LAS Embedded Assessment Action Report For Program Review

Degree Program(s): _____B.A./B.S. Earth Science + LACC Lab Science Course___
(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: ____ES203 Historical Geology_____

Faculty name: _____Dr. Jeff Myers_____

Date: _____Spring Term 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Use a liberal arts approach to solving problems requiring an interdisciplinary scientific knowledge (from the Earth Science mission statement).
- Aquire a comprehensive understanding of the interrelated physical, chemical, and biological processes operating in the Earth system (from Earth Science learning outcomes)

B) Check the embedded assessment tool(s) used :

XX Exam question
☐ Essay
☐ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

I use multiple quizzes in each course I teach, and because these quizzes require the synthesis of diverse information from a range of scientific disciplines, it is possible to measure a student's developing understanding of some critical aspects of the ES program mission and learning outcomes. I have designed at least one question, and often several questions, per quiz to be comparable between courses. Examples of questions include some I use in Historical geology: (1) Briefly explain INDIRECT evidence from rocks of the Isua sequence that suggests that life was present on earth 3.8 Ga; (2) Was the Cretaceous bolide impact responsible for changing global climate and killing off the ammonites and dinosaurs? Make a TIMELINE with explanations below to argue your case and briefly explain your conclusion. Be creative!

These types of questions measure a student's ability to synthesize data from diverse disciplines, with increasing rigor through the quarter. Results can easily be evaluated using a scoring rubric.

I have found that open ended exploratory questions are the mose effective tools for measuring student understanding of interdisciplinary scientific concepts.

LAS Embedded Assessment Action Report For Program Review

Degree Program(s): _____B.A./B.S. Earth Science_____

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: ____ES407 Senior Seminar_____

Faculty name: _____Dr. Steve Taylor_____

Date: _____Spring Term 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Understanding of physical processes operating in the Earth system.
- Understanding of chemical processes operating in the Earth system.
- Understanding of biological process operating in the Earth system.
- Understanding of interrelated nature of the Earth system.
- Student engagement of inquiry-based science.
- Application of the scientific method; including ability to define problems, make observations, present data, and develop interpretations.

B) Check the embedded assessment tool(s) used :

☐ Exam question
☐ Essay
XX☐ Oral/Multi-Media presentation Multi-media presentations of journal articles
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

To assess the above-stated program outcomes, the activity involved each student selecting 3 peer-reviewed, recently published scientific papers on a wide range of topics related to Earth surface processes and integrated watershed functions with a focus on physical, chemical, and biological parameters. Students were required to read their papers, construct extended outlines, and then prepare a 30-minute multi-media presentation on the topic in a format typically engaged at professional scientific meetings. Through this process, students were required to read and comprehend high-level scientific journal articles, assimilate data, understand quantitative methods and statistical analyses, encounter scientific vocabulary, and synthesize information by presenting it to their peers in a formal seminar setting.

LAS Embedded Assessment Action Report For Program Review

Degree Program(s): _____B.A./B.S. Earth Science_____

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: ____ES407 Senior Seminar_____

Faculty name: _____Dr. Steve Taylor_____

Date: _____Spring Term 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Understanding of physical processes operating in the Earth system.
- Understanding of chemical processes operating in the Earth system.
- Understanding of biological process operating in the Earth system.
- Understanding of interrelated nature of the Earth system.
- Application of the scientific method; including ability to define problems, make observations, present data, and develop interpretations.

