

Modeling the Human Harbor: An Equity Project in New York City, New York USA

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Abstract : The envisioned long-term outcome of this three-year research, and implementation plan is for 1) teachers and students to design and build their own computational models of real-world environmental-human health phenomena occurring within the context of the “Human Harbor” and 2) project researchers to evaluate the degree to which these integrated Computer Science (CS) education experiences in New York City (NYC) public school classrooms (PreK-12) impact students’ computational-technical skill development, job readiness, career motivations, and measurable abilities to understand, articulate, and solve the underlying phenomena at the center of their models. This effort builds on the partnership’s successes over the past eight years in developing a benchmark Model of restoration-based Science, Technology, Engineering, and Math (STEM) education for urban public schools and achieving relatively broad-based implementation in the nation’s largest public school system. The Billion Oyster Project Curriculum and Community Enterprise for Restoration Science (BOP-CCERS STEM + Computing) curriculum, teacher professional developments, and community engagement programs have reached more than 200 educators and 11,000 students at 124 schools, with 84 waterfront locations and Out of School of Time (OST) programs. The BOP-CCERS Partnership is poised to develop a more refined focus on integrating computer science across the STEM domains; teaching industry-aligned computational methods and tools; and explicitly preparing students from the city’s most under-resourced and underrepresented communities for upwardly mobile careers in NYC’s ever-expanding “digital economy,” in which jobs require computational thinking and an increasing percentage require discreet computer science technical skills. Project Objectives include the following: 1. Computational Thinking (CT) Integration: Integrate computational thinking core practices across existing middle/high school BOP-CCERS STEM curriculum as a means of scaffolding toward long term computer science and computational modeling outcomes. 2. Data Science and Data Analytics: Enabling Researchers to perform interviews with Teachers, students, community members, partners, stakeholders, and Science, Technology, Engineering, and Mathematics (STEM) industry Professionals. Collaborative analysis and data collection were also performed. As a centerpiece, the BOP-CCERS partnership will expand to include a dedicated computer science education partner. New York City Department of Education (NYCDOE), Computer Science for All (CS4ALL) NYC will serve as the dedicated Computer Science (CS) lead, advising the consortium on integration and curriculum development, working in tandem. The BOP-CCERS Model™ also validates that with appropriate application of technical infrastructure, intensive teacher professional developments, and curricular scaffolding, socially connected science learning can be mainstreamed in the nation’s largest urban public school system. This is evidenced and substantiated in the initial phases of BOP-CCERS™. The BOP-CCERS™ student curriculum and teacher professional development have been implemented in approximately 24% of NYC public middle schools, reaching more than 250 educators and 11,000 students directly. BOP-CCERS™ is a fully scalable and transferable educational model, adaptable to all American school districts. In all settings of the proposed Phase IV initiative, the primary beneficiary group will be underrepresented NYC public school students who live in high-poverty neighborhoods and are traditionally underrepresented in the STEM fields, including African Americans, Latinos, English language learners, and children from economically disadvantaged households. In particular, BOP-CCERS Phase IV will explicitly prepare underrepresented students for skilled positions within New York City’s expanding digital economy, computer science, computational information systems, and innovative technology sectors.

Keywords : computer science, data science, equity, diversity and inclusion, STEM education

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