Undergraduate Research: Of What Benefit?

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What some have speculated
The underground world of Jules Verne is one where time stopped and where the existence of giants, dinosaurs, mammoths, giant mushroom forests, and forgotten civilizations are found.

Jules Verne (1864)

Professor Lindenbrook leads an expedition to the center of the Earth via a volcano in Iceland.
Earth $V_p$ profile with minerals
Resonant Ultrasound Spectroscopy (RUS)

- Transducers
- Specimen
- Ultrasonic input

Resonant spectrum

+ Density, Edge Lengths

Inverse theory

Elastic Properties

Wave Velocities
Room Temperature

High Temperature

Al₂O₃
Diopside – monoclinic, single-crystal
Wadsleyite – polycrystal
**Approach to Undergraduate Research**

- Faculty controlled
- Plug in and learn
- Need product
- Exposure to the ‘big outdoors’
- UCLA connection

**Tasks for Undergraduate Researchers**

- Sample preparation
- Spectral data acquisition
- Data analysis – cataloging resonance frequencies
- Data reduction – elasticity from resonance spectra
Questions for UG research students

1. In what way did your research experience enhance your UG education?

2. Were there lasting benefits from your research experience?

3. How might UG students not involved in research be affected in studying at a university where faculty and students did research?

4. What might be some negatives associated with UG research experience?
1. Benefit of research to UG education?

- Connections between classroom and real world *
  “Studying electronics in the classroom after experience with analog amplifiers and piezo transducers lends credence to (the classroom). Seeing linear algebra used to analyze data produced in the lab gives context to the study of matrices in the classroom. Time after time classroom concepts that would otherwise have only a vague connection to reality (for a physics undergrad!) are given an anchor to the material world by seeing them utilized in the lab setting.”

- Preparation for future jobs by working in real labs*

- Involved in greater academic community – national meetings, publishing papers, discussing with others interested in results

- Enhances general education with a specialty – enjoy the learning process

- Develop technical and research skills

- Networking opportunities

- Summer employment
2. Lasting benefits from research experience?

- Helpful for applications to graduate school and employment
- Skills (general and specific) learned directly used in jobs
- Tight student-faculty connection useful with letters of recommendation
- Develops problem-solving skills
- Helps shape world view and approach to life

(Motivates high school students in underprivileged setting by referring to her UG research experience)
3. Affect on other students at APU?

- Sense respect for APU from those at other institutions
- Feel proud of APU – does what other prestigious institutions do
4. Negatives?

- Inflated expectations
- Time competition with coursework
- Prospect of erroneous data if inadequate supervision
- ‘Grunt’ work; Overworked and underpaid for tedious tasks
- Initial perception – boring and tedious (proved inaccurate)
Conclusions

Student perspectives of their undergraduate research experience

• UG research very positive experience

• Multiple and lasting benefits - even though research path not pursued after graduation

• Perceived as important to institutional reputation