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## School of Education and Social Policy Partnerships with Schools

*Northwestern University's School of Education and Social Policy is involved in many partnerships with schools that have significant impact on students and teachers. Following is a summary of current projects.*

### **PROJECTS INVOLVING CHICAGO PUBLIC SCHOOLS:**

#### **Biotechnology Symposium and Professional Development**

##### **Partner Schools (20):**

Alcott High School	Lindblom Math and Science Academy
Amundsen High School	Lincoln Park High School
CICS Ralph Ellison Academy	Naperville Central High School
City-Wide-Elementary Schools	Perspectives Leadership Academy
Collins Academy High School	Rickover Naval Academy
Daley Academy	Roosevelt High School
Kelvin Park High School	Solorio Academy High School
Lakes Community High School	Steinmetz Academic Centre
Lane Tech College Prep	Stockton Elementary School
Uplift Community High School	Von Steuben Metropolitan Science Center

##### **Project Description:**

The Biotechnology Symposium kicks off the Biotechnology Professional Development Series. This full-day symposium is designed to excite and inspire teachers to bring biotechnology into their classrooms and to connect them with world-class scientists from Baxter International, Inc. and Northwestern University. Scientists discuss their cutting-edge research, and then experience hands-on biotechnology curriculum modules led by educators who have successfully used them in their classrooms. A summer-long series of professional development workshops prepares educators for teaching biotechnology in the classroom.

**Teachers and Students Involved:** 23 teachers and approximately 1,840 students reached

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **Casting a Wide Net: Embedded Computational Thinking**

**Partner Schools (27):**

Argo Community High School	New Trier High School
Carmel Catholic High School	North Chicago Community High School
Chicago Bulls College Prep	Northside College Prep High School
CICS Northtown Academy	Richards Career Academy
Evanston Township High School	Simeon Career Academy
Evergreen Park High School	Technology Center of DuPage
Fenwick High School	Thornton Fractional High School North
Glenbrook South High School	Thornwood High School
Grayslake North	VOISE Academy
Jefferson Alternative High School	Von Steuben Metropolitan Science Center
Lakes Community High School	Waukegan High School
Lincoln Park High School	Whitney Young Magnet High School
Marmion Academy	Woods Academy
McHenry High School West Campus	

**Project Description:**

Our project introduces students to important 21<sup>st</sup> century skills by developing classroom activities that blend computational thinking ideas with STEM content. In taking this approach, we are able to reach a broad audience of students and provide teachers with classroom-ready materials including lesson plans and assessment items. These 21<sup>st</sup> century skills are important components of the Next Generation Science Standards and meeting the growing demand for STEM-field careers.

Over 45 high school teachers will be trained in implementing these lessons in their classrooms. This means that more than 1,000 students are engaged with these materials. Because these lessons are implemented in traditional math and science classrooms in the Chicago area, they reach a broad cross-section of students, including students from under-represented groups in STEM.

This is an interdisciplinary collaboration between Northwestern University researchers in computer science and learning sciences, STEM researchers and local teachers. In order to develop lesson plans, accompanying assessments and teacher professional development workshops, researchers interviewed science and math professionals to identify a collective list of computational thinking skills used in STEM professions. Currently in schools these skills are either reserved for specialized classes that are taken by only a small subset of students or not offered at all due to constraints on the school. In this project, we are designing computational thinking infused STEM activities that fit within existing

high school courses. In doing so, we are providing a venue for all students to learn these important 21<sup>st</sup> century skills, as well as empowering teachers with training, support and teaching materials that are easily used in current curricula. In taking this approach, we see great potential for reaching the largest audience of learners in a way that is easily adopted by schools. For more information, see <http://osep.northwestern.edu/projects/ct-stem>.

**Teachers and Students Involved:** We have worked with 35 teachers and about 2,720 students during the 2012-13 school year.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **Center for Talent Development Summer Program Outreach**

**Partner Schools and Organizations (5):**

Galapagos Elementary Charter School (CPS) and Rockford  
Chicago Jesuit Academy  
Metrosquash Organization  
Oak Terrace School

**Description and Goals:**

The Summer Program at [Center for Talent Development](#) serves gifted students in PreK through grade 12 in residential and commuter programs. The goal of the Center for Talent Development is to engage, inspire and challenge gifted students through learning. The Center works with schools to bring high-ability students with financial need to the program. Over the past five years, approximately 30 students annually have received financial assistance for Center for Talent Development program tuition.

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## **Charter Schools**

**Partner Schools (3):**

Betty Shabazz International Charter School, Chicago – three campuses:  
Betty Shabazz Elementary Academy  
Barbara A. Sizemore Academy  
DuSable Leadership Academy

**Description and Goals:**

The campuses balance instruction using African-centered themes, arts and humanities, technology, and linkages to local community resources as well as South

Africa, Brazil and Ghana.

**Students Involved:**

Betty Shabazz Elementary Academy – 313 students, grades K-8

Barbara A. Sizemore Academy – 300 students, grades K-8

DuSable Leadership – 303 students, grades 9 - 12

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## **Child-Parent Program**

**Partner Schools:** 30 sites within six school districts across the Midwest

**Description and Goals:**

The Child-Parent Program (CPC) was launched in 1967 by the Chicago Public Schools with funding from Title I of the Elementary and Secondary Education Act. It offered a multi-year enriched educational program from preschool through second grade to approximately 1,000 low-income children and their parents, while the control group of about 550 children and parents was drawn from randomly selected similar schools. Program components for parents primarily emphasized significant engagement in activities at school or in field trips, as well as a parent resource room staffed by a trained coordinator. This parent resource room served as an important space for social connections and as a location for a variety of workshops, speakers and courses, including parenting and GED courses, and health services. A series of studies (from program end through age 28) shows that CPC participation is related to numerous positive outcomes, although not as sizable as those from the above model programs. These include higher levels of school readiness, school performance, and high school completion, lower levels of involvement in the criminal justice system, and better physical health.

