Geoscience Service-Learning Literature Themes

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Process

• Synthesize available resources
• NAS documents
• SERC examples
• Campus compact examples
• GSA abstracts
• Start of the conversation
What types of service-learning activities are currently being implemented?

- Problem-based learning
- Real-world problem solving
- Career relevant skills
- “Classic” service-learning
- Not necessarily called “service-learning”

http://yrno.com/volunteer-work-new-orleans/service-learning/
What types of service-learning activities are currently being implemented?

- Geology:
  - Hydrology/Water Quality
  - Soils
- Atmospheric Sciences:
  - Climate Change
- Oceans:
  - Water Quality
- Polar
  - Outreach

http://visibleearth.nasa.gov/view_detail.php?id=2429
http://veimages.gsfc.nasa.gov//2429/globe_east_540.jpg
Themes

- Interdisciplinary
- Applied research
- Sustainability
Level

- Introductory Level
  - Classes Documented

- Advanced Level
  - Research Outreach

- Classic Service-Learning
  - Part of service-learning programs

- Themes
  - Liberal Arts Schools Document
  - Outreach theme
Assessment

- Service-learning increases student engagement with the material
- Students gain skills
  - Technical skills
  - Job skills
  - Communication
  - Collaboration
  - Change agent skills
- Partner & Community Outcomes

Source: http://www.supportbay.com/assessment
Examples of Undergraduate Geoscience Teaching

Reducing pressure on a wastewater treatment plant to accelerate remediation of a polluted harbor.

http://serc.carleton.edu/NAGTWorkshops/servicelearning/activities/39020.html

Geology, hydrology/water quality

Teaching Service Learning in the Geosciences
Topical Resources

Arsenic on Main St., Unity ME
Lois Ongley, Unity College, Unity, ME

Summary

The ultimate plan is organizing a "Water Quality Fair" for residents of the Unity, ME area (rural farming region) in which students would analyze water samples brought into the community center (although we might end up having to pay for samples). This will help identify common water quality issues (hardness, iron, arsenic, sulfur, and pesticides). At this fair, there will be also present water labs, water remediation options, and some interesting water activities. I hope to do this in Spring 2011.

As a pilot project, students taking analytical chemistry will analyze water samples contributed by employees of any local business. The data collected will help determine the arsenic concentration and hardness during the last 2 weeks of April, 2010.

In every case, various data about the water source will be recorded to begin assembling a water quality database for the state. Products may include student-designed brochures about water quality, lessons for K12 students developed by local teachers, any other good ideas students come up with. This project is expected to "feed" student/faculty research, leading to additional undergraduate theses, a publishable body of scientific work, and possibly samples sites for seasonal or long-term water monitoring.
Example: Water

Great Lakes Innovation Stewardship Through Education Network (GLISTEN) provides STEM students with service-learning experiences (e.g., research & restoration activities related to the Great Lakes on their campuses, partner clusters support students in 8 states).

(i.e. Argyilan, E. P., 2012, GSA)
Example: Water

- NSF funded REU conducts work on reservation
- Projects developed in collaboration with tribal environmental managers
- Increasing participation of historically underrepresented students (approximately half would not otherwise participate in research-estimated)

https://reuslawr.wordpress.com/about/

**Partners**
- Fond du Lac Band of Lake Superior Chippewa
- National Science Foundation
- National Center for Earth-surface Dynamics
- Healthy Cities Network, Humphrey School of Public Affairs
- St. Anthony Falls Laboratory
- Salish Kootenai College
- University of Minnesota, Twin Cities and Duluth Campuses
Examples: Soils

- Investigating contaminant transport and environmental justice issues in a local watershed through service-learning projects with Sierra Club.
  
  *Instructor: Jennifer Houghton, Rhodes University*

- Monitoring Lead in an Urban Community Garden,
  
  *Instructor: Jennifer Latimer, Indiana State University*

**News Releases (2013-2016):**

*WTHITV, Indiana State University Communication*

‘Geologists study lead levels in Terre Haute’ ‘Get the lead out: testing by students, faculty, aimed at keeping kids safe’
Example: Oceanography

- Marine Environmental Geology, Bowdoin
- Problem-based water quality project in Casco Bay
- Collect & analyze data
- Work with & present findings to partners

