

Examination of Students' Products as a way of Assessing Learning Outcomes: The IPFW Showcase



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Abstract



Public colleges and universities are required to justify every dollar spent in the education of students; especially in the present economic and political climate. We can demonstrate that 'their' money is being well spent by assessing student learning outcomes through research projects, presentations, and publications. At IPFW, undergraduates either work with professors as part of their research teams or independently on research projects. A part of the IPFW Geosciences Department's mission is to "provide rigorous undergraduate education... preparing them for success in private or academic pursuits once they leave our program." Our Program Learning Objectives (PLOs), aligned with the IPFW baccalaureate framework, are presented below along with selected student research projects. The selected student research projects showcase what students learn in and from our program. Eight students gave presentations in conferences (Branson, MO. Columbus, OH, & Pittsburgh, PA) in the 2010/2011 academic year.

Background Information:

Public colleges and universities are required to justify every dollar spent in the education of students especially in the present economic and political climate. It's important that we are able to demonstrate to our constituents what students learn in and from our programs by assessing learning outcomes. The state of Texas and some other states are currently questioning the efficiency of their education systems. Do we as professors and as departments have any obligations to politicians who control the purse strings? How can we demonstrate that 'their' money is being well spent?

Mission Statement:

"...to provide a rigorous undergraduate education for our students, preparing them for success in private or academic pursuits once they leave our program...The collective goal of the department is to provide support to encourage a broad understanding of geosciences... with the hope of generating excitement within our ... students in order to perpetuate that excitement in the general public as well. We demonstrate our commitment to our community and alumni by providing outreach ...support in educational and private enterprises."

Approach:

Students are required to undertake research projects in some of the upper level courses. We developed Program Learning Objectives (PLOs) for our program. Student research projects are one way of assessing student learning in our program. Selected students' projects are listed under sample student research projects.



A wind of change is in the air as depicted by the two IPFW 1997 (l) & 2011(r) images.

Baccalaureate Framework

Acquisition of Knowledge: Students will demonstrate breadth of knowledge across disciplines and depth of knowledge in their chosen discipline. In order to do so, students must demonstrate the requisite information seeking skills and technological competencies.



Application of Knowledge: Students will demonstrate the ability to integrate and apply that knowledge, and in so doing, demonstrate the skills necessary for life-long learning.



Personal and Professional Values: Students will demonstrate the highest levels of personal integrity and professional ethics.



A Sense of Community: Students will demonstrate the knowledge and skills necessary to be productive and responsible citizens and leaders in local, regional, national, and international communities. In so doing, students will demonstrate a commitment to free and open inquiry and mutual respect across multiple cultures and perspectives.

Critical Thinking and Problem Solving: Students will demonstrate facility and adaptability in their approach to problem solving. In so doing, students will demonstrate critical thinking abilities and familiarity with quantitative and qualitative reasoning.

Communication: Students will demonstrate the written, oral, and multimedia skills necessary to communicate effectively in diverse settings.



Well field at IPFW used by students

Program Learning Objectives (PLOs)

Students will:

- acquire map reading skills (PLO #7)
- use vocabulary relevant to the field of geology (PLO #1)
- review and evaluate geologic research (PLO #2)
- write technical reports (PLO #6)
- acquire central core of geological knowledge (PLO #1)



Students will:

- make independent observations and draw independent conclusions in laboratory and field exercises, integrate disparate observations with geologic theories, and utilize information from published literature (PLOs #2 & 3)
- apply appropriate mathematical solutions to quantifiable problems (PLOs #5 & 7)
- draw inferences about geological phenomena not encountered in course work (PLO #6)
- demonstrate proficiency in ancillary sciences applied to geology (PLO #4)



Students will:

- cite works done by others using the appropriate format (PLO #6)



Students will:

- synthesize and integrate interconnectedness among geological sub-disciplines (PLO #3)



Students will:

- develop hypotheses and draw inferences about geologic phenomena not covered in course work (PLO #6)
- develop and apply multiple working hypotheses to geologic problems (PLOs #9 & 10)



Students will:

- read and write technical reports
- give oral reports (PLOs #8 & 10)



PLOs for IPFW Geo majors

Students upon graduation should:

1. Acquire central core of geological knowledge
2. Review and evaluate geologic research (advanced specialties)
3. Synthesize and integrate interconnectedness among geological sub-disciplines
4. Demonstrate proficiency in ancillary sciences applied to geology
5. Apply appropriate mathematical solutions to quantifiable problems
6. Draw inferences about geological phenomena not encountered in course work
7. Demonstrate ability to solve quantifiable complex field problems
8. Read, write, and give oral presentation of technical papers
9. Develop and apply multiple working hypotheses to geologic problems
10. Be prepared for advanced study in graduate school or for employment in technical and non-technical fields, possibly as a professional geologist

Samples of Students' Research Projects:

Modeling Glacial Till
Time Series Analysis of water levels
Anthropogenic effect on nearby wetland
Pesticides pollution within St. Joseph Watershed
Effects of quarry operations on landfill hydrogeology
Relationship between Bowman lake and groundwater
Water quality assessment of a Mid-West city water distribution system
Using Fine Scale Sequence Stratigraphic Correlations to Decode Sedimentary Facies in the Cincinnati, Maysvillian Stage
Stop clinging! -How the Ordovician brachiopod (aka Platystrophia) Vinlandostrophia ponderosa outgrew its mid-life attachment crisis



Result:

Graduating students meet all ten PLOs listed above. Assessing undergraduate research results that are in alignment with PLOs measure what students learn in and from our program.

Conclusions:

Students learn when doing research. We can assess Program learning outcomes using students research projects. Align undergraduates research with your program learning objectives.

Acknowledgment:

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References:

IPFW Department of Geosciences Self-Study program review (2011)
IPFW published student research projects

<http://users.ipfw.edu/isiorho/>

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