Liberal Arts Essentials  
Course Assessment Report

**Course:** Geol 101 Introduction to Geology  
**Writing Unit:** No  
**Instructor:** Rodland  
**Methods:** Concept Test Question (PRS) & Faculty Evaluation Assessment Tool  
**LAE Category:** Scientific Understanding

**Goal 1:** Muskingum Students will develop skills in perception, analysis and expression.

**Departmental Perspective 2:** Students will develop the ability to analyze questions related to major concepts cover in a field of study

### A. Student Outcomes

<table>
<thead>
<tr>
<th>Learning Objective or Departmental Perspective</th>
<th>Number of Topics exceeding expectations</th>
<th>Number of Topics meeting expectations</th>
<th>Number of Topics failing to meet expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Stream of Evidence</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number and percentage of students exceeding expectations</td>
<td>Number and percentage of students meeting expectations</td>
<td>Number and percentage of students failing to meet expectations</td>
<td></td>
</tr>
<tr>
<td>2nd Stream of Evidence – evaluation(^1)</td>
<td>21 (68%)</td>
<td>8 (26%)</td>
<td>2 (6%)</td>
</tr>
</tbody>
</table>

\(^1\)Not all students completed the LAE Course Assessment Evaluation
B. Student work examined

Summarize the tasks used to measure the objective (e.g., exams, research project/paper assignments, presentation, or class assignment) and attach a copy of each (from Departmental assessment instrument or other source).

The students answered Concept Test Questions using a Personal Response System during lecture. The Concept Test questions are designed to have them analyze a geological concept that relates to the material that is being covered in lecture. One to three questions were embedded in PowerPoint presentations for selected topics covered during the semester. In addition, review sessions held before each exam, using the same technique and questions. The results from the PRS system are recorded in an excel file and were be analyzed at the end of the semester. A total of 51 Concept Test Questions were used during the Spring 2009 semester: 18 from in-class questions and 33 in review sessions.

A second stream of evidence assessed was the administration of an LAE goal assessment tool. This tool was a multiple choice questionnaire asking students whether they strongly agreed, agreed, felt neutral towards, disagreed or strongly disagreed with four statements pertaining to Goal 1 under the LAE.

C. Scoring Criteria

Explain the criteria used to evaluate student performance in relation to the learning objective (i.e., what constitutes advanced, proficient, partially proficient, not proficient, etc.) Attach copies of measurement instrument or rubric (Departmental assessment instrument or other source).

Scores of 5 through 1 were assigned to each question depending on what percentage of students answer the question correctly. Seventy-five percent or more of the students answering correctly will be scored as a 5. Seventy-four to sixty-five percent will be scored a 4, sixty-four to fifty-five percent will be scored a 3, fifty-four to forty-five percent will be scored a 2 and forty-four percent or lower will be scored a 1. A composite score for each topic will be generated and an improvement in composite scores over the course of the semester will be expected.

The results according to the first stream of the LAE assessment were mixed, with 7 topics meeting or exceeding expectations, and 6 topics failing to meet expectations. A table listing results for the individual topics are listed on the following page:
In the absence of specific guidance on the quantitative assessment of results from the LAE questionnaire, I evaluated the results by deriving composite mean scores for each student response to four questions addressing Group 1 goals. Each composite mean score fell between 5 (strongly agree to all questions) and 1 (strongly disagree to all questions), with a mean score of 3.8 for the 31 students who responded.

For each individual response, the perceived success of the course LAE objectives was determined by ranking composite mean scores according to the following rubric: Scores between 5-3.67 were viewed as “exceeding expectations”, scores between 3.66 and 2.33 were deemed as “meeting expectations” and scores falling from 2.33 to 1 were viewed as “failing to meet expectations”. By this standard, over two thirds of the students participating in 2nd stream analysis perceived the class as exceeding expectations for achieving Goal 1 under the LAE, and 94% of the class regarded it as at least a partial success.

Combined scores for the G1cat ranking (where 3=exceeds expectations, 2=meets expectations and 1=failed expectations) for both sections came to a weighted total of 2.6127 for 31 students.

D. Analysis/reflections on the course outcomes

Why do you think students performed as they did in this class? What might be done to improve their performance?

