evaluating what comes to it from the Action Circle -- but maybe there needs to be a stronger framework and parameters set so the Direction Circle gets what it envisions and, what it envisions is tied to the data. For example – children are posting very poor outcomes in math but few of the expanded learning programs seem to focus on math, or integrate math.

*This is a very relevant concern and will be addressed by the Direction Circle. First, as designed, the Direction Circle will be an active group in supporting targeted program expansions that directly impact the target populations. It will also be very active in coordinating the learning ecology framework to align and make accessible the current and planned programs/pathways offered.*

*As for its oversight of the work of the Action Circle, it will be proactive in forming guidelines that the Action Circle will react to in forming its STEM learning experience proposals. By using relevant data to drive the formation of these guidelines, the Direction Circle plays an important oversight role. And then, yes, the Direction Circle will be a reactive group to the approved work of the Action Circles – which is the point – to let the educators devise, design and pilot new STEM crosscutting learning experiences to best engage the youth they guide.*

*Will these STEM learning experiences reach a sufficient number of the targeted youth to make an impact? Our thinking is that they will. If a STEM learning experience for a sixth*

## Evanston STEM Learning Ecology Framework Proposal

*grade math class in coordination with a targeted weekend program at the public library is disseminated throughout the district, then 100% of the targeted youth in sixth grade will experience the STEM learning experience and a good number will participate in the related, out-of-school experience at the Library. The next year, a new crop of sixth graders will also experience the STEM learning experience. If we can develop 18 STEM learning experiences over the three years, we will have created 18 separate STEM learning experiences that can potentially reach all (100%) of the targeted Evanston youth during their K-12 academic lives.*

6. I would also like *more information about how pathways actually be created? Will the U/L/As be linked together and intentionally developed as pathways? There is no real description of pathways design in here. And how will young people transition successfully along pathway without family help – or maybe they are going to build family capacity (family engagement mentioned at all). Have they talked to peer communities on this issue, the work is very nascent but Sue Allen at the least...*

*The pathways to be created are in the TBD column and on the to-do list for year one. Our initial efforts will be for the Direction Circle to create a STEM asset and resource nodal map that will exhibit what is in place in Evanston and where the gaps and needs are when paired with our other data collection and cataloguing efforts. The results of the initial nodal pathway map will focus targeted program expansion and STEM learning experience developments.*

7. There is great emphasis placed on the *Connected Learning* principles and values...these are very inspirational and I wonder how Evanston will ensure the CL vision is rooted on the ground in the U/L/As. More information on this would be useful. In addition CL seems to be very technology/blended learning oriented although maybe Evanston is not envisioning it that way. If they are, more details on how they are using technology would be useful.

*The rooting of the Connected Learning principles in the work of the Action Circle will be addressed within the requirements for STEM learning experience proposal selection. Essentially, the requirements will specify to what degree the proposed STEM learning experience will be production centered, based on student interests, provide shared purpose, foster peer culture, linked to in-school or out-of-school efforts, and meet NGSS/Common Core objectives. The guidelines will also prioritize STEM learning experience proposals that integrate technology, be it through 3-D printing, iPad deployment, or the use of tinker kits available on-loan through the Evanston and the Skokie Public Libraries, for example.*

8. Again on data: do they have any outcome data from existing OST programs that do serve under-represented kids in STEM in their community – either on engagement or knowledge? Data would be useful to point to promising practices to share. Also what about the same question applied to the schools? Would be great to understand what types of initiatives the schools have taken on to close STEM achievement gaps ... and how they connect to the LENSE work.

*We do have data on discrete STEM programs in Evanston, as displayed in Section IV of this proposal and in Appendix E. Other data is inconsistent and preliminary. The formation of the LENSE with a project coordinator and evaluation team will add focus and directive to ensure*

## Evanston STEM Learning Ecology Framework Proposal

*data collection is a priority to assess STEM engagement and knowledge outcomes. For example, we already have the stated commitment from all participating partners to share data and outcomes in support of this proposal.*

9. I have a lot of questions about the evaluation and how they will do it. What is their actual outcome goal – quantifiable (is it?) and how will they measure? Are they thinking of doing badges or electronic portfolios, if so how/what types/connections to others that are doing this?

