

Mining and SD: Implementation of Undergraduate and Graduate Courses at Four Universities

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Outline

- Undergraduate course on Mining and Sustainable Development
- Graduate course on Mining and SD
- Team Based Learning (TBL)
- Closing comments

Undergraduate Course on Mining and SD

Introduction

- Developed at the University of Nevada, Reno in 2000 and first presented in 2001
- Fulfill the accreditation requirements for a course on Mining and the Environment
- Involvement with Mining, Minerals and Sustainable Development (MMSD) project
- Something “New” – a course on Mining and Sustainable Development

Undergraduate Course on Mining and SD

Content

- Course consisted of three parts of about equal length:
 - SD background and its application to mining,
 - Mining regulations (US Federal, State as well as International)
 - Mine waste management (tailings, waste rock, heap leach and water management)
- Scarce resources for first part of course (MMSD, National Indicators for Mineral Systems in the US, few publications)

Undergraduate Course on Mining and SD Changes over Time

- Focus for development of “Environmental Chapter” of final year feasibility study
- More resources became available
- Change in employment from UNR to UBC
- Delivery by video conferencing and other methods
- Maturing of content and delivery

Graduate Course on Mining and SD

Introduction

- Interest from the University of Pittsburgh (UPitt) in 2009 to develop a graduate course with this topic for their Mining Engineering Certificate Program
- Draw on materials from undergraduate course
- Scope changed to delivery of the course by video conferencing
- Included this course also in the UBC curriculum

Graduate Course on Mining and SD

Content and Delivery

- First delivery was mostly from UBC with two invited lectures from Upitt
- Contents of first third of undergraduate course was expanded
- Included a number of lectures focused on coal mining
- Conclusion after first year: delivery of long lectures by video conferencing does not keep the interest of students

Graduate Course on Mining and SD

Changes over Time

- In 2010 Virginia Tech (VT) joined the class and the course has since been taught to 3 classes simultaneously
- The five introductory classes are now based on the lectures available on YouTube
- Regional interests are different, each year the outline is fit to the interests of the students
- Faculty from UPitt and VT deliver lectures or present invited speakers
- Delivery of the course now rely strongly on Team Based Learning

Team Based Learning (TBL)

- Idea developed in late 1970's at the University of Oklahoma business school, driven by class sizes
- Main paradigm shifts of TBL:
 - Students shift from passive to active learners
 - Course goal shifts from student knowledge acquisition to knowledge application
 - Teacher shifts from “sage on stage” to “guide at side”
 - Responsibility for learning shifts from teacher to student

Team Based Learning (TBL)

Design Principles

- Formation of large teams (e.g., 5-7 students), which have diverse and sustained membership throughout the course
- Assurance of student accountability for pre-class preparation and contributions to team successes
- Provision of regular opportunities for students to make complex decisions that require the use of the course concepts and can be reported in simple form to the rest of the class
- Teacher commitment to frequent and timely feedback to students regarding their learning progress and outcomes

Team Based Learning (TBL)

Approach for Course

- Pre-assigned readings/videos
- Quiz at start of the class
- Question or discussion point given to the students; a time limit is set for discussion depending on complexity, sasy 2 to 15 minutes
- Teams are then called upon in a random fashion to provide feedback; due to different backgrounds, interests, local “hot buttons”, etc. the perspectives of the students can be quite different, both in the approach to the question as well as the outcome and comments

Closing Comments

- Development of the Mining and SD courses presented challenges to all the authors with respect to content, delivery, scheduling, coordinating, video linking technology, and others
- Definitely a developing project
- Video conferencing is an effective way of reaching bigger audiences as well as sharing ideas over different geographic and cultural boundaries