**Midwest Expansion of the Child-Parent Centers.** In 2011, the principal investigator of the CPC evaluation research, Arthur Reynolds, undertook with colleagues an ambitious expansion of the CPC program to 30 sites within six school districts across the Midwest as part of an award from the U.S. Department of Education's Investing in Innovation program. Approximately 2,500 preschoolers are being served, including 1,500 children in Chicago, 350 children in Saint Paul, 200 in Evanston, and up to 150 in Milwaukee, and Normal, Illinois. Thirty comparison sites will be chosen to match the characteristics of the program sites. All children will be followed until 3<sup>rd</sup> grade to assess the impact of the CPC program on child development.

As part of this ambitious scale-up, the new CPC program will expand the opportunities for parents, including traditional school engagement activities plus the addition of education and workforce training elements. One goal of the

evaluation study is to test variation in parent activities that range from volunteering in the classroom to workforce development and their implications for child development. We are currently exploring opportunities to develop a two-generation pilot program in Evanston, building upon the CPC classrooms.

**Students Involved:** 2,500 preschoolers are being served, including 1,500 children in Chicago

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## **Cities Stress and Learning Study**

### **Partner Schools:**

Lincoln Park High School  
Mark T. Skinner Elementary School  
Oscar Meyer Elementary School

### **Description and Goals:**

The primary aim of the Cities Stress and Learning Study is to identify both chronic and everyday life stressors facing students in the Chicago Public Schools, and to examine the extent to which those stressors impact students' emotions, stress hormone levels, sleep hours and quality, executive functioning (measured using computer-based tasks in the lab and also at home) and academic outcomes. Study participants are 400 students from three Chicago public schools, and range from 11 through 18 years of age.

Exposure to chronic stress and daily hassles is known to affect student mood and behavior; less well known is the fact that it also has implications for stress physiology and for sleep, contributing to alterations in stress hormones such as cortisol, and to shorter and lower quality sleep. Importantly for understanding academic outcomes, stress hormones and sleep play key roles in regulating alertness and cognitive processes that are important for focusing and learning in school-based settings. Stress is not equally distributed in society; those of minority race-ethnicity and living in low-income homes often experience a higher share of both chronic and daily life stressors. Thus, understanding the effects of stress on executive functioning may play a role in helping to explain racial/ethnic and socioeconomic disparities in academic outcomes. In this study, extensive measures of psychosocial stress exposure will be linked to stress hormone levels, sleep quality and academic outcomes, including both administrative reports of student grades and objective (computer-based) measures of executive functioning.

**Students Involved:** 400 students, ranging from 11 to 18 years of age

**Contact:** Dr. Emma Adam, [ek-adam@northwestern.edu](mailto:ek-adam@northwestern.edu)

## Creating Leaders for STEM Student Research

### Partner Schools (17):

Downers Grove North High School	York High School
Brooklyn Tech HS (New York City)	Evergreen Park Community High School
Evanston Township High School	Dundee-Crown High School
John Hancock College Prep High School	Elgin High School
Rock Island Center for Math and Science	Metea Valley High School
Pekin Community High School	Glenbrook South High School
Ridgewood High School	Maine South
Chicago Talent	Instituto Health Sciences Career Academy
Whitney Young Magnet High School	

### Program Description:

Creating Leaders for STEM Student Research is comprised of two professional development programs. The first program focuses on developing the capacity of STEM (science, technology, engineering, mathematics) teachers to design and implement independent student research programs in their schools. This program includes the Student Research Facilitation Course. Through this course teachers gain the following:

- Learn about models and tools for implementing student research in their school or district
- Advance their local planning efforts to facilitate student research opportunities
- Share best practices for in-school, after-school and summer program models from experienced area teachers and STEM leaders

The second professional development program seeks to develop teacher strengths in incorporating principles of sustainability into their existing STEM curricula. Sustainability was chosen for the focus of the second professional development course due to its primary importance in many of today's research fields, national focus on schools as the center of sustainable practices and students' excitement for sustainability topics. Demonstrating to students how developing technologies are possible solutions for these multiple problems empowers students to be part of the solution through their own research projects. To bring this about, informed teaching professionals need to convey how the existing technologies work and offer ideas for new investigations and experiments.

**Teachers and Student Involved:** At this time, 26 teachers have completed the first course and are reaching approximately 2,080 students. For the first part of the 2012-13 school year, 5 teachers were taking the second course, reaching about 400 students.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **CT STEM and Mathematical Modeling Workshop**

### **Partner Schools (28):**

Benito Juarez High School	Mahalia Jackson Elementary
Bloom Township District 206	Maine East High School
Downers Grove North High School	Maine South High School
Downers Grove South High School	Niles North High School
Evanston Township High School	Niles West High School
Fenton High School	Northside College Prep
Glenbard High School	Oak Park and River Forest High School
Grant Community High School	Plainfield East High School
Grayslake North High School	Reavis High School
Illinois Mathematics & Science Academy	Ridgewood High School
James B. Conant High School	Roosevelt High School
Lake Zurich High School	Stevenson High School
Lincoln Park High School	Waukegan High School
Lincoln-Way Central High School	Zion-Benton Township High School

### **Project Description:**

The Framework for K-12 Science Education and drafts of the Next Generation Science Standards emphasize computational thinking and mathematical modeling. The Common Core State Standards for Mathematics includes mathematical modeling as a standard for mathematical practice. But what exactly are computational thinking and mathematical modeling? How do university researchers utilize these skills? How can they be taught as part of the existing high school science and mathematics curricula? Are they already being taught? Middle and high school math and science teachers and administrators attended an afternoon workshop to explore answers to these questions. This free workshop included lunch and a presentation on the role computational thinking and mathematical modeling play in the Next Generation Science Standards. It was followed by a panel discussion of the educational research, utilization and high school classroom applications of computational thinking and mathematical modeling. The afternoon concluded with small group presentations of lessons that incorporate computational thinking or mathematical modeling into traditional science and mathematics courses.

