

Applicant Name	[REDACTED]
Organization Name	The Academy of Natural Sciences of Drexel University
Contact Email	[REDACTED]
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Program Website	http://ansp.org/education/programs/wins/
501(c)(3)	Yes
School/Educational Institution	No
Copyright Release	Yes
Legal Release	Yes
State / Province	PA
Audience Description	<p>The Women in Natural Sciences (WINS) program is for young women in grades 9 through 12 from under-served families in Philadelphia. The primary audience being served by the WINS program is high school girls in the School District of Philadelphia attending public or charter schools.</p> <ul style="list-style-type: none"> • 85% of our students have family income below \$50,000; • approximately 70% come from single parent homes; • the ethnicity demographics are as follows: • 56% of the girls are Black/African American; • 16% are Biracial; 12% are Caucasian; • 9% are Asian; and 6% are Latina or Hispanic; • and majority are the first in their families to attend college.
Audience Size	<p>The WINS program typically serves 6 – 7 girls each year; this year we are serving 60 underserved girls in Philadelphia and 15 girls in Mongolia (as part of a special climate change research project) as our primary audiences. Of this primary audience, Philadelphia high school girls participate in internships where they study climate change, water quality and other environmental issues facing Philadelphia and the region in depth with field scientists. With this award, we would expand the program to allow additional girls to study environmental issues through research opportunities with scientists and to act as explainers in the museums. The award would also enable us to expand our community outreach capability by attending additional community events that would result in reaching a broader audience of residents, students, and teachers; and increase the impact of our E-Stem education efforts.</p>
Annual Operating Budget (USD or CAN)	[REDACTED]

Budget Type - for program or organization?	program
Budget Type - Please describe if your budget is another type	
Images - URL or location	
Videos - URL or location	
Project Name	Women in Natural Sciences program at the Academy of Natural Sciences of Drexel University
Short Description of Project	<p>Women in Natural Sciences (WINS) is an out of school time program for Philadelphia high school girls that seeks to improve understanding of basic ecological principles and scientific methods, techniques and terminology; foster personal achievement, self-confidence, and communication skills; and identify science-related career paths and advise students in college selection. In addition to strong emphasis on academics, WINS provides uniquely nurturing environment, a community of like-minded friends, and experiences not typically found in school.</p> <p>WINS engages under-served high school students in important environmental issues that affect Philadelphia, the region and the world. Students study water quality and watershed management techniques and policies; urban gardens and healthy food choices; air quality and its effect on health; and climate change. For over 32 years, WINS has used the study of the environment and the world around us as strategy to engage students in learning about STEM—making it one of the oldest innovative E-STEM programs in the country.</p> <p>A new aspect of WINS that exemplifies innovation in E-STEM is Cultural Repercussions of Climate Change in Two Communities: A Teenage Viewpoint (CRCC) project. CRCC empowers students in Philadelphia and Ulaanbaatar, Mongolia to gain greater appreciation of each others cultures and how these cultures are influenced by climate change and how teenagers can play a vital role in educating their communities about climate change.</p> <p>CRCC builds on long-standing relationships with climate change scientists, government officials, nomadic herdsman, and students. This pioneering project allows the students to fully engage in real world problems facing them in their own city and also problems facing the world. The program engages students in environmental science research with world class scientists. The students are in the marshes in Philadelphia and New Jersey collecting data on water quality, biodiversity, and collecting core samples (which help</p>

	<p>scientist study the past and collect data on climate change). In Philadelphia, students explore the changes in air quality by looking at particulate data collected in Philadelphia over the course of a year and how this data links to climate change. In Mongolia, a country that has experienced a 2.14°C raise in temperature over the past 75 years, they witness firsthand the effects of climate change. They learn that the rise in temperature has caused pasture grasses to become scarce making it difficult for herders to properly prepare their animals for the harsh winters.</p> <p>Students learn how scientists collect and analyze data and how politicians, community members and the teenagers can use this data to make informed decisions. What makes this program an exceptional E-STEM program is that it uses topics such as water quality and climate change—very real issues impacting all of us—as a tool to teach students to better understand how scientists study environmental issues; provide the training to be informed ambassadors for climate change reduction; and expand their understanding of other cultures and regions of the world, showing them that water quality and climate change are global, not just local, issues.</p>
<p>Main Criterion #1: Describe how your program or organization uses environmental education to advance STEM learning through research and investigative activities for your service population.</p>	<p>Unlike many other environmental programs for under-served youth, the WINS program involves students in the entire scientific process. They learn that real environmental research requires collaboration, critical thinking, problem solving and the ability to make mistakes and persevere. They learn to work as a team to establish and reach common goals. They understand that science is a process that incorporates learning from the past, mutual collaboration, and developing new questions to research.</p> <p>The WINS program provides opportunities for students to join scientists in the field to collect real data. The students are partnered with mentor scientists. They are taught the skills necessary to be a productive part of the research team and then join the teams in the field collecting data and then back in the lab analyzing data. Students have also presented their research at conferences, in the museum and at community events.</p> <p>For example, ██████████ was an intern with the Academy’s Patrick Center Wetland Crew under the supervision of staff scientist, ██████████. ██████████ prepared water and sediment samples for chemical analysis in the lab and sorted above and belowground plant biomass. She participated as a vital member of the wetlands field crew and collected biomass and sediment soil cores in the marsh. ██████████ then took these skills and knowledge to the Poconos Environmental Education Center (PEEC) as camp counselor, a position she earned after participating in a joint</p>

