Council on Undergraduate Research &
the National Science Foundation- EPSCoR Education, Outreach &
Diversity Council

Virtual Undergraduate Research in Action- Highlights and How Tos
Today’s Presenters

• Kymberly Harris, Georgia Southern University
• Jeffrey Ryan, University of South Florida
• Matt Pavlina, Embry-Riddle Aeronautical University
• Jennifer Grewe, Utah State University
• Crissa Levin, Utah State University
Undergraduate Research in the Online Environment

Kymberly Harris, PhD
Georgia Southern University
Whether you are working with one student or a large group, it is important that a sense of community is developed, before any real engagement can occur.
A sense of community in the online environment with students conducting research can be created by offering a rationale for their participation that is authentic and believable and timely.
The ability of students in an online environment to project themselves as a “real person” through their personal characteristics.

Cognitive Presence
The extent to which students are able to construct and confirm meaning through sustained discourse.

Teaching Presence
Establish the course content, monitor and manage interaction and reflection, and provide appropriate guidance.
Social presence can be facilitated by the use of video and audio introductions, explanations, weekly check-ins and updates.

Cognitive presence requires front loading on the part of the faculty mentor to ensure that the students can provide factual, conceptual and theoretical knowledge relative to their line of inquiry.
Teaching presence is accomplished by constructing experiences that are modeled, practiced, self-assessed, peer-assessed (where possible).

Different from teaching presence, and unique to undergraduate research, a regularly scheduled mentor session addresses expectations that the student has.
**PHASE 1**

- **Task 1**
  - Task 1 assessed

- **Task 2**
  - Task 2 assessed

**PHASE 2**

- Program assessment

- **Task 1**
  - Phase 2 Task 1 assessed

- **Task 2**
  - Phase 2 Task 2

**Summer Schedule**

- **Week 1**
- **Week 2** End of Week 2 check-in
- **Week 3**
- **Week 4**
- **Week 5**
- **Week 6**
1. Instructor Presence in the Online Class: https://onlinelearninginsights.wordpress.com/2012/05/18/instructor-presence-in-the-online-class-key-to-learner-success/

2. The Community of Inquiry https://coi.athabascau.ca/

3. NSRF Protocols and Activities https://nsrfharmony.org/protocols/
• Screen Castify
• Camtasia
• Kaltura
• Perusall
• GoReact
• Flip Grid
• Gimkit
• Kahoot
• Slack
• Kami
Virtualized course-based undergraduate research activities: some geoscience strategies

Jeff Ryan
University of South Florida
Research for virtually connected geoscience students? There are options…

• **STEM informatics**: data resources/access generated for researchers, but accessible to all.
  • Geospatial information systems of many sorts
  • Data visualization tools (a growing menu)
  • Other databases, esp. if geo-referenced or time referenced (demography, agriculture, etc.)
• **Real research instrumentation (!!),**
  • operable online
  • that can be used in class, by students!
These all involve the collection or interpretation of REAL data. Students draw their own conclusions, become “experts”, and can make real discoveries.
Google Earth – Planet options...

Easy access to NASA global planetary data...
Online data resources for Mars exploration results - research data, some near real-time, mineable online
Via Google Earth and JMARS: Mars Orbiter Laser Altimeter (MOLA)

Color Coded:
White (real high!)
Red/yellow (high)
Green (intermed.)
Blue (low)
Purple (real low!)
THEMIS Daytime Infrared imagery

Shows relief best (infrared wavelength emission/reflection is best off flat or horizontal surfaces)
THEMIS Nighttime Infrared imagery

Shows surface roughness and (fine) grainsizes, related to differing rates of cooling on (cold!) Martian nights...
JMARS overlays of different datasets (elevation, IR, etc....)
... ≈ Student-friendly Image Analysis

- Big River channels
- Old eroded craters
- New young craters
- Wind Direction
Google Earth, GeoMapApp, (Terrestrial geospatial information platforms)

NSF Geoscience cyberinfrastructure facilities:
- IEDA
- NAVDAT,
- IRIS,
- UNAVCO
- CUAHSI
- etc....