*The Evaluation Section has been thoroughly re-thought and re-written to address the concerns here. Our outcome goal is to improve STEM literacy of our target populations. Tracking the participation levels, the growth of students along STEM pathways, and corresponding impact on math and science achievement and course enrollments at the high school level will be the critical measures to track.*

*Badges are a target goal to begin in year two of the proposal to model Chicago's Year of Learning initiative. We have asked DePaul University about bringing the City of Learning badging platform online to Evanston to support the badge tracking and management. With the leadership of the public schools, the badge concept can incorporate school electives and STEM-based school activities, such as science fair, coding club and math club to provide a complete in-school and out-of-school picture.*

10. I would like to see a discussion of the challenges they anticipate, including: cultural, language, uneven power and other barriers among people in different settings: school/OST etc. Barriers to setting up effective data sharing/transparency practices.

*The undertaking to establish the LENSE and achieve the stated goals comes with a number of challenges.*

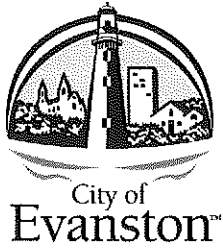
- a. A collaborative effort of this magnitude means the relationships and politics between the participating organizations will have to be well managed. Critical to this effort will be a clear understanding of the roles, responsibilities and expectations of each member and a constant, vigilant focus on the purpose and reason why each organization is involved.*
- b. As we will be working to change the culture of STEM learning for under-performing students in STEM subjects, interacting with the targeted youths' families will be tantamount to effect real change. All of the STEM program providers involved in this framework serve Evanston children and have relationships from various perspectives with the families they serve. Thus, collectively, we feel we will be able to coordinate our efforts to better communicate with and involve our target youth and their families.*
- c. Evanston organizations serving immigrant Latino families, which comprise 15% of the population, have developed various strategies to overcome the cultural and language barriers inherent with newly arrived immigrants who don't speak English. But lack of participation by these families remains a barrier to greater community participation.*
- d. We also know that professional resistance to change will be a barrier to successful dissemination of new STEM learning experiences – especially in the classroom. Educators in the Action Circle will be the leaders interested and willing to explore new practices, but*

## **Evanston STEM Learning Ecology Framework Proposal**

*implementation of new STEM learning experiences into the rest of the classrooms may not be so readily embraced. Embedded professional support, which places STEM professionals in those classrooms, will be pivotal to support teachers hesitant and/or resistant to enact Connected Learning principles in their classrooms.*

11. Would the Direction Circle also work on policy reform, financing, sustainability and scale, at city level/school leadership level? Would the DC also be responsible for creating data sharing agreements, tracking overall outcomes (process outcomes included); and figuring out how they can engage in continuous improvement?

*The Direction Circle's responsibilities have been clarified in section VI of the proposal, and includes taking on sustainability, data sharing agreements and scaling the work of the LENSE. And at the end of year 3 of this proposal, the Direction Circle will take on policy reform if this collaborative effort truly increases STEM literacy for our target populations.*



Parks, Recreation and Community Services Department  
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TTY 847.448.8064  
[www.cityofevanston.org](http://www.cityofevanston.org)

May 11, 2015

Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022


Dear Mr. Ottinger,

It is my pleasure to submit a letter in support of the creation of a STEM learning ecology framework here in Evanston submitted by Dr. Paul Goren and Jesch Reyes from Evanston-Skokie School District 65.

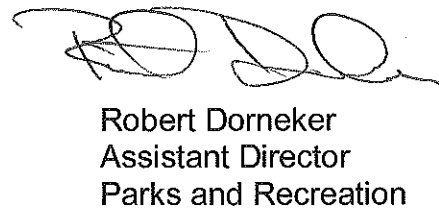
The City of Evanston is a close partner to District 65 and a firm believer in reaching and engaging all Evanston youth towards their pursuit to become productive citizens. We provide numerous after-school and summer programs including STEM programs based at our Ecology Center. For this proposal, we look forward to work with other out-of-school providers and with Districts 65 and 202 in the Direction Circle to coordinate our collective efforts and target under-served youth.

We see the efforts of a STEM learning ecology framework as a perfect supplement to the citywide Cradle to Career Initiative recently begun here in Evanston. It will take more than a home or a school to address the gaps in school achievement and economic progress for our low-income youth – it will take a coordinated effort by the entire community to inspire and engage our youth to alter their life trajectories.