**Teachers and Students Involved:** 61 teachers were involved, who reach about 4,880 students.

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# **Cultural Epistemologies and Science Related Practices: Living and Learning in Relationships and Culturally Based Citizen Science: Rebuilding Relationships to Place**

## **Partner Schools (7):**

Disney Magnet School, Chicago (CPS)

Hillcrest Primary School, Shawano, Wisconsin

Olga Brener Intermediate School, Shawano, Wisconsin

Shawano Community Middle School, Shawano, Wisconsin

Keshena Public School, Keshena, Wisconsin

Menominee Tribal School, Keshena, Wisconsin

Menominee Head Start, Keshena, Wisconsin, and Neopit, Wisconsin

These research projects are conducted through a collaboration among Northwestern University, the Menominee Indian tribe of Wisconsin and the American Indian Center of Chicago.

## **Description and Goals:**

The goals of these research projects are to gain knowledge about cultural differences in understandings of the natural world and to develop community-based science programs in preschools and in the adult community. Community-based programs are developed through design teams, composed of preschool teachers and community members.

Task data are collected through parent-child interviews, group discussions and individual child interviews. One-on-one child interviews are collected during school, with teachers allowing their students to be away from the classroom for short periods.

Results of these research programs will provide information about how culture affects approaches to learning about the natural world and science, and will shed light on culture-specific science education. Because research is conducted in urban and rural communities as well as on the Menominee Indian Reservation in Wisconsin, results also will contribute to the general knowledge of how culture and experience shape beliefs about nature.

The research projects offer partner schools volunteer hours equivalent to the number of hours of research conducted. Researchers tutor students, help with art projects, read stories or assist in other ways in classrooms.

**Teachers and Students Involved:** 85 teachers, 590 students



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## **Digital Literacy and Transnationalism Among Immigrant Adolescents in the U.S.**

**Partner School:** Curie Metropolitan High School, Chicago

**Description and Goals:**

The study explores how adolescents of immigrant backgrounds use the Internet to organize transnational social relationships, access/utilize/produce information and media content across countries, and develop cross-cultural orientation in their language and literacy learning.

**Teachers and Students Involved:** 311 student participants in survey; 32 students interviewed; 7 students participating in case studies

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## **Early Elementary Science Partnership**

**Partner School:**

South Loop Elementary

**Description and Goals:**

Teachers from Chicago elementary schools complete a two-year sequence of course work as preparation for a Teacher Leader Endorsement in Elementary Science. The initiative is related to Illinois's new endorsement in teacher leadership, which allows teachers to qualify themselves for leadership positions within a school organization such as department chair or curriculum director.

The program supports the Chicago Public Schools' hands-on curriculum in science. Professional development not only increases content understanding but also shows the connections between the science content and exhibits at four Chicago science museums. SESP is a partner in this project with the Field Museum, Peggy Notebaert Nature Museum, Chicago Children's Museum, Lincoln Park Zoo and the Chicago Public Schools.

**Teachers and Students:** 14 teachers, approximately 650 students

**Contact:** Dr. Steven McGee, [s-mcgee@northwestern.edu](mailto:s-mcgee@northwestern.edu)

## EcoCasting

### **Partner schools (6):**

Bateman Elementary  
Kilmer  
Oak Park and River Forest High School  
Roberto Clemente HS  
Von Steuben  
West Leyden High School

### **Description:**

The EcoCasting Project provides a set of hands-on inquiry activities focused on ecosystems, food webs, bioaccumulation and invasive species designed for use in environmental science and biology classes in grades 9-12. The Office of STEM Education Partnerships (OSEP) at Northwestern University has created these materials to help students learn about the scientific observations, measurement techniques and computer models used in an ongoing National Ocean and Atmospheric Administration (NOAA) Ecological Forecasting project. This curriculum is based on research conducted in Calumet Harbor, Illinois, where a NOAA team is developing more precise food web models to better predict PCB toxin levels in Great Lakes fish. The curriculum is aligned to Illinois state standards, the College Readiness Standards and the National Science Education Standards.

EcoCasting is comprised of four major investigations for students, which may be done as stand-alone lessons or as parts of a larger unit. More information about the EcoCasting project is available at <http://ecocasting.northwestern.edu>.

**Teachers and Students Involved:** 9 teachers and approximately 720 students for 2012-13

**Contact:** Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **Freezing Time: Using Digital Video to Help Teachers Reason about Classroom Events**

### **Partner Schools (8):**

Carman-Buckner Elementary School, Waukegan  
Evanston High School, Evanston  
Highland Park High School, Highland Park  
Lakeview High School, Chicago  
Lincoln Park High School, Chicago  
Payton High School, Chicago  
Perspectives Charter School, Chicago  
Northside College Preparatory High School, Chicago

**Description and Goals:**

This project examines the ways in which mathematics and science teachers attend to the complexity of classroom interactions. Researchers support teachers in learning to attend to consequential events that take place in the classroom through the use of video reflection.

This research project is motivated by the belief that, in order to promote meaningful learning in the classroom, science and mathematics teachers need to substantively attend to their students' thinking. The project is thus concerned with examining what teachers pay attention to in the classroom and how they interpret what they notice. In particular, the investigators are implementing new digital video technologies and designing new research methodologies to gain better access to teachers' tacit thinking about what moments during instruction are pedagogically relevant. "Through our work with pre-service and in-service K-12 teachers, we hope to learn how to better help teachers tune their attention to their students' thinking," says SESP associate professor Miriam Sherin.

**Teachers and Students Involved:** Approximately 25 teachers and 750 students are involved in the project.

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## Fuse

**Partner Institutions (7):**

Wheeling High School  
Evanston Township High School  
Evanston Public Library  
Neal Math & Science  
Sarah E. Goode STEM Academy  
Humboldt Park Chicago Public Library  
Harold Washington Chicago Public Library

**Program Description:**

Fuse is a new type of interest-driven STEAM (science, technology, engineering, arts and math) exploration space that engages Chicago-area teens in STEM fields through hands-on exploratory challenges.

