Opening Gateways to Completion:
Open Digital Pedagogies for Student Success in STEM
Cooperative Arrangement
New York City College of Technology, CUNY (lead)
Borough of Manhattan Community College, CUNY (partner)

Project Abstract

For many students, especially high-need students, mathematics "gateways" – the courses required to pursue study in STEM fields – appear as insurmountable barriers. "Non-contributory credit accumulation," another common phrase, is the experience of failure, sometimes repeated failure, that deflects students from their chosen major and delays or even ends their journey to a degree. In every college, a handful of courses and a few dozen professors have extraordinary impact on the prospects of our students for career advancement in STEM.

This project brings together two Hispanic-Serving Institutions within the City University of New York (CUNY), the nation's largest public urban university system, to address this compelling national issue. New York City College of Technology (City Tech) and Borough of Manhattan Community College (BMCC) will participate in a cross-campus collaboration that will introduce open-source digital technologies, open educational resources, and active learning pedagogies into the sequence of high-enrollment mathematics courses required for STEM disciplines at each college. Through an intensive pedagogical intervention that will impact more than 90 faculty and 3,100 students during the grant period, we seek to improve student achievement in these courses and advance their progress to the degree – opening the gateways to success in STEM.

Working together over a five-year period, the project teams will adapt courses in the foundational mathematics sequence to use WeBWorK, a free and open source online homework system supported by the Mathematical Association of America and the National Science Foundation (http://webwork.maa.org/). The teams will design and develop a comprehensive suite of open educational resources (OERs) for each course, consisting of WeBWorK assignments, videos, and supporting materials. In parallel, we will conduct a series of intensive year-long faculty development seminars that will enable full-time and adjunct faculty at each campus to implement these OERs successfully in their classes, introducing them not only to the technologies but also to engaging pedagogical strategies that have been proven effective with high-need students such as ours. Sessions will focus on active learning, high-impact educational practices, and problem-based learning, explore flipped classroom approaches, and equip participants with best practices for assessment and student advisement.

The project will be enhanced by use of the OpenLab (https://openlab.citytech.cuny.edu/), City Tech's innovative open source digital platform for teaching, learning, and collaboration (created through Title V funding). In addition to serving as the project's shared communication space and resource exchange, the OpenLab will be further developed to integrate with the WeBWork platform – an important contribution that will not only benefit students and faculty at City Tech but also, since the code will be released publicly, the educational technology community worldwide. All open educational resources, seminar materials, best practices, and lessons learned will be made freely and publicly available, amplifying the impact of the project's work.