B) Check the embedded assessment tool(s) used :

☐ Exam question
☐ Essay
☐ Oral/Multi-Media presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
XX☐ Other _____Web-based Exit Exam_____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

To assess the above-stated program outcomes, the activity involved each student taking a web-based exit exam that is under development by Dr. Taylor in the Earth Science program. The web-based exit exam for Earth Science uses the WebCT software environment. Over 1500 keyed questions have been entered into a database, derived from published GRE Geology practice exam manuals from the 1990's and from more recent introductory Earth Science test banks. A pilot version of the exam was administered to four students in ES407 during spring term 2008. The online exam environment is approximately 60% complete, but the database is still under construction. Robust statistical methods also need to be further developed. The next iteration of the exam will be administered in spring 2009, with the goal of full implementation at that time. The objective of the exit exam will be to measure minimum competency of graduating seniors in approximately 6 specialty sub-disciplines from the undergraduate Earth Science program, as tied to program outcomes. In the final rendition, each question will be related statistically to a sub-discipline area and an explicit program outcome. In sum, this is still a work in progress, and a large time sink, however full implementation is targeted for use with the senior seminar class of spring 2009.

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Degree Program(s): _____B.A./B.S. Earth Science_____

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: ____ES407 Senior Seminar_____

Faculty name: _____Dr. Steve Taylor_____

Date: _____Spring Term 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Understanding of physical processes operating in the Earth system.
- Understanding of chemical processes operating in the Earth system.
- Understanding of biological process operating in the Earth system.
- Understanding of interrelated nature of the Earth system.
- Student engagement of inquiry-based science.
- Application of the scientific method; including ability to define problems, make observations, present data, and develop interpretations.

B) Check the embedded assessment tool(s) used :

☐ Exam question
☐ Essay
☐ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning

XXCapstone project Willamette Basin project presentation at Academic Exc. Showcase

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

ES407 students partnered with the ES473/573 class and participated in a threaded theme session entitled: "Earth Science in Context: Land Use and Watershed Function in the Willamette Basin". The theme session was comprised of subcomponents including Physiographic Setting, Climate History, Geologic Framework, Hydrology, Landuse, Natural Hazards, Effects of Timber Harvest, and River Alteration. Each student was assigned two published journal articles or reports in their assigned subtopic. Participants were required to read their papers, construct extended outlines, write abstracts, and then prepare a poster presentation on the topic in a format typically engaged at professional scientific meetings. Through this process, students were required to read and comprehend high-level scientific journal articles, assimilate data, understand quantitative methods and statistical analyses, encounter scientific vocabulary, and synthesize information by presenting it to their peers in a formal conference setting. After the conference, students provided 10-minute oral summaries of their posters to their peers, then were provided an opportunity to share notes and concepts for use in studying for the linked final exam.

LAS Embedded Assessment Action Report for Program Review

Degree Program: BS Earth Science; Minors in Earth Resources, Earth System Science, Geology

Course # / Title: ES 454 / Volcanology

Activity: Bend Pumice-Tumalo Tuff Field and Laboratory Research Project/Writing Assignment

Faculty name: Jeffrey Templeton

Date: Spring 2008

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

1. Acquire a comprehensive understanding of the interrelated physical, chemical, and biological processes operating in the Earth system.
   Outcome not being assessed by this embedded assessment strategy.
2. Develop proficiency in using technology-enriched analytical techniques to solve geologic problems.
   a. *Rate degree to which technology-enriched analytical techniques are used to solve given geologic problem*
   b. *Use of technology-enriched analytical techniques is appropriate to solve given geologic problem*
   c. *Student demonstrates proficiency / competence in applying technology-enriched analytical techniques to solve a given geologic problem.*
3. Gain experience in conducting inquiry-based science in the context of outdoor adventure.
   a. *Rate degree to which student was engaged in inquiry-based science.*
   b. *Rate degree to which student engaged science in field setting.*
   c. *Student demonstrates skills in applying the scientific method, including ability to define problem, present relevant observations and data, and develop interpretations based on these observations and data.*

B) Check the embedded assessment tool(s) used:

X Capstone paper / project

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

ES 454/554 Volcanology

Bend Pumice/Tumalo Tuff Writing Assignment (Part 3)

Due: Wed., June 11 by NOON

Worth 20 points towards Exercises/Assignments/Field Trip Project part of grade.