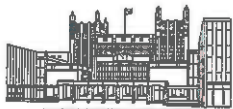
Sincerely,



Joseph McRae  
Deputy City Manager / Director  
Parks, Recreation & Community Services



Robert Dorneker  
Assistant Director  
Parks and Recreation



## Assistant Superintendent for Curriculum and Instruction

Dr. Peter Bavis – Assistant Superintendent for Curriculum and Instruction  
Telephone: 847-424-7702 Fax: 847-424-7710

EVANSTON TOWNSHIP HIGH SCHOOL  
1600 Dodge Avenue  
Evanston, Illinois 60201

May 14, 2015

Mr. Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

I am writing in support of the creation of an Evanston STEM learning ecology framework. Evanston Township High School is a leader in STEM education. ETHS District 202 is a diverse school in a near-in semi-urban district with approximately 3100 students, with 41.1% of the students coming from low-income families. The demographics of the student body include 43% White students, 31% Black or African-American, 17% Hispanic/Latino, 4% Asian, and 5% identifying themselves as two or more races.

We have partnered with District 65, City of Evanston, and Northwestern University to advance youth development, particularly in STEM. One example of partnering with the City of Evanston is our Geometry in Construction course. In this STEM course students apply geometry and engineering principles and build a house. The house is then moved to a parcel of land in Evanston and sold to a first time home owner. This course requires ongoing partnering with the City of Evanston, the business community, and local agencies.

Another example is the work Northwestern/ETHS Partnership Office has begun to support young women in science courses and career pathways. Women in STEM (WiSTEM) was created with the mission of addressing issues relevant to women in all STEM courses, with a particular focus on the attrition rate in our most rigorous physical science and engineering classes. WiSTEM is supported by the Society for Women Engineers and Mentorship Opportunities for Research and Engagement (M.O.R.E.) @ETHS. These Northwestern student volunteers provide near-peer role models and mentors for the WiSTEM girls. Through WiSTEM, ETHS girls participate in STEM Shadow Days with NU women and attend STEM events such as Argonne's Science Careers in Search of Women. Student and faculty leaders of WiSTEM leverage current research about women in the STEM pipeline in order to try to assist the ETHS girls in making informed course and career choices. We are looking to expand this work with District 65.

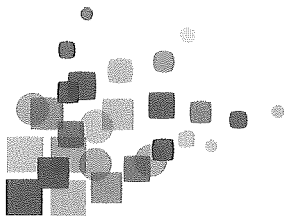
ETHS will take an active role in an Evanston STEM learning ecology framework because it is central to our STEM mission to purposefully teach problem solving, teamwork, scientific inquiry, innovation, technology, and communication throughout the curriculum. To this end, we will

- Expand collaboration among departments, teachers, students, District 65, Northwestern and the community
- Provide encouragement and develop a sense of belonging and ownership for STEM in student populations typically underserved in these areas
- Build an awareness of STEAM related career fields and post-secondary options through our education and counseling programs, including local business and educational partners

We will participate in data collection in evaluation within the framework of ETHS's approved policies and FERPA guidelines. ETHS is proud to support the creation of a STEM learning ecology framework.

Sincerely,

Pete Bavis, Ph.D.  
Assistant Superintendent for Curriculum and Instruction  
[bavis@eths.k12.il.us](mailto:bavis@eths.k12.il.us)



# evanston public library

community

events

resources

ideas

May 14, 2015

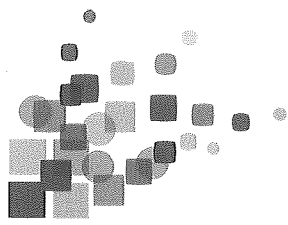
Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

On behalf of the staff and administrative team of the Evanston Public Library, I am delighted to write this letter of support for the creation of an Evanston STEM learning ecology framework. Working in collaboration with key Evanston institutions our work will collectively and carefully support our children as they learn in school, after school and all year long.

