**Curriculum + Community Enterprise for Restoration Science (CCERS):**

How We Use Oyster Restoration in New York Harbor to Enhance STEM-C Education

**ABSTRACT**

The Curriculum + Community Enterprise for Restoration Sciences (CCERS) encourages urban middle school students to explore and participate in restoration of the oyster population in New York Harbor. It aims to enhance STEM-C education by engaging participants in long-term restoration ecology and environmental monitoring projects, and develop a replicable model for other restoration projects as suited to local environmental conditions. The model has five programmatic pillars.

**PROJECT GOALS**

- Increase quality and effectiveness of STEM-C teaching and learning
- Increase teacher's knowledge and instructional skill
- Increase student's knowledge of and interest in STEM

**METHODOLOGY**

- External evaluators employ a quasi-experimental research design to conduct a formative and summative evaluation to assess the implementation, effectiveness, and impact of the STEM-C model. The model includes five programmatic pillars: Pillar 1: Teacher Development, Pillar 2: Student Learning, Pillar 3: Digital Platform, Pillar 4: Afterschool Mentoring, Pillar 5: Community Exhibits.

**PROJECT DESCRIPTION**

Problem: Employment opportunities in Science, Technology, Engineering, Math, and Computer Sciences (STEM-C) are outpacing supply of qualified applicants because the number of students entering higher education STEM-C pathways is low.

**EDUCATIONAL MODEL**

Digital platform supports other pillars by archiving Pillar 1 in-school curriculum for Pillar 2, Pillar 4 out-of-school curriculum, and other resources provided by Pillar 5. Accessible via associated website for Pillar 2 and Pillar 4 students to conduct expeditions, collect data and record field observations at Oyster Restoration Stations. The dashboard feature will enable students to access database, analyze this data and generate graphs to create research presentations for annual symposium.

**PILLARS’ COMPONENTS & CONTRIBUTIONS**

**Pillar 1: Teacher Development**

Professional development course trains middle school teachers in New York City public schools to develop and implement a new curriculum, to promote active learning of STEM-C using Project Based Learning (PBL) & Bybee’s SE Model.

**Pillar 2: Student Learning**

Lessons incorporate harbor restoration activities with field site monitoring in curriculum aligned to Next Generation Science Standards (NGSS).

**Pillar 3: Digital Platform**

A digital repository for materials and data to be shared, discussed, and reviewed by teachers, students, and citizen scientists. Measurements and observations uploaded from restoration stations can be compared across school sites and time points.

**Pillar 4: Afterschool Mentoring**

Scientists and youth development experts collaborate on STEM-C curriculum adapted for afterschool and summer school settings with few provided resources.

**Pillar 5 Community Exhibits**

Collaborative efforts produced interactive exhibits tied to the CCERS project. Student field trips incorporate content on biodiversity and local restoration efforts.

**NOTE:**
- The CCERS partnership is a three-year education research project.
- Ten organizations are collaborating to develop a curriculum to enhance STEM education in middle schools. Lessons engage students and teachers in long term restoration ecology and environmental monitoring projects.}

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