This particular class is difficult to evaluate, as individual performances varied widely during the semester, and grade volatility was unusually high. Typically performance on one exam is a very strong indicator of performance on any other, but this semester
a larger number of students showed radical swings in performance than I have ever seen before. This volatility in performance can be seen in the assessments as well.

Student performance was mixed with several topics failing to meet expectations during the semester. The best performance on assessments was during the second quarter of the semester, in the period between the first and second midterm exams (a portion of the class focusing on rocks and the rock cycle). Exam performance during this period was unusually strong. Perhaps part of the problem comes from a pronounced drop in student effort after that strong start; end of semester performance was unusually weak by comparison. A summary of the LAE assessment is given in the following table:

This course enabled me to …

<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>… arrive at new conclusions by synthesizing information in a new way.</td>
<td>3.81</td>
</tr>
<tr>
<td>… examine information in novel ways to create new understandings.</td>
<td>3.71</td>
</tr>
<tr>
<td>… investigate information and ideas by generalizing or explaining, to arrive at new conclusions.</td>
<td>3.90</td>
</tr>
<tr>
<td>… use information and ideas through hypothesizing to produce new meaning and understandings.</td>
<td>3.87</td>
</tr>
</tbody>
</table>

Students largely perceived the class as fulfilling the LAE Goal 1 objectives, despite apparent deficiencies in some areas of course content. This is not entirely surprising, as the first stream results are targeted at specific topics, rather than providing a general assessment of the four goals stated in the LAE questionnaire. These results are comparable to those of the GEO 110 Environmental Geology course taught by Stephen Van Horn in Fall 2008.

**E. Reflections on the assessment**

**How might the course-embedded assessment process be improved?**

**Ideas for possible revisions of listed learning objective(s) related to the goal are especially welcome.**

In interpreting this data, the first assumption that must be evaluated is whether the assessment technique is being employed in the most effective manner. There are several reasons why this may not be true. Scores are based off of a very small number of questions per topic, and because the questions were taken from a standardized list used for assessment by other instructors, they may have been framed differently from their presentation in lecture.

An additional problem comes from the scoring system. Multiple choice questions with differing numbers of answers may not be directly comparable because of the tendency of students who are unsure of themselves to select the answer that sounds best. With
more options, it becomes less likely for students to select the correct answer by chance. In other words, 2 or 3 option questions will be more prone to ‘pad’ the percentage of correct answers with students guessing than a 4 or 5 option question. In order to get a better feel for the overall class performance, the rank order of answer popularity was evaluated: out of 51 questions, the correct answer was the most popular one on 32 occasions. If interpreted as a meta-success rate, this would fall at the high end of “met expectations” using the department scoring rubric (~64%).

Four of the ‘failed’ topics are based on scores from 1 or 2 questions alone. The difficulties seen in the rock cycle and plate tectonics assessments are difficult to explain, as student performance on these questions in exams and lab exercises are dramatically better. The rock cycle exam review in particular covered topics where expectations were exceeded during in-class lecture assessments. This may reflect how fresh the information was in students minds, and a lack of preparation for the review session assessments. An increasing reliance on review-session assessment towards the end of the semester may explain the apparent decrease in performance.

Time constraints place serious limits on the ability of this technique to accumulate larger amounts of data during the class, at least through in-class assessments. Review session assessments, while providing more data and assisting students with preparation for exams, appear to be more variable. The questions themselves, while standardized for purposes of comparison, vary significantly in difficulty, and may be better as tests of students logic and reasoning than evaluating ‘what students learned’. In that sense, a laboratory based assessment tool might be more effective.

Regarding the second stream assessment: it would be highly useful in the future if composite scores for each student could be provided as part of the overall data analysis, rather than needing to compile these results by hand. Multiple choice response forms lend themselves well to detailed statistical overviews for each question with minimal effort, but without providing a detailed data report, it is impossible to evaluate these results fully without tabulating results by hand, and duplicating work unnecessarily. In addition, the lack of detailed and specific guidance on the tabulation of the second stream results handicapped and delayed this final report. By detailing the analysis performed here, I hope that future assessment analyses can be simplified and ensure consistency of reporting across different disciplines.