Instructors: Ed Laine, Cathryn Field
Examples: Atmospheric Science

- Campus Greenhouse Gas Emissions Inventory, Climate Action Plan
  
  *Instructors: Suzanne Savanick Hansen & Chris Wells, Macalester College*

- Local Solutions to Global Climate Change: locally-relevant climate modules created collaboratively with local experts and informal science experts

  *Instructor: Sarah Fortner, Wittenberg University*
Example Student Outcome, increased relevance:
Paired responses from 44 students that resulted in significant attitudinal shifts

Are climate and energy issues important to many fields?
5= Important to all or almost all sectors
4= Important to most sectors
3= Important to some sectors

Example Partner Outcomes:
• 2 students became interns with local experts following this course
• 2 students hosted additional events with local experts
• Literacy modules were used again at other public events
• Science museum partners converted to a for-profit model with larger universities to train science graduate students in communication
Juneau Icefield Research Program (JIRP)

- Summary: Juneau Icefield Research Program (JIRP) students share their glacier in a public blog. JIRP also has a long history of having students present research to the Atlin, B.C. community at the end of the research expeditions. This community has a vested interest in the glaciers near them.

*Principle education-outreach instructor: Kristin Timm*
Program Level Example

Wittenberg University Geology & Environmental Science
- Emphasis on community-based research across the curriculum
- 6 faculty, frequent co-teaching, 20+ partners

Student Outcomes:
- Gains in research experience (CURE, RISC, Inquiry & Analysis VALUE Rubric)
- Students intern for partners they worked with in class
- Student gains increased access to resources, land, & instruments for research
- Reflection essays suggest that relevance of topics is clear; several have gone on to similar careers as the partners we work with

Partner & Community Outcomes:
- Increased publicity/awareness
- Better environmental decision making & management
- Increased watershed restoration & recreation (e.g. new wetland area, lowhead dam removal, & monitoring of reservoir releases for tourism, public land evaluation)
- Shared programming with faculty, students, & other partners

Faculty Outcomes:
- Educative gains from partnering inform teaching & scholarship (new knowledge) (Fortner, et al., 2015, GSA)
Information goes in 2 directions
From partners to students &
students to partners

Photos from Amber Burgett, Wittenberg
Service is highly valued as an institutional marketing tool.

Students are compassionate change agents.

But there is little evidence that it is valued in institutional reward structures.
19 S&T undergraduates to exhibit research to state legislators

Undergraduates from Missouri University of Science and Technology will travel to Jefferson City to exhibit their latest research projects to the state’s top legislators Tuesday, March 15.

By Staff Reports

Posted Mar. 13, 2016 at 4:07 PM

Undergraduates from Mö exhibit their latest resena

Amid urban jungle, Penn has partnered with West Phila. to build community farm

By CHARLOTTE LARACY • 04/07/16 3:43 am

SHARE THIS: About a five to 10 minute ride on the 36 trolley from Penn’s campus will get you to a secret garden of Philadelphia’s West Philadelphia. Credit: Charlotte Laracy
Vacant lot lead testing,
DePaul University

Mineral resource partnership with SGS,
University of Regina
Interdisciplinary minors energize learning and enhance job prospects

By Jessica Wolf, UCLA
Tuesday, March 8, 2016

A growing list of interdisciplinary minors is attracting students who seek to broaden their post-graduation prospects and interact with peers in different areas of study.

“I’m clearly seeing how beneficial the entrepreneurship minor is to my future career prospects,” said Veronica Chan, a fourth-year who is double-majoring in both architecture and design media

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Dean Moosavi’s partnership on the Gulf of Mexico expands
The institutional reward structure may not favor service-learning.

Figure 2.

a) Traditionally disciplinary activities

b) Interdisciplinary activities

Red = institutionally rewarded
Grey = unrewarded

Goring et al., 2014
Yet we’re becoming more interdisciplinary & need applied problem-solving
Service-Learning in the Geosciences

Summary

• Increases student engagement with the material
• May not be called service-learning
• Common areas
  • Water
  • Climate
  • Soils
• Students gain skills
• Interdisciplinary, real-world projects

http://visibleearth.nasa.gov/view_detail.php?id=2429
http://veimages.gsfc.nasa.gov/2429/globe_east_540.jpg
The rest of the slides are graphics that could be used.

The discussion will ask people to identify common & unique elements for service-learning by:

- Discipline
- Institution type
- Nature of students

The talk & paper primarily cover the first so maybe this gap is the last slide?
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Source: http://www.supportbay.com/assessments/