Many universities, museums, research centers and similar organizations around the country have been working to connect teens to the excitement of cutting-edge STEM resources and programs. However, most of these programs are targeted at teens who have already developed a strong interest. The Fuse project is an effort to better

engage in STEAM fields teens who may not yet have developed interests, and it seeks to do so in more youth-accessible locations — like libraries and schools.

Teens are able to drop in and “hang out, mess around and geek out” after school and on weekends with the Fuse set of challenges. Each challenge uses a “leveling-up” model from gaming and is carefully designed to engage teens in different STEM topics and skills sets. Fuse has challenges in the areas of robotics, electronics, Android app development, fashion and architectural design, for example. Challenges can be tackled individually or in groups. Professional scientists, engineers, advanced undergraduates and graduate students are available as mentors. In addition, teens who have leveled up to more advanced challenges in the progression are available as peer mentors. All challenges result in digital media artifacts that are shared online for peer review, remixing, expert judging and collaboration.

The goal of Fuse is to engage a diverse body of students across the city and suburbs in local and online collaborative communities. For more information, see <https://www.fusestudio.net/>

**Teachers and Students Involved:** More than 600 students have gone through the program so far.

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## **GK-12 Reach for the Stars**

### **Partner Schools (6):**

Evanston Township High School  
Lincoln Park High School  
Von Steuben Metro Science Center  
Nettelhorst School  
Niles North High School  
Chute Middle School

### **Project Description:**

Reach for the Stars: Computational Models for Teaching and Learning in Physics, Astronomy and Computer Science places STEM (science, technology, engineering, and mathematics) graduate student fellows in K-12 science classrooms for the entire academic year. The program brings more inquiry-based teaching methods into the classroom and exposes teachers and students to the research process.

Through Reach for the Stars, GK-12 fellows adapt concepts of computational thinking and actual computational modeling tools from their research work to classroom activities connected to the existing math and science curriculum. This

program enriches the education of the fellows by strengthening their development as researchers and advancing their communication and teaching skills. Teachers benefit from the presence of a “resident scientist” in their classrooms, giving their students a face on practicing scientists and engineers. In addition, they have the opportunity to design and implement a new program and engage with modern-day computational research tools. K-12 students benefit from hands-on experience with high-level computing facilities and tools made available to them through work appropriately connected to their grade curriculum and a mentor relationship with the fellows. Northwestern University’s Office of STEM Education Partnerships (OSEP) and the Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA) collaborate on the National Science Foundation’s GK-12 program.

**Teachers and Students Involved:** During the 2012-13 academic year 7 graduate students, 7 K-12 teachers, and more than 560 students are involved. Over the three years of the project there have been 24 teachers, reaching about 1,900 students.

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## How to Do Better on Job Interviews

### **Partner Schools (2):**

Schurz High School  
Steinmetz High School

### **Description and Goals:**

The goal of this project is for urban high school students to learn skills for succeeding in job interviews. The innovative curriculum for teaching job interview skills grew out of an evaluation that Dr. Barton Hirsch conducted of Chicago’s large-scale After School Matters apprenticeship program of for high school students. With the help of human resources professionals, the researchers designed a mock job interview to assess marketable job skills.

Before the teens were given interview training, human resources experts found that although many teens had experiences and skills that employers value, in interviews the youth often failed to convey those experiences or communicate their credentials. In several Chicago public school classrooms, the mock interview training nearly tripled the would-be hiring rate.

**Teachers and Students Involved:** The project has been piloted at Schurz and Steinmetz high schools in Chicago, and plans are pending to scale up the project.

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## The iLab Network

### **Partner Schools (7):**

Nettelhorst Elementary  
St. John the Evangelist Elementary  
Lakes Community High School  
Amundsen High School  
Higgins Community Academy  
North Chicago Community High School  
Roosevelt High School

### **Description and Goals:**

Online laboratories are experimental facilities that can be accessed through the Internet, allowing students and educators to carry out experiments from anywhere at any time. Remote labs enrich science education by vastly increasing the scope of experiments that students have access to both in and out of school. The iLab Network enables students to use real instruments, rather than simulations, via remote online laboratories using their web browser. Unlike conventional experimental facilities, iLabs can be shared and accessed widely by students and other audiences across the world that might not otherwise have the resources to purchase and operate costly or delicate lab equipment. Take a look! <http://www.ilabcentral.org>

Our mission is to create the iLab Network — a scalable and sustainable online network that is recognized as the premier site where students and scientists around the world come together to access and share remote labs.

**Teachers and Students Involved:** OSEP directly trained 10 teachers this year, who reached about 800 students, but worldwide there are 500 registered teachers and more than 5,000 students using iLabs.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## Job Shadowing

### **Partner Schools (4):**

Hancock High School  
Solorio Academy  
Maine East High School  
Glenbard North High School

### **Project Description:**

The Office of STEM Education Partnerships offers a limited number of job shadowing opportunities for math, science and CTE teachers over the summer. Selected teachers spend time with a researcher at Northwestern University or a local industry partner.

**Teachers and Students Involved:** 4 teachers and 320 students

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## **Making Discoveries on BEAGLE**

### **Partner Schools:**

Wildwood World Magnet School (Illinois)  
Dayton Regional STEM School (Ohio)

This project implements some of the BEAGLE (Biological Experiments in Adaptation, Genetics, Learning and Evolution) models in life sciences classes in middle and high schools. BEAGLE is a multi-agent based modeling environment that has been carefully designed to help students learn about evolutionary processes in an engaging and accessible way. BEAGLE provides students the opportunity to explore a collection of NetLogo-based models, collect data, make and test predictions, and engage in group discussions about evolution and evolutionary mechanisms.