Each student in the class will prepare a short paper (3-5 pages of text) focusing on the research we have been conducting on the Bend Pumice/Tumalo Tuff section studied as part of the field trip. A couple of points to consider: (1) be sure to separate observations and data from interpretations, and (2) the use of photographs, figures, maps, graphs, and tables is strongly encouraged (figures must be specifically relevant to the paper and cited in text).

The paper should:

i. briefly introduce project
ii. provide a concise description of the Bend Pumice/Tumalo Tuff section (provide well drafted copy of measured section)
iii. highlight the pertinent field observations
iv. present and discuss the granulometric analysis data (provide relevant graphs and data)
v. provide an interpretation of the origin of the different units of the Bend Pumice/Tumalo Tuff exposure based on the field observations and granulometric data
vi. summarize study and discuss hazard implications
vii. cite references

LAS Embedded Assessment Action Report for Program Review

Degree Program: BS Earth Science; Minors in Earth Resources, Earth System Science, Geology

Course: ES 454 – Volcanology

Activity: Volcano Research Project – Poster Presentation at Academic Excellence Showcase

Faculty name: Jeffrey Templeton

Date: Spring 2008

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

1. Acquire a comprehensive understanding of the interrelated physical, chemical, and biological processes operating in the Earth system.
   a. *Content displays understanding of physical processes operating in the Earth system*
   b. *Content displays understanding of chemical processes operating in the Earth system*
   c. *Content displays understanding of interrelated nature of the Earth system*
2. Develop proficiency in using technology-enriched analytical techniques to solve geologic problems.
   a. *Rate degree to which technology-enriched analytical techniques are used to solve given geologic problem*
   b. *Use of technology-enriched analytical techniques is appropriate to solve given geologic problem*
   c. *Student demonstrates proficiency / competence in applying technology-enriched analytical techniques to solve a given geologic problem.*
3. Gain experience in conducting inquiry-based science in the context of outdoor adventure.
   Outcome not being assessed by this embedded assessment strategy.

B) Check the embedded assessment tool(s) used:

X Poster presentations at Academic Excellence Showcase, Spring 2008

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

ES 454/554: Volcano Research Project

For the term project, you will conduct research on a topic associated with a specific volcano and prepare a poster based on your research. The posters are due on **Thursday, May 29** and will be displayed as part of the Academic Excellence Showcase. Abstracts for the Showecase are **due Monday, April 28.** You will be required to display your poster at the scheduled session on that day. (Exact time will be determined, but probably in the afternoon from 1:30-3:30.) No late posters will be accepted – **no exceptions**, including computer/printing problems! I will collect your posters after the poster session on that day.

I expect your poster to be informative, artfully designed, and suitable for public display. I will evaluate your work based on your ability to convey the information in a poster format (i.e., graphically AND with text), the originality and creativity of your work, how well researched the topic is, and the completeness and thoroughness in covering the material outlined below. Be sure you cover the specific topic for your volcano in sufficient detail for a 400-level science class.

INTRODUCTION

Provide a brief overview of the poster. Introduction should hook the viewer and get them excited about the topic. Also, discuss relevance of your volcano and topic to science of volcanology.

OVERVIEW OF VOLCANO

Location: Geologic and plate tectonic setting

Provide an overview of the Geologic and Plate Tectonic setting in which the volcano occurs. (Consult the Earth's Fractured Surface map)

Eruptive history, Products of volcano, and Modes of eruption

Briefly Summarize the eruptive history of the volcano (i.e., <u>when</u> has it erupted). This will most likely be based on geological studies of the volcano and possibly historical records.

Provide information on the composition of the volcano, types of rocks, and the types of deposits produced (i.e., <u>what</u> does it erupt? e.g., pyroclastic flows, lava flows). Given this information, describe how volcano erupts (i.e., modes of eruption)

DISCUSSION

This section should cover, in detail, the specific aspect of your volcano and/or volcanic eruption, as provided on the "List of Volcano Research Topics" sheet. I will expect you to conduct research on your topic and present the results of this research in this section of the poster.

