**PROJECT TITLE:** Delivering Student-Centered Environmental Education to Minnesota Students

**I. PROJECT STATEMENT**

In the land of 10,000 lakes, clean water is a central part of the culture of Minnesota. By providing high-quality, inquiry-based educational programing focused on water to young students, we help build the next generation of Minnesotans who care about the natural world and have the tools, knowledge, and networks to protect it. **The primary goal of this project is to cultivate the next generation of environmental stewards by providing inquiry-based learning opportunities in the environmental sciences to Minnesota students.**

This project will result in the delivery of environmentally focused curriculum to approximately ~**6000 new K-12 students** over the 3 year project. This will be accomplished by doubling the reach of the existing environmental education program called Integrated Science Education and Outreach (InSciEd Out). By the end of the project, this funding will have supported programming for **~15000 students in total** (4k the first year of the project, 5k the second year, and 6k the third year). We propose to target our expansion efforts by focusing on schools in the Minneapolis, St. Paul, and the surrounding suburbs. Based on the demographics of targeted partner schools, many of these students will represent populations underserved in science*.* Additionally, this project with provided professional development for **60 new teacher partners** and supplementary professional development for **30 current teacher partners.** InSciEd Out will also provide training in science communication and outreach for **30 undergraduate students** over the course of the three year project**.**

Integrated Science Education and Outreach (InSciEd Out) provides authentic environmental science experiences to underrepresented and low socioeconomic status students in the West St. Paul, Richfield, and White Bear Lake school districts as well as professional development training for their teachers. Currently, our program reaches ~3,000 students annual across 6 partner schools. We provide in class curricula that are aligned to the MN State science standards covering some of the most pressing environmental topics in the state. This includes classroom programs focused on the effects of road salt on aquatic ecosystems, contaminants of emerging concern, and land use change. In short, the program uses an initial professional development experience to build scientist-teacher partnerships that result in the implementation of InSciEd Out curriculum that addresses grade specific education standards through environmentally focused learning modules.

**II. PROJECT ACTIVITIES AND OUTCOMES**

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| **Activity 1:**InSciEd Out Professional Development Internship for K-12 Science Teachers | **Budget: $110,00** |

The adult internship is a 12-day summer professional development program where teachers from partnering schools receive training in the areas of pedagogy, dialogue, nature of science, and environmental science. The internship is developed specifically to increase teacher preparedness in implementing cutting-edge environmental modules in their classrooms. Nature of science training allows teachers to better understand the process of science and how scientific understandings are developed. Teachers then use this new understanding to bring high-level science into their own classrooms and develop a culture of scientific thinking in their schools. Once teachers have participated in this initial internship, they are eligible to participate in additional 1-week focused programs that promote additional development of science identify and content knowledge.

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| **Outcome** | | **Completion Date** |
| *1. 60 new teacher partners implementing InSciEd Out Curriculum (20 per year)* | | *June 2023* |
| *2. Advanced training for 30 existing teacher partners (10 per year)* | | *June 2023* |
| **Activity 2:**Implementation of InSciEd Out Curriculum in new classrooms. | **Budget: $500,000** | | |

The InSciEd Out environmental curriculum works by pairing stewardship experiences (i.e. naturalism) with inquiry-based environmental science. Students are engaged with an initial guided experience (outdoors, naturalism) and asked to use that experience to develop scientific questions related to the environment. In the guided experience, students would perform basic monitoring on a water body near their school (temp, pH, DO, DOC, TDN, etc) or simply observe the different types of vegetation growing in a nearby wetland. This experience is than followed by an extension project, where students use those data to drive deeper questions about how changing ecosystems may impact organisms. For example, students may notice an oxygen concentration gradient in their nearby lake during the warmer months, which could drive questions related to testing the effects of oxygen availability on microbial processes or an extension related to eutrophication driven hypoxia. Throughout the extension phase of the module, students work closely with scientist partners from the University of Minnesota (primarily undergraduate student interns) to plan and execute independent projects related to an environmental problem. In this manner, InSciEd Out not only benefits our K-12 partner students, but we provide opportunities for undergraduate students to build their skills in science communication and outreach through our research mentor internship program. To assess the effectiveness of our modules, student learning over the course of the InSciEd Out module is assessed using a variety of techniques, including talking drawing analysis, pre/post surveys, connectedness to nature surveys, and performance on the MCA science test (when grade appropriate). These results are used to continually improve our curricular products.

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| **Outcome** | **Completion Date** |
| *1. Provide research-based environmental curriculum to* ***~1000 new students annually*** *over the course of the project resulting in double the size of the existing programs to 6,000 annual students served* | *June 2023* |
| *2. Provide science communication and outreach training for* ***10 undergraduate research mentors*** *each year for a total of* ***30 trained mentors*** *over the course of the project* | *June 2023* |

**III. PROJECT PARTNERS AND COLLABORATORS:**

**Seth Thompson** (Teaching Specialist in the Department of Biology Teaching and learning at UMN-TC): Aquatic Science Expertise; Educational Researcher, and InSciEd Out Twin Cities Program Leader. Current Twin Cities school partners included **Heritage E-STEM** and **Henry Sibley High School** in West Saint Paul, **Richfield STEM** School, and **Willow Lane Elementary** in White Bear Lake, Potential partner schools include **Weaver Lake Elementary** and **Minnesota Excellence in Learning Academy** in Maple Grove, **Hoover Elementary** in Anoka, and additional schools within our current partner districts and the Minneapolis and St. Paul Public School Districts.

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

Over the course of this three year projects, we aim to double the reach of our existing programming and develop a sustainable model for continued expansion. Currently, we are best situated to provide opportunities for students within a 25 mile radius of the University of Minnesota campus because we rely heavily on equipment sharing and providing volunteers from the University of Minnesota. More recently however, we have started to explore the possibilities and logistics associated with expanding our programming to Greater Minnesota. While we are not currently situated to recruit partners outside of the Twin Cities metro area, funding from this proposal would provide the opportunity to continue our expansion within the metro area and allow for additional time to more fully plan for an expansion to Greater Minnesota. This would include developing the necessary partnerships, with both school districts and scientific partners, to adequately provide programing away from the main campus of the University of Minnesota. Ultimately, the goal is to be able to offer access to high-quality environmental education opportunities to students across the entire state of MN.

As for financial sustainability, InSciEd Out has a track record of varied and well-leveraged financial relationships. Currently in the Twin Cities, our work is supported through a federal grant from the National Institute of General Medical Science to Dr. Chris Pierret (Mayo Clinic), previous Schulze Foundation Grants, cost sharing with the Department of Biology Teaching and Learning, and Sales and Service agreements with partner schools. Additionally, schools have successfully written small grant applications to support supply needs for our curricular units. This breadth in funding allows us to leverage funding to better meet the goals of our funders. Further, it allows a sustainability that is rare in science and education partnerships.