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**TIES TO COLLABORATE WITH STEM ECOSYSTEM PARTNERS IN CLASSROOM
AQUAPONICS PROJECT**

TULSA, BALTIMORE – TIES (The Teaching Institute for Excellence in STEM) is collaborating with STEM Learning Ecosystem partners to bring aquaponics-based STEM learning to Tulsa and Baltimore City Schools.

Aquaponics, a system of growing plants and fish in a symbiotic combination where the plants' nutrients comes from fish waste, is a soil-less closed loop system except for the input of food for the fish. This environmentally sustainable agricultural method uses limited water and causes less environmental impact than traditional farming.

It also uses less land per square foot of food production and can be easily built in a classroom or backyard.

The USDA PD-STEP (Professional Development for Secondary School Teachers and Education Professionals) grant provides immersive learning experiences for K-16 teachers/educational professionals to create and replicate best practices to improve student success outcomes within the food, agricultural, natural resources and human sciences. The grant will fund TIES and its partners to develop small-scale classroom aquaponics systems, curriculum and teacher professional development programs to aid students in creative problem solving, developing 21st century skills and demonstrating STEM competencies.

In Tulsa, TIES will partner with Symbiotic Aquaponic, the Tulsa Regional STEM Alliance (TRSA), the Outdoor Classroom at Woodward Park and area schools with the goal of making students “STEM-ready,” providing students with knowledge to pursue career paths in science, technology, engineering and math after graduation.

“This program holds amazing promise for providing students with the types of hands-on learning in STEM that will allow them to acquire valuable skills and understand the important role that they play in solving some of the challenges of our world,” said Jan Morrison, founder and managing partner of TIES. “By connecting this work to the vast network of the 84 ecosystems that make up the STEM Learning Ecosystems Community of Practice, we have a tremendous opportunity to scale this work throughout the nation and the world.”



Morrison noted that the STEM Learning Ecosystems Community of Practice, a five-year old initiative to connect STEM learning to many stakeholders, is ranked as the top priority in the federal five-year STEM plan for the nation.

After piloting the program in Tulsa, TIES will bring the program to partners in Baltimore City Public Schools, Great Kids Farm and the Maryland Out of School Time Network, allowing students to collaborate on their research across the nation.

“Our goal in this partnership is the same as TIES, and that is to make STEM education accessible to all,” said Symbiotic Aquaponic CEO Kaben Smallwood. “This will be a good opportunity to develop systems that can be used in any classroom in the future.”

Students from multiple districts will use the aquaponics systems during a six-week interdisciplinary science unit to address one of the National Academy of Engineers 14 Grand Engineering Challenges, Managing the Nitrogen Cycle. Students will use the engineering design process to prototype filters to manage solids in each system and critical thinking skills to collect data and manage their aquaponic systems.

The Tulsa Regional STEM Alliance and the Maryland Out of School Time Network will provide assistance in measuring outcomes through the Harvard PEAR Dimensions of Success tool which evaluates the effectiveness of STEM learning.

The goal is for Outdoor Center partners to sustain this program after the grant has been completed, training more teachers and students about the benefits of STEM education through aquaponics.

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