CONCLUSIONS

Present your own interpretations and ideas about the volcano. Also, conclusion should convey the significance of your volcano to the growth and development of science of volcanology.

REFERENCES CITED

You should use at least <u>three</u> different sources of information (besides your textbook) to prepare your poster. I will be evaluating your research in terms of how thorough and complete it is for the given topic and will give higher scores to students who use peer-reviewed scientific literature rather than non-peer reviewed web resources. Make sure to cite the pertinent references within the body of the poster, where applicable, and provide a reference list.

Poster Information:

Your poster should include all of the materials described above and the components below. Poster size will be a maximum of 36" x 48", although the size will probably be 32" x 40". The Earth Science program has a color plotter, which is ideal for printing large-sized posters. I would strongly encourage you to do your posters in PowerPoint and plot them. I have a template available to get your started, which you can get by emailing me and requesting the template. You should plan an adequate amount of time to plot your poster. You must plot the poster PRIOR to May 29, and time will be limited on May 28. *The recommended time for plotting is sometime during the 8th week of the term.* A sign-up sheet will be provided.

Necessary Components:

Required: Title; Student Name; at least three references

Introduction

Does it spark interest and draw viewer in.

Content

Substantial and Informative

Excellent coverage of all materials described above

Well researched, references cited

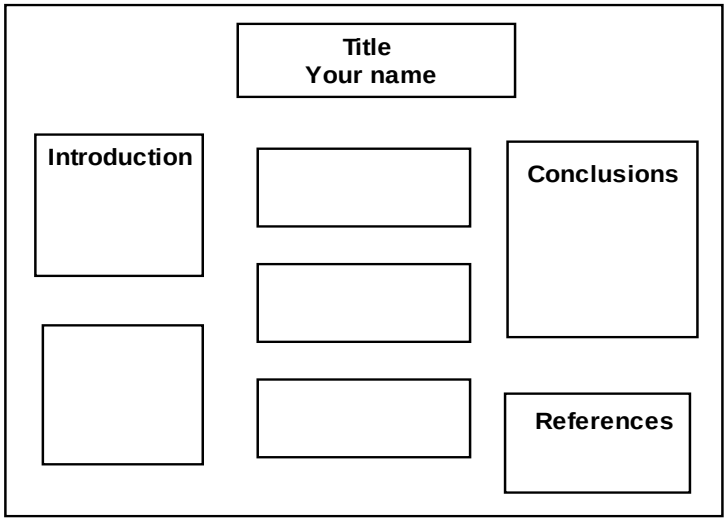
Presentation

Graphical and diagrammatic; artfully designed

Text and figure captions are provided to tell viewer what they should be observing

Good flow and organization

Sample Layout (Please use this as a guide only, be creative!)



LAS Embedded Assessment Action Report For Program Review

Degree Program(s): _____B.A./B.S. Earth Science_____

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: ____ES473/573 Environmental Geology_____

Faculty name: _____Dr. Steve Taylor_____

Date: _____Spring Term 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Understanding of physical processes operating in the Earth system.
- Understanding of chemical processes operating in the Earth system.
- Understanding of biological process operating in the Earth system.
- Understanding of interrelated nature of the Earth system.
- Student engagement of inquiry-based science.
- Application of the scientific method; including ability to define problems, make observations, present data, and develop interpretations.

B) Check the embedded assessment tool(s) used :

☐ Exam question
☐ Essay
☐ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
XXCapstone project Willamette Basin project presentation at Academic Exc. Showcase
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

ES473/573 students partnered with the ES407 class and participated in a threaded theme session entitled: "Earth Science in Context: Land Use and Watershed Function in the Willamette Basin". The theme session was comprised of subcomponents including Physiographic Setting, Climate History, Geologic Framework, Hydrology, Landuse, Natural Hazards, Effects of Timber Harvest, and River Alteration. Each student was assigned two published journal articles or reports in their assigned subtopic. Participants were required to read their papers, construct extended outlines, write abstracts, and then prepare a poster presentation on the topic in a format typically engaged at professional scientific meetings. Through this process, students were required to read and comprehend high-level scientific journal articles, assimilate data, understand quantitative methods and statistical analyses, encounter scientific vocabulary, and synthesize information by presenting it to their peers in a formal conference setting. After the conference, students provided 10-minute oral summaries of their posters to their peers, then were provided an opportunity to share notes and concepts for use in studying for the linked final exam.

