

SELF-AWARENESS

All of the institutions have self-identified the fact that they are resource limited (i.e. limited staff, limited funds, limited facilities) in an age of increasing demand for mining engineers (and associated fields), and that the nature of their respective programs either are, or need to change in order to meet the challenge of matching supply and demand. They also recognize that, to one extent or another, that the nature of how they teach (i.e. how materials are presented to the student) vs. how students learn (i.e. how materials are received by the student) has also changed over the past 20 years, and that many educational institutions are now dealing with a model that is effectively outdated. Lecture/lab, the traditional approach, can be challenging when there are insufficient resources to cover all of the bases. It can be even more difficult, when specific programs 1) lack internal resources with expertise/experience in core disciplines, 2) there is a pervasive shortage of persons within the industry who possess that expertise, and 3) the traditional mechanisms of connecting teachers SME Annual Meeting Feb. 23 - 26, 2014, Salt Lake City, UT 3 Copyright © 2014 by SME and students does not translate well to solving the problem. While they would all like to have experts in all fields as part of each of their respective staff, in today's resource strapped market that is little more than wishful thinking.

Each of their respective programs has seen student enrollment grow significantly over the past few years. CSM and U of A are on track to boast a student enrollment of 150+, and UBC is now over 200. Unfortunately the same cannot be said for the number of faculty nor the amount of funding that they receive to support of the same programs. The numbers of tenure track faculty has steadily declined (in response to the general declining trend of student enrollment in Mining Engineering programs through the 1980's and 1990's). In 1984, The CSM Mining Engineering Department had approximately 125 undergraduate students and 11 state funded tenured faculties (which did not have to do research as part of their tenure track) along with a commensurate contingency of support staff, lecturers etc. CSM now has less than half the tenure positions, and those professors must generate research funding as a requirement of their positions. They have seen their state supported budgets dwindle, and the space allotted to them (in terms of campus facilities) shrink by almost 75%. CSM, like U of A and UBC must supplement with Adjunct, Graduate Students, Professors of Practice and Research Professors, which are typically supported by soft money (which must be raised independently by the Department). The department recognizes that they effectively lack the dedicated facilities to effectively teach the course load. It is a sobering realization.

As indicated above, the longer term problem is not going to be easy to solve. At one count within the past calendar year, there were over a dozen open faculty positions within the US, and 5 institutions were recruiting for a department head. The situation has become so dire that pending PhD candidates who have significant industry experience are being aggressively recruited, even prior to their completion of the dissertation, and (it seems) the only viable means of finding a good candidate is to take them away from someone else. Changes in departmental funding, specifically increases in funding (such as the approval to add a tenure track position or to fill a vacancy) typically requires

legislative approval, and occurs so slowly as to be described as "glacial".

THE WISH LIST

The "survey" consisted of only two basic questions. The first was, "if you were to receive US\$1,000,000 in support of educational programs, how would you spend it?". Dr. Mary Poulton's answer (of The University of Arizona) gave the distinct impression that the topic has been given plenty of prior thought. Not surprisingly, Dr. Hugh Miller's answer (CSM) and Malcolm MacLachlan's answer (UBC) were nearly identical. Dr. Poulton indicated that a "wish list" would include a wide array of items. The composite list included (in no particular order), consisted of the following.

- Scholarships for students*
- Summer Jobs for Students*
- Real Mining Data Sets*
- Coordinated effort in Developing of Targeted Content, and Delivery (such as dedicated courses in the Block Caving Method of Mining - a Rio Tinto speciality)
- Industry Technical Mentors, including Executives in Residence*
- Mining Case Studies*
- Funding for Field trips*
- Funding for Graduate Students (to be used as TAs and graders for undergraduate classes)*
- Funding for General Staffing
- Funding for Professors of Practice (Non-Tenure)
- Laboratory equipment (i.e. Computers, programs, etc.)
- A K-12 outreach program intended to get students in primary and secondary education interested in mining
- Chaired-Endowed Professorship

Surprisingly, the items on each parties list that were designated as the highest early priority were those items that, relatively speaking, required a lesser capital investment and more sweat equity (indicated by *). These institutions, if indicative, are looking for an industry partner, more-so than they are looking for a handout. That should represent a significant green-flag, and an opportunity, to change the way the traditional model works.

THE SECOND QUESTION

The second question was, as an off shoot of the first, "if you were to receive US\$1,000,000 in support of Educational Programs, and, you had to share it with the other two universities, how would you spend it?" The answer was, although not unexpected, pleasing to hear. The predominant theme was to establish or improve the ability to work together via a North American Educational Partnership Network where in the three universities would share scarce resources, content development, and delivery. The only significant changes/additions to the wish list were:

- Distance Learning Equipment (i.e. Audio-Video) for those schools that did not already have that capability (which is CSM)