



Multiple Literacies in Project-Based Learning

A collaboration with Joseph Krajcik from Michigan State University; Annemarie Palincsar and Elliot Soloway from the University of Michigan at Ann Arbor; and Emily Miller from the University of Wisconsin

The Multiple Literacies in Project-Based Learning (PBL) project will design, develop, and test rigorous, interdisciplinary project-based learning curricula for the upper elementary grades. Lessons will require sense-making through the application of science ideas and practices, language literacy, mathematical thinking, and technology tools. The exploration of culturally and personally relevant driving questions will propel student learning. In doing so, these PBL curricula will promote access to and ownership of knowledge for diverse learners.

Interdisciplinary Design: The curricula will support teachers in making connections between Next Generation Science Standards and Common Core language arts and mathematics standards. The project will design a scope and sequence for grades three through five and will develop and test student and teacher materials for grades three and four. PBL units will require that all students demonstrate meeting science standards by asking questions, conducting investigations, explaining phenomena, communicating ideas, and designing solutions to problems. Language arts literacy will be addressed as students obtain, evaluate, and communicate information effectively through reading, discourse, and writing. Mathematical literacy will be essential as students interpret and manipulate quantitative and spatial data to explain phenomena. Learning technologies will promote collaborating in data collection and analysis, building and revising models, and developing multimedia documents to illustrate understandings. The curricula will be designed with educative supports and a platform to support professional development.

Research Approach: As a design-based initiative, materials will be developed iteratively and vetted by teachers, administrators, and students. Partnering schools will reside in underresourced communities that serve diverse learners. In years one and two, teaching experiments with at least three teachers in each of grades three and four (approximately 75 to 90 students per grade) will enhance the development of unit designs. In years two and three, these teachers will pilot units, providing further information regarding the sequencing, clarity, and effectiveness of learning tasks; the way teachers implement the materials; and the design of assessments that will reveal learning outcomes. Field testing in years three through five with 10 PBL classrooms (approximately 250 to 300 students) and five comparison classrooms (approximately 125 to 150 students) per grade will establish promising evidence of effectiveness of the curricula. In year five, a study with 20 PBL classrooms and 20 comparison classrooms will provide gold-standard evidence of effectiveness of the third-grade materials. Effectiveness will be evaluated based on productive shifts in teacher practice; improved student performance as reflected in science, literacy, and mathematics outcomes; increased student efficacy and metacognition in science learning and language use; and greater student motivation and engagement to explore science using scientific practices, language, and mathematics.

Expertise: The collaboration of Michigan State University and the University of Michigan brings together interdisciplinary expertise in the learning sciences and grounded experience in designing project-based learning curricula. Joseph Krajcik, Annemarie Palincsar, Elliot Soloway, Raven McCrory, and Barbara Schneider are leading researchers in the respective areas of science education, literacy development, learning technologies, math education, and research methodologies. Emily Miller is an experienced practitioner at the elementary level with expertise in the Next Generation Science Standards and in developing teacher tools to promote sense-making for diverse language learners in science. Deborah Peek-Brown brings more than 28 years of experience as a science educator and leader in project-based science curriculum design and professional development. Linda Kucan at the University of Pittsburgh and Shirley Magnussen at California State Polytechnic will collaborate with the team to enhance student opportunities to learn from science texts and text-based discussions.