**Teachers and students involved:** 25 eighth-grade students and 1 teacher at Wildwood, 120 10<sup>th</sup>-grade students and 1 teacher at Dayton

**Contact:** Dr. Uri Wilensky, [uri@northwestern.edu](mailto:uri@northwestern.edu)

## **ModelSim Project**

### **Partner Schools:**

Northside College Prep  
Noble-Johnson College Prep  
Waukegan High School  
Niles North High School  
Niles West High School

### **Description and Goals:**

The ModelSim project develops two-week model-based science inquiry units for high school. The project collaborates with teachers to test the units in classrooms and study the best practices in design and use of such units. A summer workshop familiarized participating teachers with the units, and teachers have been particularly excited about how well the units align with the Next Generation Science Standards.

The ModelSim project approaches its four core curriculum areas (evolution, population biology, electricity and the particulate nature of matter) with a distinctive and unified approach: in each of these subject areas, students learn to conceive of fundamental real-world scientific phenomena in new ways. Activities for each unit are designed around computational models that simulate phenomena of interest. These models serve as environments for designing and conducting experiments to collect and analyze data in order to construct scientific explanations.

**Teachers and Students Involved:** 10 teachers have used project units in a total of 28 classrooms, engaging about approximately 500 students across five schools.

**Contact:** Dr. Uri Wilensky, [uri@northwestern.edu](mailto:uri@northwestern.edu)

## **NetLogo Investigations in Electromagnetism**

**Partner School:** Wildwood Elementary School, Chicago

Over the last two years, this project has been conducting classroom implementations of NetLogo Investigations in Electromagnetism (NIELS), a computer model-based curricular unit, in fifth- and seventh-grade classes at Wildwood Elementary School. Multi-agent computational models depict phenomena such as electric current and resistance as they arise out of simple interactions among thousands of *individual level agents* such as electrons and ions within the wire. Researchers find that such representations enable students as young as fifth grade to learn and reason about the relevant concepts in electricity that are typically taught in advanced undergraduate or graduate school physics courses.

Students interact with NIELS models through a set of carefully designed, innovative, open-ended activities and develop a deep understanding of the relevant phenomena. NIELS has been implemented in fifth- through seventh-grade classrooms at Wildwood and is also being implemented in two eighth-grade classes in Singapore schools.

**Teachers and Students Involved:** Fifth- and seventh-grade students and teachers

**Contact:** Dr. Uri Wilensky, [uri@northwestern.edu](mailto:uri@northwestern.edu)

## **The New Civic Journalism Project**

**Partner Schools (2):**

John C. Haines Elementary School

Lakeview High School



**Description and Goals:**

The goal of the project is to teach immigrant students to use cultural resources and journalism to help communities solve public problems.

The most serious problems facing society — involving health, education, jobs and inequality — are public problems that collide with the political system and cannot be solved without an active, well-informed citizenry. The political process is particularly inaccessible to marginalized groups such as immigrants and the poor. The new civic journalism project teaches students to use journalism to engage those communities in solving public problems.

The project consists of three programs: (a) a youth journalism class taught at multi-ethnic, underserved schools like Chicago's Lakeview High School, (b) the Immigrant Connect class at Northwestern's Medill School of Journalism and (c) the Digital Design for Social Change class at Northwestern's School of Education and Social Policy.

In the youth journalism class, Lakeview students produce video profiles that describe immigrants' experience with social problems, such as health care. Northwestern undergraduates mentor Lakeview students, helping them develop journalism skills and encompass relevant policy issues in their presentations. At the end of each reporting cycle, the community profiles, in-depth print reports and interactive policy presentations appear together on the Immigrant Connect website and through local media outlets.

In this project, students engage in the political process by working as novice community journalists, so they are actually doing civics, not just learning about civics.

**Teachers and Students Involved:** Two teachers and 16 students

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## **Northwestern University Biology Investigations in Oncofertility (NUBIO)**

**Partner Schools (14):**

CityWide-Elementary Schools  
Curie High School  
Jefferson Alternative High School  
Kelvin Park High School  
Lane Tech College Prep  
Lincoln Park High School

Morgan Park High School  
Nash Elementary School  
Onahan Elementary School  
Roberto Clemente High School  
Roosevelt High School  
Steinmetz Academic Centre

**Project Description:**

Northwestern University is partnering with Chicago-area high schools on NUBIO, a new high school biology curriculum that embeds contemporary biomedical research content and skills relevant to the emerging field of oncofertility. Oncofertility research is focused on novel approaches to preserve the fertility of cancer patients (see [www.oncofertility.northwestern.edu](http://www.oncofertility.northwestern.edu) for details).

NUBIO is designed by the Office of STEM Education Partnerships and teachers and incorporates cutting-edge biotechnology skills and experiences through a partnership with biomedical researchers. This curriculum not only exposes students to advanced biology skills and concepts, but it also teaches real science through advanced labs and experiments, all in the real-world context of oncofertility.

The purposes of this program are twofold. The first purpose is to design an engaging and up-to-date high school core biology curriculum in the context of oncofertility. This curriculum utilizes modern biotechnology laboratory techniques in order for students to learn biology content through active, hands-on investigation and experimentation. The second purpose is to create a model for strategically forging relationships between schools and research institutions to create curriculum that is based on real-world biotechnology techniques and careers.

**Teachers and Students Involved:** 15 teachers and approximately 1,200 students involved in the 2012-13 school year.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

**NU Leadership Academy for Science Improvement  
Chicago Transformation Teacher Institute  
From Nanoscale to Macroscale**

**Partner Schools (19):**

Amundsen High School  
Bogan High School  
Curie Metro High School  
Foreman High School  
Goode STEM Academy  
Hancock High School  
Harper High School  
Hubbard High School  
John Hope College Prep  
Jones High School

Juarez High School  
Kelly High School  
Lane Tech College Prep  
Robeson High School  
Roosevelt High School  
TEAM Englewood  
Tilden High School  
Walter Payton College Prep  
Williams Prep

**Description and Goals:**

Northwestern University is part of the Chicago-area collaborative creating the Chicago Transformation Teacher Institutes (CTTI) program. In collaboration with the Illinois Institute of Technology, the Chicago Public Schools (CPS), and other university and curriculum development partners, this project focuses on increasing the content and pedagogical knowledge and skills of teachers who occupy leadership positions in mathematics and science in CPS. Teacher courses are closely integrated with the curriculum and professional development efforts of the High School Transformation program.