WINS/PEEC partnership, Women in the Water. [REDACTED] is studying environmental sciences at Drexel University on [REDACTED] scholarship.

In addition to research opportunities at the Academy, the WINS program partners with other institutions to provide research opportunities for students. Every summer, select students intern with the USDA. WINS student [REDACTED] engaged in agricultural research through the USDA program and had this to say about her experience: "We would go and work with different scientists in the building to get a feel for what they did. We would also have a lunchtime discussion with the female scientists in the building. Audrey Thompson was the guest speaker that changed my career plans. She's an agricultural engineer who spoke with us about women in engineering and career options. Up until then [REDACTED] was in a bubble. It had never crossed my mind to pursue a degree in engineering. She opened my eyes to the possibility of Chemical Engineering, [REDACTED] degree that I am currently in pursuit of."

Students, like [REDACTED] and [REDACTED] have presented at the US Geological meeting, USDA Federal Women's Program and the National Science Teacher Association meeting. Other students have presented at conferences such as The Annual Joint Meeting of Ichthyologists and Herpetologists.

The CRCC project between the WINS students and the students in Mongolia is another exceptional example of a program that allows students to collaborate with scientists and students on a global scale. The project uses technology to partner high school girls in Philadelphia (United States) and high school girls in Ulaanbaatar (Mongolia) to explore cultural heritage and how it relates to climate change in their individual neighborhoods, cities and countries. Through the project the girls develop [REDACTED] broader knowledge about and understanding of each others cultures (and how this relates to climate change). They also gain experience in how scientists study climate change in different habitats and in different countries. They use these experiences to develop and present short programs and interactive activities to community members on climate change and other cultural topics.

The CCRC program began by establishing bonds and relationship between the girls in Philadelphia and Ulaanbaatar. Via Facebook and Skype the girls are discovering common interests. This bonding and collaboration is an essential aspect of the program. For example, [REDACTED] shared: "Hello Carolyn and Katie. My name is [REDACTED] (you can call me [REDACTED]) I am 16 years old and I study at National Laboratory School. [REDACTED] want to be an environmental researcher or neonatologist when I graduate. I am more interested in chemistry and biology. I like to sing folksongs, read books and go to the park with my friends in my free time. I go

	<p>to the countryside in season break. And I like to learn from my grandparents. It is very interesting. So I hope we will get to know each other... Have great day.”</p> <p>The students have begun participating in lessons on climate change via an online curriculum built in Blackboard. Each WINS student discusses and collaborates with her Mongolian partner about what has been learned in the lesson. As their knowledge and skills progress, they will develop and present lessons to their fellow classmates and visitors in the museums.</p> <p>Students will then join scientists in the field in both Philadelphia and Mongolia. In March, the Mongolian students will visit Philadelphia and conduct research. In July, the Philadelphia students will conduct research in Mongolia. They will learn how to collect soil samples, water samples, macro-invertebrates, and core samples. The samples will be taken back to the Academy and Fresh Water and Nature Conservation Center in Mongolia to be analyzed. Together the girls will develop research posters and interactive presentations to teach other students and community members what they have learned about the water quality and the effects of climate change on two very different habitats.</p> <p>The outcomes from such rich experiences in E-STEM are exemplified in how many of our students pursue STEM careers. Dr Fadigan has been studying the WINS program and similar programs since 2002. Dr. Fadigan states, “I have been conducting research on this program [WINS]. I have found that the program has an extremely high retention rate (over 80%) and that all of the young women graduate from high school. I found that out of a sample of 75 girls, 94% went on to pursue post-secondary education, and close to 48% pursued STEM-related careers” (Fadigan & Hamrlich, 2002).</p>
<p>Main Criterion #2: Describe how the organization or program you are submitting for this award promotes citizenship and social responsibility.</p>	<p>WINS program objectives and outcomes support and encourage citizenship and social responsibility in a number of ways. The five primary objectives and their measurable outcomes are:</p> <ol style="list-style-type: none"> 1. Improve understanding of basic ecological principles and scientific methods, techniques, and terminology, helping students become scientifically-literate adults. ANS staff supports the girls’ science course selection and grades throughout high school. Program evaluators note that students who participate in the WINS program have significantly higher participation in elective and Advanced Placement-level high school science courses, beyond the 3 years of science required for graduation by the School District of Philadelphia. This year, advanced students report taking AP biology, pre-calculus and calculus, environmental sciences, chemistry, physics, and statistics. Students are also involved in their schools’ environmental clubs and activities.