Data Resources “closer to home”
CUR-NSF Webinar

John M. Pavlina, Ph.D., Assistant Professor
Computer, Electrical, and Software Engineering Dept.
3700 Willow Creek Rd., Prescott, AZ, 86301, 928.777.3841
pavlinaj@erau.edu
Research performed with Dr. Akhan Almagambetov, and undergraduate student researcher Eleanor Pahl
The Set-up

A project about using computer vision for wind tunnel image visualizations. It was a summer sponsored URI project.

A few key points we had to work through.

- The researchers would never be in the same place.
  - At one point, one of us was in Germany, another Iceland, and the third Russia.
- A general consensus was needed about what was to be accomplished.
  - A minimum to maximum level with expectations from both the investigators and the student.
- A timeline and budget needed deciding upon prior to any research starting.
  - Office of undergraduate research grant application helped ensure this happened.
- Make use of generally available technology.
  - School email, MATLAB, WhatsApp
Timeline

At the beginning, we were mostly helping the student understand the feasibility of the project and what the expectations would be.

We had the benefit of at least one or two face to face meetings to discuss the logistics and outline of the project.

We forced the student to make the initial timeline.

This gave us the chance to see their organization skills and expectations.

Then we thoroughly slashed and revised it so it resembled something realistic.

General communication guidelines were established.

An email research update at least every other week.

Other questions that needed to be answered more quickly to be sent to the group chat in WhatsApp.
What worked this time

The fact that the entire project could be performed using software that was available to the researchers even when not on campus was a must.

If extra materials would have been needed, it might have proved logistically infeasible. (shipping/transporting to Iceland, or Russia...)

Having some way to chat quickly about smaller questions using WhatsApp was extremely helpful. WhatsApp can also “Call” or video chat anyone from anywhere which we also utilized.

Having a student who was extremely well suited to working by themselves was essential.

All the best laid plans and organization mean nothing if the student doesn’t actually want to put in the time and effort.
Thoughts for the next time

Have some update meetings on just the logistics, and not necessarily the research/technology aspects of the project.
- Logistics and timetables are hard to do.

Undergraduate students don’t know as much as they think they do.
- Be intentional about what you are trying to teach the student, and what you want out of them.

“More structure is always useful.”
- The student’s response when asked about what to do differently next time.
- And along the same lines, a “more clearly defined schedule of when we would talk” (phone/video) and not just email.

What I wish I knew before I started?
- You will get a lot less done than you would if face to face. (Obviously?)
- It is much harder, but just as worthwhile as “normal” research.
- Be clearer than you think you need to about communication expectations.
Thanks for your time!

You can do it too!
Running a Distance Undergraduate Research Lab
Crissa Levin, PhD
Jennifer Grewe, PhD
What are the values and goals of the experience, instead of the outcomes of the experience?

Examples of Potential Goals of a Research Lab for Student:
• Growing Critical Thinking
• Exploring Career/Graduate School Opportunities
• Applying Information Literacy
• Growing Curriculum Vitae or Resume
• Inclusivity & Offering Opportunities
• Contributing to Progressive Science
Building for Values

Student Goals:
Critical Thinking
Exploring Career
Inclusivity

Faculty Goals:
Mentoring
What can online research labs offer or contribute that in-person labs cannot?

What research content can be done better online than in-person?
How can we supplement what in-person labs offer with another excellent thing, instead of offering a sub-par option for those who can’t do the “good one?”

What lab exercises can be done better online than in person?
Who can we include that cannot be included in person?

Distance students tend to be lower SES, higher rates of disability, higher rates of veteran status, higher rates of having families while in school.
What are the values and goals of the lab?

How can I use these values and goals to guide decisions on obstacles and challenges to moving online?

How can we play to the online medium?

How do our values and goals guide us to make the distance lab thrive in this environment, instead of attempt to replace an in-person environment?