Engaging teachers and students in Scientific Knowledge and Practices

In science learning, scientific practices are a vehicle to develop and use scientific knowledge, and a context to understand how the discipline of science builds knowledge. Engaging students to participate in these authentic scientific knowledge-building practices, rather than solely being consumers of scientific knowledge, poses serious challenges both for learners and for teachers. Not only are these practices unfamiliar, they clash with students’ intuitive ideas about the nature of knowledge and school learning, and with many teachers’ perspectives on their role as science teachers. In this talk I introduce the research funded by the NSF-USA aimed at making the scientific practices of scientific modeling meaningful and tractable for teachers and learners in middle grades classrooms. The modeling practices include students developing scientific models, applying them to understand phenomena, evaluating them against empirical tests and revising them to fit these new findings. The talk is built on an example of teaching and learning on the molecular-atomic model of matter to consider the following issues in incorporating scientific modeling in classrooms: (1) I examine how existing classroom norms and understandings of science pose challenges for making this practice meaningful. (2) I will describe our approaches in curriculum design for scaffolding students’ participation in scientific practices.