

**TITLE: Distance Learning through Game-Based 3D Virtual Learning
Environments: Mission Hydro Science**

Type: Development

Absolute Priority: *The Mission HydroScience (MHS) project addresses absolute priority 5, effective use of technology, and sub-priority (b) integrating technology with the implementation of rigorous standards to increase student achievement and engagement and teacher efficacy.*

Description: The MHS team seeks to design, develop and evaluate a game-based 3D virtual learning environment (3D VLE) for teaching and learning in blended or distance education. MHS targets middle school students in small and rural schools learning hydrologic systems and scientific argumentation. A four-cycle design and development process will include usability, usage, feasibility and pilot testing.

We propose an iterative, design research process consistent with research type 3 of the IES/NSF Common Guidelines with methods for developing an intervention, collecting evidence of feasibility and promise of outcomes along with external critical review

Objectives: There are 5 project goals: 1) Develop a game-based 3D VLE for learning hydrologic systems and scientific argumentation. 2) Develop learning analytics system to provide in-game assessment and feedback to students and enable teacher monitoring and efficacy to intervene as needed. 3) Provide teacher professional development and support to ensure effective implementation. 4) Deliver and evaluate MHS in partner schools. And, 5) build new knowledge about game-based learning, analytics and teacher support for effective VLE. The project outcomes include increased student interest in technology and science, water systems and argumentation competencies, and meeting NGSS, as well as high levels of teacher efficacy.

Students Served: Field Testing in year 4 will evaluate teacher efficacy and student engagement and achievement using pre and post indicators and will include 200 distance students (20 classes) and 1000 blended learners (25 classes).

Special Features: Game-based 3DVLE, Learning Analytics, Teacher Support System

Partners: The partners for MHS are the University of Missouri, Biological Sciences Curriculum Study (BSCS), Blended Schools Network, Missouri Partnership for Educational Renewal, Columbia Public Schools & Wright State University