LAS Embedded Assessment Action Report For Program Review

Degree Program(s): _____B.A./B.S. Earth Science_____

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: ____ES473/573 Environmental Geology_____

Faculty name: _____Dr. Steve Taylor_____

Date: _____Spring Term 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Understanding of physical processes operating in the Earth system.
- Understanding of chemical processes operating in the Earth system.
- Understanding of interrelated nature of the Earth system.
- Develop proficiency in using technology-enriched analytical techniques to solve geologic problems
- Student engagement of inquiry-based science.
- Student engagement of science in a field setting.
- Application of the scientific method; including ability to define problems, make observations, present data, and develop interpretations.

B) Check the embedded assessment tool(s) used :

☐ Exam question
☐ Essay
☐ Oral presentation
☐ Thesis
XX☐ Portfolios Lab exercise portfolio with writing work samples
☐ Practicum / Service Learning
☐ Capstone project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

ES473/573 students were required to work on a variety of inquiry-based, technology-enriched, laboratory exercises throughout the term. In addition to in-class assignments, students participated in several field trips related to environmental geology (e.g. water filtration plant, landfill, highway construction site, etc.). Each field trip and reading assignment was associated with a 500-800 word summary to enhance the writing skills of students. Summaries included: (1) Introduction to the Problem / Issue, (2) Summary of Main Points, (3) Final Discussion of the Relevance of the Presentation / Field Trip to Environmental Issues in the State of Oregon, (4) References Cited, and (5) pertinent figures and tables. Lab exercises and writing assignments were compiled into professional portfolios that could later serve as work samples which students are encouraged to use for employment-related interviews.

LAS Embedded Assessment Action Report For Program Review

Degree Program(s): _____B.A./B.S. Earth Science_____

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: ____ES473/573 Environmental Geology_____

Faculty name: _____Dr. Steve Taylor_____

Date: _____Spring Term 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Understanding of physical processes operating in the Earth system.
- Understanding of chemical processes operating in the Earth system.
- Understanding of biological process operating in the Earth system.
- Understanding of interrelated nature of the Earth system.
- Application of the scientific method; including ability to define problems, make observations, present data, and develop interpretations.

B) Check the embedded assessment tool(s) used :

XX☐ Exam question Final exam question focusing on integrated watershed functions

☐ Essay
☐ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

An embedded assessment question was presented on the final exam to assess student understanding of integrated concepts of physical, chemical, and biological processes operating at the Earth's surface. The question was framed in the context of watershed function and linked to the Academic Showcase project presentations. The question was stated as follows: "Summarize your understanding of the interrelated physical, chemical, and biological processes operating in the Willamette Basin subsystem. Frame your answer in the context of the ES473/573Academic Showcase Poster project entitled: "Earth Science in Context: Land Use and Watershed Function in the Willamette Basin". In the order presented, address the following components: (A) regional tectonic setting of the Willamette Basin (include a sketch map of the plates, the type of tectonic system, and the key tectonic and physiographic components of the landscape), (B) the environmental and anthropogenic setting of the Willamette Basin (land-use activities and their distribution throughout the valley), (C) the relationship between regional climate and vegetation distributed from west to east across the basin (relate this answer to the tectonic-physiographic setting discussed in A above), and (D) the geomorphic and ecological effects of human-induced disturbance to the landscape via timber harvesting. forest-road construction, and floodplain alteration (i.e. discuss how human activities influence sedimentation and vegetation patterns in the watershed system)"