The Evanston Public Library has a long history of working with District 65 teachers, parents and students to support our children as they learn, explore and development skills. A few examples are:

- Beginning with the littlest learners we offer a variety of pre-school story times and activities, visit pre-school providers to share materials and books and reinforce the importance of reading together with parents and care givers.
- Over the summer, our staff works with District 65 and the Youth Job Center as we train teens to teach rising kindergarten students who are struggling to enjoy reading and master the alphabet. Helping all of our children to begin school ready to learn is part of our vision statement.
- Our librarians visit classrooms at all District 65 schools and welcome kindergarten, first and sixth grade class tours to the Evanston Public Library. We issue students EPL library cards, assist with their research and provide books to encourage reading at all grade levels.
- Working with three District 65 librarians, our Teen Outreach and Children's Outreach Librarians embarked on a joint grant funded project which provided professional development, a deeper understanding of our respective work and a deeper collaboration. As part of this grant, EPL purchased chrome books for in-library use by District 65 students.



evanston  
public  
library

community

events

resources

ideas

- Staff from our teen space, *The Loft*, visit classes to showcase our 3D printer, discuss ways to bring additional STEM learning to the classroom and encourage students to participate in our weekly FUSE Studio – produced in partnership with the Office of STEM Education Partnerships at Northwestern University. This program description entices new students to join the core of our faithful participants: Challenge: Accepted! Drop in with your friends to design and 3-D print jewelry, cars or even your head! Create your own stickers and accessories with our vinyl cutter, wire LEDs, mix your own ringtone, build an amp, combine chemicals to make gel beads, navigate a Lego Mindstorms robot through an obstacle course, or try any of the other cool challenges we have for you to level up in. For grades 6-12 \*\*3-D prints that are not completed on Saturday will be available to pick up the following Saturday\*\*.

In partnership with District 65, Evanston Township High School and Northwestern University, the Evanston Public Library looks forward to working together to create an Evanston STEM learning ecology framework. Our work will help to fulfill our Mission and important elements of our Vision:

**Mission Statement:**

Evanston Public Library aims to be the heart of the community by promoting the development of independent, self-confident, and literate citizens by providing open access to cultural, intellectual, technological and, informational resources.

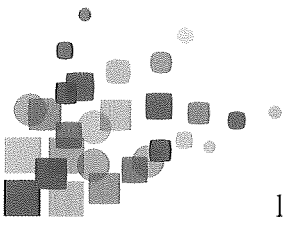
**Vision Statement:**

The Evanston Public Library Board of Trustees envisions a community in which the Library engages all residents in reaching their aspirations.

The Library’s staff, collections, programs, technology and leadership help ensure:

- That every Evanston resident has the opportunity to enjoy an intellectually and culturally rich life
- That every child enters school with the requisite developmental skills and continues to develop critical thinking and literacy skills including reading and functional literacy
- That every child experiences the pleasure of reading and the joy of learning
- That our community celebrates, appreciates and supports its diversity
- That those in need can find assistance and information with ease





■ That every resident experiences the pleasure of reading and the joy of lifelong learning

# evanston public library

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As we continue to explore ways to compile and compare data and results, this partnership will assist in the collection, analysis and long term tracking of program impact and the efficacy of out of school learning programs such as our annual Summer Reading Program. We have been working together since 2014 to discuss the most efficient ways to harvest data from a variety of systems and work with District 65 and Evanston Township High School to define both participant and control (non-participant) group lists. Once the groups have been created, we are asking the respective districts to use existing test and assessment data to compare learning and competency levels. All identification information will be removed and data will be aggregated for each group. Though we recognize that participation in library programs is only one way to support learning over the summer and after school, it will be interesting to learn if any differences are identified.

Working together to support each student as they learn, develop new skills and follow their curiosity, we fully support the goals of this proposal to create a new STEM learning ecology and help every student to reach their full potential. It is an exciting time to work together in the City of Evanston on behalf of our learners of all ages.

Sincerely,

Karen Danczak Lyons  
Library Director



Dorothy A. Williams, Ph. D.  
Director

May 14, 2015

Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

It is a pleasure for Family Focus Evanston to write a letter of support for the creation of an Evanston STEM Learning Ecosystem.

Family Focus has been operating in the West Evanston Community for more than 40 years. Our partnerships with Evanston schools is a major asset to our youth programs. Family Focus has maintained agreements with the school district and partnering schools to develop or improve career aspirations and choices.

The center works closely with the city staff to meet the needs identified in the City of Evanston's Consolidated Plan. The plan notes the need to pursue strategies to address the social service needs of low and moderate income residence especially children and youth in vulnerable areas of the community. Family Focus is located in the heart in West Evanston where a disproportionate number of families, 13% are living in poverty compared to 5% of families city-wide. The center is best situated to serve youth from this segment of the population. The STEM learning ecology framework will strengthen connections between the vulnerable youth living in West Evanston. The District is committed to supporting racial minorities, and economically disadvantaged youth, to foster diverse and inter-connected STEM learning experiences.

