

**Project Title:** Effective Mining Safety Training - Design, Implementation, and Evaluation

**Organization:** The University of Arizona

**Partnerships:** Louisiana State University (Reid Bates, Ph.D.)  
BHPBilliton, Barrick Goldstrike  
Resolution Copper, Salt River Materials Group  
Vulcan Materials  
Arizona Mine Inspector  
Hazard Prevention Institute

**Investigator(s):** Mary M. Poulton  
Eric A. Lutz

**Focus Area:** Training

### SYNOPSIS

***Problem Statement and Justification:*** More than \$100B is spent by US companies each year on training. Further, mining companies spend millions of dollars each year on training, including MSHA-required courses such as annual refresher; yet illnesses, injuries, and accidents continue to occur. Research from other industries suggests that active learning can result in increased knowledge acquisition and reduction in health and safety incidents, but there is no data available specific for mandated mining safety training. The main objective of this study is to increase the effectiveness of mandated training. The project will provide guidance to mine trainers on how to modify existing training courses to include more active and engaging learning experiences while simultaneously meeting MSHA requirements. Refinement and validation of an instrument to measure the adult learning principles applied in this study will allow managers to evaluate their trainers and provide mine companies and regulatory agencies with a powerful tool to assess the quality of contractor- or vendor-led training courses.

***Impact of Research:*** Mining companies will have access to a mining-specific ‘handbook’ of evaluated active learning exercises for use in mandated training courses. Coupled with this handbook, trainers and operators will have access to the train-the-trainer curriculum and materials for increasing the adult learning, active learning, and transfer of training knowledge to the job. The Andragogical Process Inventory, the first validated instrument to measure andragogical principles and process design elements that impact learner satisfaction and learning outcomes, will be validated for use by companies, federal agencies, and others. These tangible items can help mine companies design and implement better, more effective, training programs for their employees, validating the effectiveness of these trainings, and ultimately reducing the rates of occupational incidents, injuries and illnesses.

***Objectives and Research Approach:*** We have partnered with both large and small mine operations representing major commodity sectors, a state agency, and a private training company, who cumulatively train more than 3,000 individuals representative of the broader mining community (e.g., young/old, new/experienced, native English speakers/English language learners, working in a variety of positions, from laborer-to-contractors-to-management, and across many commodity sectors in both surface and underground) and will therefore support the generalizability of our study outcomes. With these partners we are proposing to:

- Re-design existing mandated training courses using adult and active learning methodologies;
- Create and disseminate a handbook of active learning exercises;
- Design and implement a train-the-trainer course using active learning methodologies emphasizing transfer of training;
- Disseminate the train-the-trainer curriculum for use by the mining community;
- Validate and publish the Andragogical Process Inventory instrument for use in the mining;
- Conduct an empirical study (with treatment and control groups) comparing the outcomes of the re- designed training courses with traditional, lecture-based training courses.