2. Provide activities which foster personal achievement, self-confidence, and communication skills.

During their first year, WINS students participate in classroom lessons, science experiments, behind-the-scenes museum tours, and day-long, weekend, and four-day field trips. Advanced students participate in bi-weekly after-school programs that encourage professional and academic achievement. One workshop focuses on academic support, including financial aid, resume writing, and interviewing and other pre-professional skills. As part of the program more advanced girls help younger students through our WINS Big Sister Program. Becoming a mentor for an underclassman allows the girls to give back to the program and their community.

3. Assist students in all aspects of preparing for college admission.

The number of students who apply and are accepted to colleges or universities is the benchmark used by the Academy to evaluate its success in preparing students for college admission. Graduates from WINS have a 96% college attendance rate, compared with only 34% for the School District of Philadelphia. This number is even more impressive when you consider that most of the girls from the WINS program are the first in their families to attend college.

4. Assist students in developing life skills, such as interviewing, communicating with diverse audiences, and resume development.

A good indication that students are developing and improving their life skills is their commitment to the Explainers program and their involvement in internships. Twenty-three WINS students were Explainers in the past year; four had internships with the USDA; two were mentors with the Poconos Environmental Education Center; and others had internships at the Academy in the Fossil Preparation Lab, Ichthyology, Botany, Vertebrate Paleontology, and the Patrick Center for Environmental Research. Staff and visitors are impressed with the students and continue to comment on their skills. The students learn responsibility, communication skills, and new science topics by helping staff facilitate learning and research.

Each year students share these skills with the community through service days. Service days include park cleanup activities, attending community days and education youth about environmental issues and participating in Philadelphia's Science Festival with hand-on interactives about the affects of climate change.

5. Encourage students to enter science fields by identifying science-related career paths, demonstrating how they can follow these paths, and providing mentors to assist them.

More than 60% of WINS alumnae have majored in science or science-related fields in college. The thirteen 2014 WINS graduates are majoring in Environmental Science, Chemistry, Nursing,

Kinesiology, Agro-ecology with Sustainability, Biology, Neurosciences, Psychology, Math, Business, and Social Work with Criminal Justice. Four of the WINS graduates got full scholarships to their chosen schools. Those who have chosen other career paths have indicated that they believe the program has helped them appreciate the role that science plays in their daily life.

The program's lasting impact is demonstrated in this testimonial from [REDACTED], a former WINS student. "Currently, I serve as chief of staff to Congressman [REDACTED] ([REDACTED]), Ranking Member on the Commerce, Justice, and Science subcommittee for the House Appropriations Committee. Our work in this current federal spending environment calls on us to not only focus on responsibly funding government science programs; it now requires us to be active advocates for federal investment in science and research. I credit my ability to be a competent advocate for science because I was a WINS girl. A understanding of science isn't required as a policy maker but having this background shapes my appreciation of an issue -this understanding is a direct result of the programming I enjoyed through WINS."

In addition to the research and environmental experiences, mentoring is a critical part of the program. Mentoring in the WINS program results in the students becoming more competent, confident, connected, caring and more likely to contribute to their communities. A formal evaluation of the WINS program described the effects of mentoring as, "Because of their involvement in WINS, participants met new people, were exposed to possible career opportunities, and were supported in reaching their goals. The women in this study saw themselves as able to do more and "be more" as a result of participating in WINS." (WINS Evaluation, Institute for Learning Innovation 2011).

In the NSF funded project Cascading Influences: Long-term Impacts of Informal STEM experiences for Girls, a WINS student describes her experiences with scientist mentors and other adult mentors in the program: "She [REDACTED] enjoyed meeting the scientists that were a regular part of the experience. For instance, she recalled being very excited to meet a marine biologist at the Academy of Natural Sciences. She also met a female scientist who had discovered "an entirely new species of fish, a Ratfish, not known to anyone". This up-close encounter with an accomplished scientist who seemed liked a regular person led [REDACTED] to important realizations about science and the kind of people who can do science. [REDACTED] recalled being "so impressed by her; [she was] a normal person, down to earth and tangible." [REDACTED] was really impressed with the community of practice at the Academy. [REDACTED] felt that WINS helped her think about possibilities in her life that she