The mission of Family Focus is to *promote the well-being of children from birth by supporting and strengthening their families in and with their communities.* We concentrate on the needs of young children (0-5 years, but provides services to children of all ages. Our community-based support services build upon families inherent strengths and help young children by providing their families with the support they need to thrive.

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FAMILY FOCUS EVANSTON  
2010 DEWEY AVENUE  
EVANSTON, ILLINOIS 60201  
847/475-7570 • FAX 847/475-7590  
E-Mail: [evanston@family-focus.org](mailto:evanston@family-focus.org)  
[www.family-focus.org](http://www.family-focus.org)

*Promoting the well-being of children from birth by supporting and strengthening their families in and with their communities*

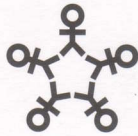
Family Focus Evanston is willing to support data collection efforts as described in the evaluation section during the three-year proposal and within the approved policies of Family Focus and per FERPA guidelines. Family Focus Evanston is fully committed to the Evanston STEM Learning Ecosystem, a system that will support those youth who have historically been under-represented in STEM, and to fully support the goals of engaging and changing lives through STEM engagement.

Sincerely,

A handwritten signature in black ink, appearing to read "Dorothy A. Williams". The signature is fluid and cursive, with a long horizontal stroke at the end.

Dorothy A. Williams  
Center Director

LEWIS-SEBRING



FAMILY FOUNDATION

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May 12, 2015

Mr. Ronald Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

As head of our Evanston-based family foundation, I am writing in support of the creation of an Evanston STEM learning ecology framework.

Our foundation is actively supporting many of the leading not-for-profit organizations here (such as the McGaw YMCA and its MetaMedia program and Y.O.U. and its future maker space) as well as Dr. Goren and District 65 and the City. Much of our work focuses on youth development, and within that, STEM education.

Penny Bender Sebring, our President, co-founded the University of Chicago Consortium on Chicago School Research twenty-five years ago and remains a leader there. The Consortium has created a one-of-a-kind data archive, which our foundation has long supported. Likewise, we would anticipate supporting evaluation and data collection efforts related to the Evanston STEM learning ecology framework, to the extent we are able.

We would greatly appreciate the Noyce Foundation's support of this initiative.

Sincerely,

A handwritten signature in cursive that reads "Charles Ashby Lewis".

Charles Ashby Lewis

cc: Penny Bender Sebring  
Paul Goren



**FOR YOUTH DEVELOPMENT®  
FOR HEALTHY LIVING  
FOR SOCIAL RESPONSIBILITY**

May 14, 2015

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**McGaw YMCA is a  
tax-exempt charitable  
organization.**

Ron Ottinger  
Executive Director  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger:

On behalf of the McGaw YMCA, I am pleased to provide this letter in support of the Evanston-Skokie Community Consolidated School District 65's (D-65) proposal to the Noyce Foundation to create an Evanston STEM learning ecology framework. Through this framework, various STEM-focused programs will operate in greater partnership and cohesion, enabling youth from throughout Evanston greater access to high-quality STEM education and innovative programs both in- and out-of-school.

As one of its strategic focus areas, youth development has long been a priority of the McGaw YMCA. This focus manifests itself in the provision of high-quality programs that instill in youth independence, perseverance, honesty, and respect for themselves and their peers. In partnership with D-65 and many other youth-serving organizations, the McGaw Y engages over 5,000 youth each year in programs that improve academic achievement, increase participants' self-confidence, establish positive, caring relationships between youth and adults, and engage youth in healthy behaviors.

The newest of these programs is MetaMedia which offers middle school-aged youth a safe place, free of charge, to go after school and during the summer. MetaMedia is a fun and engaging youth space that fosters creative opportunities and connected learning. Through self-directed projects and staff-led instruction, youth learns skills in the STEM fields as well as art and design. MetaMedia will play a major role in bringing the STEM learning ecology framework to Evanston students.

The McGaw Y is thrilled to be a part of this collaboration and organized effort to expose more under-served youth in Evanston to STEM education and practice. With our new MetaMedia Lab and STEM programming, the next generation of computer scientists, engineers, inventors, and mathematicians will be developed and encouraged in their academic and professional pursuits.