Teacher courses provide expertise regarding content and curriculum as well as integration within the larger context of environmental science studies and geoscience curriculum projects at Northwestern, and with the help of IIT faculty, in the life sciences program there. Northwestern is developing two of the four courses in the life and environmental sequence: (1) Environmental Issues: Focus on Climate and (2) Environmental Issues: Focus on Energy. The first course was taught in summer 2011. In the 2012-13 school year, the NU Academy for Science Improvement was funded as a companion to CTTI. The CTTI teacher leaders participate in leadership professional development around the five pillars that are the core of the SESP Teacher Leadership master's degree program. In addition, teachers receive in-school coaching to support the improvement of their course teams. In summer 2013, the From Nanoscale to Macroscale project will offer a companion class to CTTI focusing on nanotechnology initiatives from the International Institute for Nanotechnology. In addition, the program is funding a redesign of the Environmental Issues: Focus on Energy course to align with the Initiative on Sustainable Energy at Northwestern.

**Teachers:** 48 teachers, approximately 5,000 students

**Contact:** Dr. Steven McGee, [s-mcgee@northwestern.edu](mailto:s-mcgee@northwestern.edu)

## **Principal Policy and Practice Study**

**Partner Schools:**

With support from the Spencer Foundation and the Consortium for Chicago School Research, the Principal Policy and Practice (P<sup>3</sup>) Study focuses on school principals who are new to their posts. In order to maintain confidentiality, school names cannot be provided, but study participants are all new hires in the Chicago Public School system. In addition to surveys and interviews with principals, the research team has also interviewed CPS officials, recently retired principals, Local School Council (LSC) members, and LSC support providers.

**Description and Goals:**

The primary goal of the Principal Policy and Practice Study is to examine the preparation, recruitment, retention and career paths of school principals through an in-depth look within Chicago Public Schools. Supported by funding from the Spencer

Foundation, this work is undertaken in collaboration with the Consortium for Chicago School Research. This study considers principal recruitment and retention from the perspective of both supply and demand.

On the supply side, the researchers are concerned with the preparation and career paths taken en route to principalships, as well as the preferences and constraints facing prospective principals, the characteristics of those who become principals, and the factors that impact retention. Given the professional and personal aspects of these supply-side concerns, the researchers also explore how new principals become socialized into the role of principal over their first few years on the job and how they respond to struggles they face in their new positions. On the demand side, the research project focuses on hiring policies and practices, decisions made by school district and Local School Council (LSC) hiring officials, and factors that impact whether principals are hired and later retained. The aim is to generate knowledge that will inform school leadership policies and processes in Chicago Public Schools and other districts across the country.

**Teachers and Students:** 120 principals

**Contact:** Dr. James Spillane, [jspillane@northwestern.edu](mailto:jspillane@northwestern.edu)

## Project Access

### **Partner Schools (7):**

Nettelhorst Elementary School  
St. John the Evangelist Elementary  
Lakes Community High School  
Amundsen High School  
Higgins Community Academy  
North Chicago Community High School  
Roosevelt High School

### **Project Description:**

The goal of Project Access is to create a scalable and sustainable cyberlearning resource to enhance authentic STEM (science, technology, engineering and math) learning through real-world science investigations. Project Access therefore provides teachers and students with “access” to remote online labs that enable students to use real experimental devices via a web browser. Because remote labs are available 24/7, students can carry out their lab assignments from any location with Internet access, providing significantly more lab time with greater flexibility of access.

Through Project Access, HP tablets are provided to teachers and students. These HP tablets are an ideal platform for delivering three- to five-day remote lab curricula

for STEM courses such as chemistry and physics. In addition to enriching student learning and lab experience, Project Access also provides professional development opportunities for teachers in how to develop curricula around remote labs and cyberlearning. Tablets may also be used to access our other cyberlearning tools: FieldScope GIS and online computational models developed for the EcoCasting Project.

The program supports rural and low-income schools that do not have adequate computers for students to access the remote laboratory network. The computers provided by this grant increase the number of schools, classrooms and students that are able to access our online labs and curriculum. For more information, see <http://hpcatalyst.northwestern.edu>.

**Teachers and Students Involved:** During the 2012-13 academic year Project ACCESS will reach 10 teachers and nearly 80 students.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **Research Lab Experience**

**Partner Schools (4):**

Lincoln Park High School

Curie High School

Niles West High School

Dyett High School

**Project Description:**

Outstanding teachers are selected to gain hands-on lab experience working alongside scientists in their research labs at Northwestern University. Teachers will use their experiences "at the bench" to develop their own curriculum materials.

**Teachers and Students Involved:** 4 teachers and 320 students

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **Study of the High School to College Transition**

**Participating Schools (58):**

All 58 high schools in Chicago Public Schools

**Description and Goals:**

This project analyzes programs to improve college attendance. This investigation includes evaluating the impact of a new college counseling model on college

enrollment.

**Numbers of Students and Teachers Involved:** High school seniors in Chicago Public Schools – 44,627 students

**Contact:** Dr. James Rosenbaum, jim11111@gmail.com

## **Survey of Biotechnology**

### **Partner Schools (11):**

CICS Ralph Ellison Academy  
City-Wide-Elementary Schools  
Daley Academy  
Farragut Career Academy  
Lane Tech College Prep  
Lincoln Park High School  
Plainfield South High School  
Roberto Clemente HS  
Solorio Academy High School  
Steinmetz Academic Centre  
Von Steuben Metropolitan Science Center

### **Project Description:**

The Survey of Biotechnology professional development workshop is designed for middle and high school science teachers who want to learn more about the variety of ways to incorporate biotechnology in their classrooms. The workshop is presented in five modules:

- Biotech Basics
- Recombinant DNA Technology
- Forensics
- Proteomics and Bioinformatics
- Applications in Biotechnology

Teachers gain experience with a wide variety of hands-on labs, interact in discussions with Baxter research scientists, and receive lab kits to take back to their own classrooms.