	<p>might not have otherwise considered. It also provided a network of supportive peers and mentors. For example, ██████ recalled that: [I] didn't spend much time with my parents and family growing up, and WINS helped me think about what was important. WINS really helped me see what someone might do in the future."</p>
<p>Main Criterion #3: Describe how your program or organization tackles real challenges in the environment.</p>	<p>The WINS program has many opportunities for students to become involved in tackling real life environmental issues. The strength of the WINS program, for its entire 32 years, is the integration into the environmental science happening every day at the Academy. The opportunities are vast—whether it be attending the New Jersey State Museum's Paleontology Field School in Red Lodge, Montana; working in the ichthyology department photographing preserved specimens from the academy's extensive collection; or going on a field trip with staff scientists to learn about stream habitat and riparian classification. Through the Academy's participation in projects such as the Delaware River Watershed Initiative funded by William Penn, students can study water quality, watershed health and how scientists train communities to monitor their own watersheds. In the Fairmount Park Restoration Project students participate with scientists to access habitats and then develop restoration plans for natural areas within the park. As part of the Academy's Stream Restoration Project, Mongolian Aquatic Insect Survey and Ecological Change in the Delaware, students have opportunities to partner with environmental scientists and organizations regarding important environmental issues in Philadelphia and Mongolia.</p> <p>The CRCC project is a testament to the program's goals to engage students in real world environmental challenges. This project builds upon current scientific research and allows the students to drive their own learning experiences. Through this project the girls will: develop a broader knowledge about and understanding of one another's cultures (and how this relates to climate change); better understand how scientists study climate change in different habitats and in different countries; be able to present short programs and interactive activities to community members on climate change and other cultural topics. The project will also produce new opportunities to leverage existing relationships into new partnerships between these two communities.</p> <p>Mongolia is a country with a rich history, unique cultural traditions, and varied environmental features. It is also one of the regions of the world most impacted by climate change: while global air temperatures have increased between 0.8 and 1.5 degrees Celsius in the past 70 years, temperatures in Mongolia have risen more than 2 degrees Celsius during the same period. The Mongolian government has declared climate warming to be a serious</p>

	<p>environmental issue threatening the country’s ability to sustain its food production and support its population. In a recent statement to the United Nations, the Mongolian President declared climate change “is not a challenge for the future; it is a matter of urgent priority today.” He urged world leaders to support climate change reduction with “bold action and strong political will.”</p> <p>The Academy has 20-year history of successful research and education in Mongolia that encompasses biodiversity assessment, environmental monitoring, land-use management, and ecotourism development. Led by Dr. Clyde Goulden, Director of the Academy’s Asia Center, the work involves collaborations with academics and training young scientists. The international partnership includes three major components: research on the effects of warming and precipitation changes in northern Mongolia; analysis of meteorological data; and interviews with nomadic herders to gauge the ecological, cultural, and economic impact of recent environmental changes. Involving students in these components transforms climate change from something students read about in science text books to a real problem facing them today; it empowers them to find real solutions to mitigate the effects of climate change, working with their Mongolian partners and Philadelphia partners.</p> <p>The CRCC program is bridging the gap between the generations in Mongolia and Philadelphia. Through the program, students are interviewing their older relatives about the changes they have witnessed over the past decades. Students are learning first hand from Mongolian nomadic herders about the effects of climate change.</p> <p>The students are then using Facebook, twitter and special programming to educate their communities and others out about climate change and to work toward adapting to future climate changes. Teenagers can be effective advocates for climate change within community.</p> <p>To ensure students have the skills necessary to educate their communities, the Academy provides a week long workshop on presenting science to the public for the girls. It also provides a nurturing and supportive environment for the girls to practice their communication skills in the museum, through participation in conferences and at community festivals.</p>
<p>Describe how you might you use these funds to advance your work.</p>	<p>If awarded the UL Innovative Education Award, the funds would support expanding three primary aspects to the WINS program:</p> <p>1) Increased paid internship opportunities for WINS participants. The internships expose students to diversity of scientists and</p>

	<p>science careers; increase the likelihood of students majoring in the sciences; and increase their science process skills. Because program participants are primarily low-income students, paid internships are particularly important.</p> <p>2) Increased participation in community events, such as the Philadelphia Science Festival (approximately 100,000 participants) and the Mongolian Family Day (100,000 participants). These events offer opportunities for the students to learn the importance communicating important scientific topics to the general public.</p> <p>3) Increased opportunities to work as Explainers in the museum. The opportunity for program participants to present science to an audience of peers and mentors is an important life skill and increases their science literacy. It also puts the program participants in a position of role model for museum visitors and other WINS students to participate in the future.</p>
Application Feedback	