MINE WATER AND ENVIRONMENT: A re-engineering of learning outcomes

BACKGROUND

Through engagement with alumni and industry a gap was identified in the mining engineering curriculum with issues related to mine water and the environment. Upon meeting with several internal and external stakeholders, Mine water and environment was created, including ongoing revision with regard to final content for the course. Of particular concern was making the course unique and distinctive while addressing all technical content, how to differentiate the graduate experience from the undergraduate experience, and how to address diverse student interests from different backgrounds without the same prerequisites and exposure to the subject.

WHAT IS CHANGING

When tweaking a course it is important to focus on one step at a time. The intent was to re-engineer SMART learning outcomes in such a way that they aligned with preassessments, classroom activities, and both summative and formative assessments, using an Interactive-Constructive-Active-Passive (ICAP) framework. According to this framework student learning is maximized when there is active engagement. The end result are increased “aha” moments, directed paradigm shifts and achievements of course objectives.

INTENDED OUTCOMES

The primary objective of this re-engineering effort is to help students relate the importance of mining to better stewardship of the environment, while broadening their interests in technological innovation and research, improved mining practices and sustainable development. The intended learning outcomes include the following measurable capabilities:

A. List and critique current practices in water management for surface and underground mines in the context of mine life cycle
B. Solve problems in mine geotechnics using qualitative and quantitative methods
C. Design management schemes of mine waste based on the origin, composition and other constraints presented by each particular mine
D. Discuss and analyze regulatory considerations for mine reclamation and mine closure
E. Demonstrate effective verbal and written communication of challenges related to mine water and the environment
F. Demonstrate effective team work through brainstorming of mitigation strategies for mine water and environmental problems

Levels of Engagement
1. Passive
2. Active
3. Constructive
4. Interactive

"We used to prepare students so that they know a lot. However research shows an autodidactic approach is more effective” - Sam Spiegel

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