Sincerely,

Mark A. Dennis, Jr.  
President and CEO

**McGaw YMCA**

1000 Grove Street  
Evanston, IL 60201  
P 847.475.7400  
F 847.475.7959

**Children's Center**

1420 Maple Avenue  
Evanston, IL 60201  
P 847.475.8580  
F 847.733.2562

**Foster Reading Center**

2010 Dewey Avenue  
Evanston, IL 60201  
P 847.864.3360  
F 847.475.7959

**Camp Echo**

3782 S. Triangle Trail  
Fremont, MI 49412  
P 231.924.0829  
F 231.924.0061



May 5, 2015

Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

I am writing in support of the Evanston STEM Learning Ecology Framework, a project that aligns directly with the Museum of Science and Industry's vision to inspire and motivate children to achieve their full potential in science, technology, medicine and engineering.

MSI's Center for the Advancement of Science Education (CASE) includes programming directly for youth, as well as their influencers including schools, teachers and families. *Student Experiences* engage more than 23,000 students in grades 3-12 in on-site programming each year. Hands-on learning labs inspire students with science topics including life, physical and environmental science. *Community Initiatives* allow children from diverse backgrounds to discover new interests and skills, prepare for college, and learn about science career opportunities by meeting with real scientists working in the STEM field. *After-School Science Clubs* with MSI-trained facilitators engage 10,000 children ages 8-13 at more than 100 club sites throughout the city each year. Youth development programming through the Museum's *Science Minors* and *Science Achievers* gives 250 teens the chance to learn about and present science to the public throughout the year. Since 2007, the *Institute for Quality Science Teaching* has provided research-confirmed professional development to 913 teachers from 347 schools and these teachers have impacted an estimated 200,000 students during and immediately following their participation with MSI. The new *Science Leadership Initiative* will support whole-school change.

MSI staff who develop and lead the above programs will serve as advisors to the Evanston STEM learning ecology framework, providing insight based on best practices, lessons learned in our own program development and relevant resources. In addition, the Museum will lead a professional development workshop for formal and informal educators involved in the project, centered on creating NGSS-aligned lessons and activities for both types of settings.

MSI and the Evanston STEM Learning Ecology Framework share a commitment to changing lives through STEM engagement. We look forward to supporting this project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Nicole Kowrach'.

Nicole Kowrach  
Director of Teaching and Learning  
Museum of Science and Industry

May 14, 2015

Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

As the Director of the Office of Science, Technology, Engineering, and Mathematics (STEM) Education Partnerships (OSEP) at Northwestern University, I am pleased to write this letter of collaboration, indicating our partnership and commitment to the development of an Evanston STEM learning ecology framework.

Set up to bring the STEM resources of Northwestern to the K-12 community, OSEP develops and implements outreach and engagement initiatives for both in-school and out-of-school time learning and youth development in STEM. OSEP's work therefore engages diverse partners including Northwestern faculty and students and K-12 schools, youth development organizations, industry, libraries, museums, and other community organizations in Evanston, the greater Chicago area, and throughout Illinois. The LENSE project is directly aligned to our work and we are pleased to have the opportunity to provide expertise and resources in program and partnership development, research, data collection and analysis, and STEM education to this effort. In addition, OSEP has numerous existing initiatives and programs that can be aligned to the efforts proposed for LENSE, providing significant immediate benefit to the partnership.

For example, OSEP manages a unique Partnership Office located at Evanston Township High School (ETHS). This office is staffed by a full-time Partnership Coordinator and STEM Coach that is funded by the university and part of our *Good Neighbor, Great University* initiative. The coordinator's role is to increase collaboration between Northwestern and ETHS and enhance STEM learning and engagement opportunities. OSEP also has a growing partnership with Evanston School District 65. One example of this partnership's work is the "Kits n' Cats Code" initiative which is part of Computer Science Week's global "Hour of Code" held each December. During Kits n' Cats Code, OSEP staff and Electrical Engineering and Computer Science faculty and graduate students support coding activities for more than 2,000 middle school students across Evanston.

OSEP engages youth during out-of-school time via our partnership with the McGaw YMCA in Evanston. This partnership has created MetaMedia, a new youth space that is designed to foster creativity, engagement, collaboration, and mentorship through youth interest-driven learning. As a lead partner in both the design and implementation of MetaMedia, OSEP provides expertise and research on the design of STEM learning programs for the space. In particular, we run FUSE, a new kind of interest-driven learning experience developed by my colleague Reed Stevens and I. FUSE engages youth in STEAM (STEM + arts/design) topics while fostering the development of important 21<sup>st</sup> century skills such as adaptive problem solving, creativity, and persistence through a set of challenges. The research our team is doing at MetaMedia is explicitly focused on studying the STEM-related interest pathways among youth which is complimentary to the goals of LENSE.

