Title of Project:
Classroom-Based Technology Integration: Scaffolding Technology-Enhanced Learning for Leaders in America (STELLA)

Project Abstract (< 100 words):
In response to the National Science Education Standards (National Research Council, 1996, 2000), considerable research has been conducted to promote student problem solving in science classrooms. However, little research has been conducted to investigate the roles of technology-enhanced scaffolds when jointly employed with teacher and student scaffolds to promote scientific problem solving in everyday classrooms. The purpose of this project was to partner with a science teacher to design technology-enhanced curricular materials and examine what factors influence students’ inquiry during their use of the materials and simulations in science classes.

Project Personnel:
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1. **Describe the activities you completed this year for your Synergy Grant in relationship to the goals of the Holmes Partnership.**

   The science teacher and our research group developed and implemented a set of technology-enhanced curricular materials for three-week classroom activities on Changes in State in four required science classes. The materials included handouts and two chemistry simulations developed by the Molecules and Minds research group at New York University and PhET research group at the University of Colorado at Boulder. These two simulations were chosen and integrated into the classroom activities in collaboration with the classroom teacher to provide inquiry opportunities for students to identify and explore science problems. Both offered students the opportunity to explore and experiment on a molecular level that they otherwise couldn’t observe or experience in the classroom.

2. **Describe your plans, if any, for continuation, scaling up, and/or institutionalization of the project next year.**

   We will continue to analyze the data collected from this project and identify key factors that influence student problem solving in science classroom with emerging technologies.
We will also discuss ways to incorporate the findings from the project into technology-enhanced science classes.

3. *Of the six goals delineated in the strategic agenda of the Holmes Partnership, this project primarily addressed two:*

a. High quality professional preparation—the current project helped a science teacher to engage in the school-based research process (vs. telling them what to do), to improve teaching practices using technologies. The current project has been implemented upon the existing and ongoing partnership with science teachers that PERSIST (Purdue Educational Research on Scientific Inquiry and Scaffolding Technology) group established to support teachers’ classroom use of emerging technologies.

b. Scholarly inquiry and programs of research—the project promoted three crucial themes of Ed Tech research: (1) emerging technologies, (2) problem solving and scaffolding framework, and (3) classroom-based research. This project also employed an iterative research process involving brainstorming potential topics with the classroom teacher, identifying classroom-based challenges pertaining to student learning with technologies, and the collaborative design of research materials.

4. *Summarize any impact data you have collected on your project, especially impact on P-12 students, teachers, principals, etc.*

Data were collected from knowledge tests and surveys on motivation, critical thinking, and scientific inquiry skills. The results show that the teaching strategy and prior knowledge were significant factors that predicted students’ post-test scores. For the delayed knowledge post test that examined the transfer effect of science learning with simulations, the scaffolding strategy was a still significant predictor as well as post-test scores, but prior knowledge was not. This indicates that students benefited more from conceptual scaffolds that enabled students to spend more time on basic science principles on their own pace, compared to procedural guidance in which students were asked to follow a prescribed set of activities. The findings of this study can be incorporated to design technology- and teacher-enhanced scaffolds.

5. *Summarize your plan for disseminating the results of your project to state and national audiences.*

The findings of this project will be presented at the annual meeting of the Association of Educational Communications and Technology in 2012. We are currently preparing a manuscript based on the study to submit to a journal.

6. *What suggestions do you have for future Synergy Grant participants or for the project administrators?*
We would like to thank Dr. Sidney Moon, the Holmes Partnership, and the Synergy Grant administrators for their support of this project.