Lessons in Collaboration & Field Research Design from the Appalachian Headwaters Research Experience for Undergraduates

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Collaborations Represented

- **Interdisciplinary Faculty**
  - Dr. Alice Jones, Planner & Geographer—land use - water quality policy
  - Dr. Jimmy Fox, Civil Engineer—biogeochemistry, watershed modeling
  - Dr. Melinda Wilder, Environmental Educator—formal and non-formal educator training & certification

- **Institutional Collaboration**
  - Eastern Kentucky University—regional comprehensive undergraduate-focused, serving rural Appalachian Kentucky
  - University of Kentucky—state’s flagship land-grant public research university

- **Multidisciplinary Participants**
  - 2 chemistry majors
  - 2 biology majors (+ 1 teacher)
  - 2 civil engineering majors
  - 1 real estate major
  - 1 Appalachian science major
  - 2 M. Ed science education

- **Applicant, Participant Diversity**
  - Program recruitment focus on socioeconomically distressed Appalachian coal communities
  - 63 applicants; 22 from target region
    - 5 students from Appalachia
    - 1 from non-PhD schools
    - 3 female, 5 male participants
  - 2 Asians; 5 Appalachian natives

Program Design Strategies

- **Clear Outcome/ Objectives**
  - In-house Poster Conference
  - Deans, chairs, affiliate faculty invited
  - Manuscript required for final stipend payment
  - Professional conference travel incentive

- **Establish Work Context Early**
  - First week: Regional orientation field trip
  - Field hike, mine visit, interviews with residents
  - Appalachian food and dancing required!
  - Humanized research environment
  - Field and laboratory methods orientation in first, second week
  - Required to constrain student research design
  - Mentor emphasis on appropriate-scale project

- **Open Communication, Regular Feedback**
  - Emphasis on regular, open communication
  - Daily informal conversation
  - Discuss problems and redirect or redesign as needed
  - Environment of trust between mentors, participants

Research Program Calendar

- **Week 1-3: Intro, Experimental Design**
  - Intensive lecture/ overview
  - Regional orientation field trip

- **Weeks 4-6: Data collection, Sample Prep and Spatial Analysis**
  - Lit review, problem statement & research design
  - 3 days in lab/ classroom, 2 days in field
  - Sample collection and prep organized by team
  - GIS orientation and map production

- **Weeks 7-9: Data Analysis & Results**
  - Spatial and statistical analysis and interpretation
  - Research results, poster prep, manuscript draft
  - Weekly writing deadlines
  - Seminars in poster prep & professional presentation
  - “Fun Day” Cave Run Lake trip
  - Day off—stress relief and camaraderie

- **Week 10: Presentation of Results**
  - In-house poster conference (Tuesday)
  - Final manuscripts (Thursday)
  - Program evaluation (Friday)
  - Final luncheon and goodbyes (with parents)

Take-Home Lessons

**Plan for fun!**
- Social activities overwhelmingly well-received
- Welcoming barbeque picnic (Sunday prior)
- Appalachian orientation tour (Week 1)
- Coal mine and bee reclamation site (Week 4)
- Cave Run Lake fun day (Week 7)
- Mammoth Cave (Optional-Week 8)
- Weekly “Together Time”
  - “Pizza Wednesdays” seminars, discussion
  - Daily lab or field chats

**Plan field trips far in advance**
- Designated Logistics Officer
  - 15-20 hours for every 2-day field trip
  - Bureaucracy WILL be slow an tedious
  - Vehicle scheduling, rentals, housing, food, purchase orders, stipend checks...

- Good Food Equals Good Day!
  - More is always better!
    - 3 quarts of peanut butter
    - 10 lbs lunchmeat
    - 150 granola bars
    - 18 lbs of apples and bananas
  - Assure good meal at night

- Expect the Unexpected, Plan for Flexibility
  - Establish backup plans & communications
  - Trust team leaders’ judgment
  - Debrief and learn from experience

  - Weather, medical emergencies, tray dogs, traffic accidents, lost cell phone service...

**Faculty attitudes set tone**

- Model good communication
  - Working through differences
  - Respecting each other’s expertise
  - Keeping positive attitude

- Model good research & work behavior
  - Passion, hard work, and FUN!

**Balance research focus with freedom**

- Give students autonomy in research design
- Set clear boundaries for the “decision space”
  - Lab and field access constraints
  - Time constraints

Program Evaluation: Lost Cell Phone Service. . .