**Teachers and Students Involved:** 11 teachers and about 880 students were involved in the 2012-13 school year.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **Sustainability and Climate Change**

### **Partner Schools (11):**

Dundee-Crown High School  
William Fremd High School  
George B. Swift Specialty School  
Jefferson High School  
Lakes Community High School  
Maine East High School  
Niles North High School  
Niles West High School  
Stevenson High School  
Victor J. Andrew High School  
Waukegan High School

**Project Description:**

The Office of STEM Education Partnerships at Northwestern University brought together a cohort of climate change and sustainability researchers and teachers to improve climate change education at the high school level. At the workshop, teachers learned from four scientists on the cutting edge of climate change research and sustainable solutions.

Teachers have the opportunity to do hands-on activities related to this research and to take these activities back to their classroom. Also supplied are strategies for aligning this content to the new dimensions of the Next Generation Science Standards and how to develop new classroom materials, including assessments, based on the research presented. For information, see <http://osep.northwestern.edu/projects/climate-change>

**Teachers and Students Involved:** 14 teachers and about 1,120 students in 2012-13.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## Watershed Dynamics

**Partner Schools: (2)**

Emerson Middle School  
Warren Township High School

**Program Description:** The Watershed Dynamics project is a partnership among the Office of STEM Education Partnerships ([OSEP](#)) at Northwestern University, the Global Learning and Observations to Benefit the Environment ([GLOBE](#)) program and the Consortium of Universities for the Advancement of Hydrologic Science, Inc. ([CUAHSI](#)). Each organization represents a group of people interested in hydrology and science education. Working together, curriculum developers at OSEP, the worldwide network of science educators in GLOBE, and scientists and engineers from CUAHSI have created tools and curricula to support student investigations of the watershed.

This curriculum is designed to teach students about water availability and the

impacts of human activity on the watersheds we live in. Watershed Dynamics promotes the use of authentic scientific data and technology in the high school classroom. Students and teachers learn to use geographic information system (GIS) tools and various data sets to answer questions about the environment. More information is available at <http://wd.northwestern.edu>.

**Teachers and Students Involved:** 2 teachers and about 160 students for the 2012-13 school year, and this project has been used in over 80 classrooms across the country by more than 1,600 students.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## Writing across the STEM Curriculum

### **Partner Schools (16):**

Abraham Lincoln (CPS)  
Amundsen High School  
Brentano Academy  
Christian Heritage Academy  
George Westinghouse College Prep  
Grayslake North High School  
Higgins Community Academy  
Lake Forest High School  
Lakes Community High School  
Maine South High School  
Naperville North High School  
Nettelhorst School  
North Chicago Community High School  
Stewart Elementary  
Thornton Township High School  
Wheeling High School

### **Project Description:**

Teachers from across the Chicagoland area come to Northwestern for two days of intense professional development on the benefits and techniques of including more writing and argumentation in their STEM (science, technology, engineering and mathematics) courses. In addition they begin developing new curricular materials under the guidance of argumentation, communication and education professionals with backgrounds in STEM.

On the first day of the workshop, participants cover the pedagogical justification for including more discussion, writing and argument in science and math courses. They discuss the learning theory that encourages these methods and talk about struggles teachers have had implementing writing and discussion in their courses. On the



second day, the focus is on more practical application, including discussions of the methods for encouraging students to write and the examination of a number of pedagogical scenarios.

**Teachers and Students Involved:** For the 2012-13 school year, 20 teachers were involved, reaching about 1,600 students.

**Contact:** Dr. Kemi Jona, [kjona@northwestern.edu](mailto:kjona@northwestern.edu)

## **NON-CHICAGO PUBLIC SCHOOLS PROJECTS:**

### **Center for Talent Development**

**Description and Goals:** The [Center for Talent Development](#) (CTD) at the School of Education and Social Policy is a learning center and research facility that has been serving gifted students, their families and educators for 30 years. The Center identifies, educates and supports gifted students and serves as a leader in gifted education. CTD has been accredited as a nonpublic supplementary school by the North Central Association Commission on Accreditation and School Improvement (NCA CASI) since April 1, 1994. NCA CASI is recognized by the U.S. Department of Education and has more than 100 years of experience in improving educational quality.

Programs of the Center include the Saturday Enrichment Program for students in preK through grade 9, an Accelerated Weekend Experience providing two-day courses for students in grades 5 through 9, a Summer Program offering enrichment and for-credit courses for students in preK through high school, Northwestern University's Midwest Academic Talent Search offering assessment through above-grade-level testing for grades 3 through 9, Gifted LearningLinks for online enrichment and honors courses for students in kindergarten through high school, and Civic Education Project offering programs that promote civic engagement and responsibility for students in grades 7 through 12.

In addition to these programs, the Center offers seminars and conferences educating parents about the needs of gifted learners, as well as resources, professional development opportunities and graduate courses for educators. CTD also offers a variety of outreach and scholarship programs that serve underrepresented students, including Project EXCITE and the Jack Kent Cooke Young Scholars Program.

Through outreach and advocacy efforts, CTD informs parents, teachers and school personnel about the characteristics and needs of gifted learners and empowers them with the knowledge and confidence necessary for meeting those needs successfully.

In serving more than 500,000 families throughout the last three decades, Center for Talent Development has evolved from a single focus on talent identification to a multi-faceted operation with four central foci: talent identification, talent development, research and advocacy.

**Students Involved:** 22,000 students take part in Northwestern University's Midwest Academic Talent Search annually. 10,375 students from preK through high school enroll in CTD courses and offerings annually (3,300 in Saturday Enrichment Program, 250 in Accelerated Weekend Experience, 4,650 in the Summer Program, 1,600 in Gifted LearningLinks, 575 in the Civic Education Project).

More than 150 families attend the CTD summer conference each year, and about 75 educators register for the professional development seminar.