OSEP's infrastructure and expertise in education research, STEM, and K-12 will therefore help to build the capacity and increase the impact of the STEM learning ecology in Evanston. We will work with the LENSE team and network of partners to lower barriers to participation in STEM, create new opportunities for engagement and collaboration, and develop deeper and more sustained STEM learning pathways for youth.

We are pleased to be part of the design and implementation of this community-wide project and look forward to getting started!

Sincerely,

A handwritten signature in black ink, appearing to be 'KJ', written in a cursive style.

Kemi Jona, Ph.D.  
Director, Office of STEM Education Partnerships  
Research Professor, Learning Sciences and Computer Science





Science in Society  
Office for Research  
600 Foster St., Suite 130  
Evanston, IL 60208



NORTHWESTERN  
UNIVERSITY

May 15, 2015

Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

We're writing to enthusiastically affirm our commitment to support and collaborate on the Evanston STEM Learning Ecology Framework.

Our office, Science in Society at Northwestern University, is dedicated to science education and community outreach. By developing science education programs for underserved audiences, we're able to connect high needs youth with Northwestern scientist mentors and promote authentic, inquiry-based approaches to STEM learning.

Science Club, our largest youth initiative, is an after school program for both elementary and middle school youth. Every week throughout the academic year, Northwestern scientists mentor small groups of kids through hands-on experiments. Science Club uses a unique curriculum, which challenges youth to investigate real world problems using the scientific method and the engineering design process. The Science Club curriculum has covered a range of topics, from biomedical engineering to food science to environmental biology, and aligns well with the Next Generation Science Standards. Science Club was initially developed in partnership with the Boys & Girls Clubs of Chicago and we are thrilled that the program has expanded this year to serve Evanston youth in collaboration with Youth Organization Umbrella (Y.O.U.).

As part of the Evanston STEM Learning Ecology Framework, Science in Society would bring significant experience in developing both learner- and culturally-appropriate curricula, training educators to be effective in the out-of-school space, designing rigorous evaluation methodologies, and maintaining long-term community partnerships. We endorse the approaches described in this Noyce proposal and would gladly participate in any of the data collection efforts.

The proposed STEM Learning Ecology Framework addresses critical gaps in both the Evanston community and the larger field of STEM education. This work is very timely and we are excited to be a part of this team.

Sincerely,

Rebecca Daugherty, Ph.D.  
Assistant Director, Science in Society  
Northwestern University

Michael Kennedy, Ph.D.  
Director, Science in Society  
Northwestern University



Anthony Agee\*  
Allan Alson  
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chief operating officer

Donald A. Baker  
founder and director  
emeritus

May 14, 2015

Ron Ottinger  
Noyce Foundation  
419 S. San Antonio Road, Suite 213  
Los Altos, CA 94022

Dear Mr. Ottinger,

On behalf of Youth Organizations Umbrella (Y.O.U.), we are pleased to write this letter of support and partnership for the creation of an Evanston STEM learning ecology framework. This project will greatly benefit Y.O.U. by building our capacity and our program activities in STEM education.

Y.O.U. is an Evanston-based organization that provides services and leadership to meet the emerging needs of young people. We offer an array of year-round services – from afterschool enrichment and mentorship to clinical counseling and crisis intervention – that support more than 1,300 young people annually. Moreover, Y.O.U. has a long history of working with District 65 to implement afterschool and summer learning programs that support youth in their academics, social and emotional development, and physical health.

One of the greatest challenges we face as an organization is finding exciting and accessible ways to engage our youth in STEM activities. A recent needs assessment by our organization, which included surveys and focus groups with over 125 of our youth, identified that we need more options for afterschool activities in the STEM fields. This innovative model for building our community's capacity will ultimately provide youth at Y.O.U. with much-needed STEM educational activities after the school day has ended.

Given the strong mission alignment of our organization and this learning ecology initiative, we plan to participate actively in every aspect of the partnership, including development, implementation, data collection, and evaluation.

We are extremely excited to be partners in this project, as we believe this learning ecology will uplift our existing STEM activities, help us envision new activities, and enhance our collective impact.

Sincerely,

Seth Green  
Executive Director