Vision Project Environmental Geoscience Summer Bridge Workshop

Day 1: History of Lowell and water collection

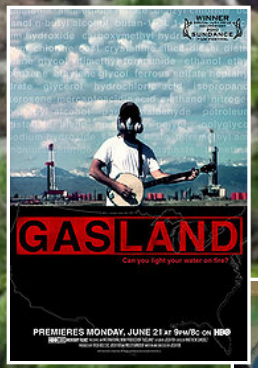
The Massachusetts Board of Higher Education established the Vision Project to address the issues of college completion, workforce alignment and elimination of disparities. UMass Lowell's Summer Bridge workshops specifically address college completion and success.

Over the last several years, many of the students who start as STEM majors do not remain so through to graduation. We believe that this situation originates in part from a significant lack of basic skills. For example, I have found that most of the students choosing to study environmental science have a passion for the subject but lack basic math and computer skills. It is unfortunate that many of these struggling students become disheartened and discontinue their college education all-together.

From May 21, 2012 through May 25, 2012, UMass Lowell hosted four workshops with students from local community colleges as well as several UML sophomores. These workshops were limited to environmental geoscience, chemistry, biotechnology and physics majors and were supported by the Vision Project grant. Each of the workshops was free and included lunch vouchers for the students. The students did not receive any academic credit for the workshops, and were under no financial obligation to attend each day. The groups were small, with nine in environmental geoscience, five in chemistry, ten in physics and eighteen in biotechnology. Of the nine in environmental geoscience, four were UML sophomores and five were from Middlesex Community College. Each day started at 10:00AM and was completed by 4:00PM.

The environmental geoscience workshop was designed to expose the students to different subjects within the major without the stress of exams and homework. On the first day of the workshop we covered the history of Lowell from the Grenville orogeny to the present, including the industrial revolution and the acute effects it had in the Lowell area. This lecture was followed by an afternoon hike along the canal system in Lowell. This hike provided an excellent opportunity to take a few water samples for subsequent examination. The next day, we discussed basic groundwater dynamics, conducted a simple porosity/permeability lab and visited the Tsongas Industrial History Center for a little more Lowell history and an industrial watershed lab exercise. The third day was spent in the lab analyzing the water we had collected on the first day. To test the accuracy of the equipment—and the students' abilities—we first tested bottled water and compared the results to what was reported by the individual bottling companies. The fourth day we used the sieve shaker to analyze the grain size distribution of coarse sand, fine sand and glacial outwash. We took the data and used it for a simple excel tutorial in the afternoon. The last day we watched the documentary "Gasland" and discussed the science of hydraulic fracturing as well as the pros and cons of oil and gas development. The last afternoon we covered geologic maps—specifically the geologic map of Massachusetts—and compared field samples to the descriptions and locations on the map. We conducted a simple GIS exercise and had a guest speaker from UML Career Services discuss our co-op program.

At the start of the workshop the students were asked a series of questions regarding their academic statuses, what they were expecting from the workshop and the number of geoscience classes they had taken up to that point. All of students participated in the workshop with the hopes of becoming a better science student. Two of the students hoped the workshop would help them decide whether or not to pursue a geoscience degree. The number of geoscience classes the students had taken ranged from zero to more than five. I also asked a question about how many hours per week the students worked during the school year. I wanted to address the academic trouble full-time students can face when working more than 15 hours of work per week. Post-workshop evaluations suggest the students enjoyed the experience and felt they gained valuable knowledge during the week's activities. All would recommend the workshop to other students and all felt it was a good use of their time. What remains to be seen is if these students will perform better in the future because of this small helping hand.

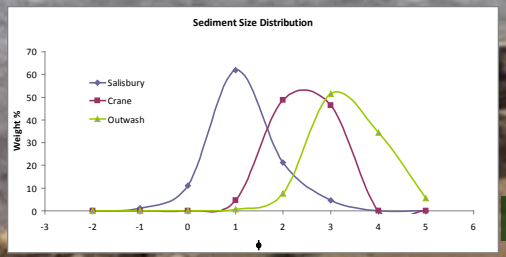


Day 5: Classroom discussion of *Gasland* and hydraulic fracturing, geologic maps and basic GIS

Day 2 Groundwater and Tsongas Industrial History Center

http://mrdata.usgs.gov/geology/state/state.php?state=MA

Day 3: Water chemistry



Day 4: Sediment size distribution and spreadsheet basics