**Contact:** Dr. Paula Olszewski-Kubilius, [p-olszewski-kubilius@northwestern.edu](mailto:p-olszewski-kubilius@northwestern.edu)

## **IQWST Earth Science**

**Partner Schools (18):**

18 schools in Illinois, Michigan, Texas and Florida

**Description and Goals:**

IQWST: Investigating and Questioning our World through Science and Technology investigates how to design middle school science curriculum materials that support students in learning ambitious science content and scientific practices through meaningful investigations. The project is building a three-year curriculum of project-based investigations in chemistry, physics, earth science and biology. Eighteen schools in several states have implemented an IQWST curriculum, and national field trials are being held to assess the impact on student achievement. Teachers involved receive professional development before beginning to teach the unit.

**Teachers and Students Involved:** 74 teachers, 7,411 students

**Contact:** Dr. Brian Reiser, [reiser@northwestern.edu](mailto:reiser@northwestern.edu)

## **NebraskaMATH**

**Partner Schools:**

Together with colleagues at the University of Lincoln, Nebraska, the NebraskaMATH study will partner with schools in four districts in Nebraska: Omaha, Lincoln, Grand Island and Papillion. The project will administer a survey to 2,500 teachers across

these districts and at different grade levels, pre-K through grade 6. Data collection is in its fourth and final year.

**Description and Goals:**

Based upon the successful model of Math in the Middle, the NebraskaMATH project will extend the successful methods of teaching enrichment and address problem areas identified beyond the middle school experience. NebraskaMATH focuses on three different transition points in mathematics education: the mathematics education of children from kindergarten to grade 3, algebra at the transition from middle to high school and the transition of new secondary mathematics teachers from certification to the classroom.

The Northwestern subcontract focuses on the Primarily Math Intervention, the goal of which is to cultivate teachers' ability to understand how children learn and use mathematics, with attention to students requiring special considerations; increase mathematics content knowledge in teachers; and eventually certify teacher participants as math specialists. The project administers the NebraskaMath Survey (NMS) to approximately 2,500 teachers across four districts in Nebraska: three times in Omaha, Lincoln and Grand Island (in spring 2010, 2011, and 2013) and four times in Papillion (in spring 2010, 2011, 2012, and 2013) at the district's request. It will provide information on the efficacy of the intervention, as well as illuminate the changes specific to mathematics teaching and school leadership, and staff advice and information interactions.

**Teachers involved:** 2,500 teachers surveyed (approximately 1,700 respondents)

**Contact:** Dr. James Spillane, [j-spillane@northwestern.edu](mailto:j-spillane@northwestern.edu)

## **NetLogo Investigations in Middle-School Science and Mathematics**

**Partner School:** Parkview School - Morton Grove, Illinois

**Description and Goals:**

Over the past four years, the middle school science and mathematics teachers in this school of 900 students have piloted the use of NetLogo in a variety of contexts. Mathematics teachers have used it to teach students how to apply mathematical representations in algebra and geometry to a structured programming environment. In this context, students have created their own models for a three-week computer science project. Interest in this project carries over year after year, as many graduating students continue to use NetLogo and develop science-related models for high school classes.

Science teachers have used NetLogo in their classes to enhance various curriculum pilot projects including piloting the Center for Connected Learning's model-based curricula, Connected Chemistry and BEAGLE evolution. Students and teachers developed and used models for selective breeding and natural selection as part of a problem-based seventh-grade science unit on genetics. They used models for molecules and chemical reactions in the sixth- to eighth-grade chemistry units. And they have used ecosystem and cellular models in sixth- and seventh-grade units. The models have provided a dynamic and vibrant learning environment for students to help support inquiry-oriented teaching and learning of vital learning goals in the science curriculum.

**Contact:** Dr. Uri Wilensky, [uri@northwestern.edu](mailto:uri@northwestern.edu)

## **Perceptions of Higher Education and the Pursuit of Current Academic Goals**

**Participating Schools:**

District 65: Evanston Middle Schools, primarily Haven, Nichols and Chute

**Description and Goals:**

This set of field experiments distributes different types of information to middle school students about financial pathways to college and the future benefits of college to assess the effects on school goals and motivation.

**Numbers of Students and Teachers Involved:** Approximately 200 students and 10 teachers

**Contact:** Dr. Mesmin Destin, [m-destin@northwestern.edu](mailto:m-destin@northwestern.edu)

## **Project Excite**

**Partner Schools (9):**

Evanston Township High School  
Chute Middle School  
King Lab School  
Haven Middle School  
Kingsley School  
Nichols Middle School  
Lincoln School  
Rhodes Magnet School  
Lincolnwood School

**Description and Goals:**

Project Excite is a collaborative research endeavor involving the Center for Talent Development, Evanston Township High School District 202 and Evanston/Skokie School District 65. The goal of the project is to increase the number of underrepresented minority students taking upper-level mathematics and science courses when they are in high school. Project Excite identifies gifted minority students from Evanston third-grade classrooms and provides enrichment mathematics and science education and support to prepare the students for advanced classes in middle school and at Evanston Township High School. More information is available at <http://www.ctd.northwestern.edu/excite>.

**Teachers and Students Involved:** Approximately 150 third- to eighth-grade students, 17 teachers, 10 to 15 Evanston High School students and 40 NU volunteers acting as after-school volunteers.

**Contact:** Dr. Paula Olszewski-Kubilius, [p-olszewski-kubilius@northwestern.edu](mailto:p-olszewski-kubilius@northwestern.edu)

## **Reducing the Achievement Gap**

**Participating Schools:** Oak Park Elementary District K–8 Schools

**Description and Goals:** Assistant professor Jelani Mandara conducts parenting workshops with small groups of parents of African American children. He teaches parenting strategies that the empirical literature shows relate to academic achievement.

**Students Involved:** Parents of approximately 150 students have been to at least one workshop.

**Contact:** Dr. Jelani Mandara, [j-mandara@northwestern.edu](mailto:j-mandara@northwestern.edu)