

Concept for NSF Proposal, Revised 3/14/07

Introduction

The goals of TPEA (Technology Platform to Elevate Assessment) are to: 1) institute a technology platform at York College of the City University of New York in order to support assessment and learning of critical competencies as part of an interdisciplinary, gateway experience for STEM majors, and 2) create an interdisciplinary, research agenda on the impact of the TPEA model on a variety of student and faculty outcomes. The overwhelming minority student population of the college makes the proposed program a critical pipeline to retention and academic success in the STEM disciplines and professions. The chancellor of CUNY recently committed the university community to the Decade of Science in an effort to support STEM programs and disciplines, with the primary goal of increasing the numbers of undergraduate and graduate students in these disciplines and providing competitive training and education in line with the National Research Council and National Science Foundation (NSF) recommendations and goals.

Goal #1: Institute a Technology Platform

Over a three-year period, TPEA will take a two-prong approach that centers on Course-Specific Strategies and Student Support Services. The Course-Specific Strategies will use technology-driven assessments of student learning that provide live, immediate feedback to students and instructors. The aim is to use the science of learning to support student success in gateway courses by making transparent their progress in key competency areas. Online pre-assessments, live course-based assessments, and in-class post-assessments will comprise a platform that situates assessment as an ongoing part of the teaching and learning experience. Students and faculty will have access to student performance in key competency areas before, during, and following instruction allowing students and faculty to refine their learning and teaching. At the same time, students will learn to trust the technology-driven assessment process as a vehicle for learning and self-evaluation because the online and live assessments will carry minimal cost, are low stakes assessments and expectations of participation will be made critically clear. APA task force recommendations on best practices in assessment will be used, including providing students with samples or models of exemplary performance. The online pre-assessments will be aligned to select reading assignments and focus on key concepts articulated in the text and to be taught in forthcoming lectures. Engaging students in the ongoing, self-evaluation of their learning from the text supports the acquisition of metacognitive reading strategies. Such self-regulatory skills, particularly for students who have not been trained well during the high school years, are critical to the retention and success of the college student. Live course-based assessments will allow instructors to incorporate low-stakes assessments in their lessons to poll student understanding “live.” Using clickers and/or hand-held devices, students will be able to enter their response. Aggregate data can be tabulated and fed back to the instructor who can then make a determination of how to proceed. Methods of creative re-teaching of key concepts are expected to emerge among faculty as they engage in this process. In-class post-assessments will be designed to maximize feedback to students in key competency areas. A variety of technological advances in offering Student Support Services will also be incorporated into the TPEA model. Student responsibility toward improving their understanding of course content will be facilitated with access to online tutoring (Ask-A-Tutor), student chat rooms, and Blackboard-enhanced modules. The enhanced modules will be directly linked to the areas in need of improvement. In this way, feedback on student performance will include strategies for improving that performance.

Four competency areas will be targeted as part of the gateway experience: 1) Critical Reading and Writing Skills, 2) Mathematics, 3) Scientific Reasoning, and 4) Collaboration Skills. Competencies in these areas are deemed critical to academic success, particularly in STEM majors. Concepts that emerge early in the curricula sequence re-emerge in more complex and abstract ways in upper division courses. A solid foundation in the early college years is expected to increase the likelihood

of success in the major, improve retention, and improve overall academic achievement. This foundation is expected to be supported with the TPEA model because TPEA provides immediate feedback on student performance and understanding of concepts building a self-regulatory capacity that nurtures cognitive and metacognitive strategies for learning, provides instructors live formative feedback mid-lesson, and creates a culture of thinking about the relationship between teaching, assessing, and ongoing student learning as supported by advanced learning technologies.

The project will occur over a three-year period. In year one, faculty from mathematics, biology, chemistry, psychology, and English will define student competencies in the four defined areas, develop assessments and rubrics for the competencies, and collect baseline data on all outcome measures. The Chief Information Officer, along with staff from Academic Computer Services will work alongside faculty to design and/or refine the technological platform to support the TPEA model. In year two, the model will be piloted in three key courses in the Fall semester: Introduction to College Writing, Pre-Calculus, and Chemical Principles I and three key courses in the Spring: Understanding Literature, Analytic Geometry and Calculus, and Biological Principles I. These courses feed three majors: Mathematics, Chemistry, and Biology. It is expected that in year two, changes in curriculum, instruction, assessment practices, and technology use might shift to support a new culture of thinking. Therefore, while data will be collected, year two will be treated as a pilot and time for further refinement to the model. In year three, the full model will be implemented and evaluated.

Goal #2: Research Impact of TPEA

There are several threads of research that will be occurring simultaneously over the three-year process. An interdisciplinary group of faculty will be leading the research on the impact of TPEA and all work will be made public via a website devoted to the project. All data will be collected at baseline, for the intervention group, and for a control group (students in different sections of the same classes targeted by TPEA). Student outcomes will include competencies in the four target areas, overall classroom experience, academic performance, and retention. Faculty outcomes will include teaching effectiveness, understanding of classroom assessment and technology, and overall classroom experience.