

Project Summary

This project will build foundational knowledge about the role that state agencies can play in supporting improvement to science education when partnered with researchers and each other. Building on 4 years of prior collaboration, the effort will establish a formal partnership between university researchers and the Council of State Science Supervisors, the national professional association of state-level leaders in science education. State science supervisors from 12 states will form teams and a network that will develop and test state-level strategies for improving formative assessment as a policy instrument for aligning curriculum, instruction, and assessment. Researchers will study how and under what conditions these strategies support the emergence of *coherent* state systems of science education can emerge in which all students have opportunities to meet challenging new standards. The conjecture we are investigating is that focused activity to analyze classroom assessment tasks and associated student work provides a powerful tool for bringing key stakeholders in state science education into alignment about a coherent vision for state science education.

The project aims to build knowledge and theory about the conditions under which a network of state teams can promote coherent guidance for instruction in local districts and schools through engaging in iterative design-based research on foundational knowledge for the implementation of the “3-dimensional” model of science and engineering learning – a model of science and engineering learning that integrates disciplinary core ideas, science and engineering practices, and crosscutting concepts (National Research Council, 2012). The network of state teams will collaborate with researchers to diagnose current challenges to promoting coherence and develop knowledge about conditions for promoting coherence by testing and studying strategies for cultivating it. A first step will be to identify key system actors in each state and their responsibilities to assemble a participatory research team. A second step will be to engage this team in conducting a rapid assessment of needs within each state. A third step will be to engage in an iterative process of design-based research that focuses on creating contexts for investigating how improving formative assessment can help align curriculum, instruction, and assessment in both states and districts around a vision of 3-dimensional learning. By attempting to create conditions that directly address implementation dilemmas and learning needs of local actors in the system through design, the project will move beyond accounts that document incoherence and begin to identify supportive processes and practices for promoting it.

The **intellectual merit** of this project is that it will build foundational knowledge related to how a network of states can support implementation of ambitious new standards. The proposed activities will develop, apply, and refine concepts from learning sciences, information sciences, and institutional theory to the study of implementation of new visions for teaching and learning. The partnership of researchers and state leaders that will lead the effort and its external advisors bring a unique blend of expertise in organizing effective collaborative design processes and conducting rigorous implementation research, in formative assessment, and in educational leadership practice.

The **broader impact** of the project is that building knowledge of conditions that support equitable implementation of 3-dimensional science learning will benefit society by developing in all students’ sufficient knowledge of science and engineering to engage in public discussions on related issues. Since inequity of opportunity to learn is a chief obstacle to broadening participation of underrepresented groups in STEM fields (NRC, 2012), this knowledge can contribute to the design of solutions to expand diversity in these fields. This project seeks to explore how to support broad-scale implementation of central aspects of the national-level, consensus vision for K-12 science education (NRC, 2012) by developing tools and routines collaboratively in close partnership with many states from across the country. The direct involvement of state teams comprised of leaders with authority to make system-level changes increases the potential for the project to have direct and immediate impacts on practice. The resources and leadership of CSSS as the field’s professional organization for state leaders ensures that the knowledge gained will continue to live and grow beyond the life of the project.