

Integrating Innovative Technologies in Inquiry Science: Professional Development for Teachers and the Impacts on Teacher and Student Learning *Marcia Linn, University of California at Berkeley; Chad Dorsey, Concord Consortium; Kelly Ryoo and Libby Gerard, University of California at Berkeley*

Question(s) for Discussion: What do teachers need to learn to make effective use of technology-enhanced inquiry curricula and embedded assessments? How will we support teachers to learn this?

Session Description: The purpose of this session is to investigate the kinds of professional development that support teachers' use of innovative technology in inquiry science and their impacts on learning. Marcia Linn is the Chair and will introduce the session. Presenters will report for 10 minutes with 5 minutes after for questions and comments from the audience. Marcia will then lead a 15-30 minute synthesis discussion with the audience and panel members.

1. Libby Gerard and Marcia Linn will discuss the literature on professional development in technology-enhanced inquiry science, having examined over 75 peer-reviewed studies since 2000. The research questions include What are the professional development designs in technology-enhanced inquiry science, and what are the impacts on teacher and student learning? Results will be reported in terms of three stages of teacher professional development trajectories. The first stage includes "one-shot" studies that support teachers for one year in pre-service or in-service to learn a new technology. The second and third stages include multiple-year studies that support teachers from pre-service to in-service, or in multiple years of in-service to learn, integrate, and sustain use of new technologies in inquiry science.
2. Chad Dorsey will discuss a pilot study for an ongoing research project that provides evidence of how innovative technologies can be used to support teachers in approaching curriculum involving cumulative learning in the topic of energy. By providing teachers with innovative tools to facilitate student discourse, elicit student ideas and visualize student thinking, this study demonstrates how professional development and curriculum support can combine to support a coherent approach to teaching cross-cutting science concepts.
3. Lydia Liu will examine how teacher characteristics are associated with student learning in technology-enhanced science using a hierarchical linear model. Several teacher-level characteristics including professional development experiences and peer support showed a positive impact on student inquiry-based science learning. For example, teachers who had colleagues in the school implementing the same technology-enhanced inquiry unit brought about larger student knowledge integration gains than teachers without such colleagues. Teachers who needed less guidance in the classroom from professional developers and teachers who attended a workshop to participate in the design of the inquiry units with curriculum developers also brought about greater student learning gains than other teachers.
4. Kelly Ryoo and Marcia Linn will describe a case study of science teachers collaborating with education researchers, technology developers, and content experts to design a technology-enhanced curriculum. Data include teacher interviews, reflections, curriculum development documents, and classroom observations. Findings demonstrate how the collaborative design process with experts in various domains can support science teachers to design effective inquiry curriculum materials. They also will investigate the impacts of the collaborative design process on these teachers' content knowledge, instructional strategies, and their beliefs about the use of technology in the classroom.