Overview of the Research Methods Used by Geoscience Education Researchers

Julie Sexton
University of Northern Colorado
Context

Geoscience

Workforce Shift

Education Research (Social Science)

Training in Education Research

Little

Extensive

Quality of Geo Education Research

Poor

High
Solutions and Purpose of Presentation

Solutions

• Establish and communicate norms for geoscience education research
• GSA session to share methods and techniques

Purpose

• Provide overview of education research and framework to think about talks in session
What is a Method?

- Theory forming the foundation for the study
- Research design
- Technique to identify and select participants
- Technique to collect data
- Technique to analyze data
- Approach to interpreting results
1. CONTEXT
- Topic
- Research questions
- Literature/Theory
- Philosophical Perspective

2. TYPE
- Qualitative
- Quantitative
- Mixed

3. DESIGN/TECHNIQUES
- Research Design
  - Sampling
  - Data Collection
  - Analysis
  - Interpretation
1. Context: Topic and Research Question

<table>
<thead>
<tr>
<th>Topic</th>
<th>Research Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gendered experiences in the geosciences</td>
<td>What are the gendered experiences of undergraduate female students in geoscience programs?</td>
</tr>
<tr>
<td>Recruitment and retention in the geosciences</td>
<td>What factors predict if undergraduate students select and persist in a geoscience major?</td>
</tr>
<tr>
<td>Purpose</td>
<td>Example</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1. Major findings</td>
<td>Topic: Factors associated with recruitment and retention in geoscience</td>
</tr>
<tr>
<td>2. How the topic is investigated</td>
<td>• <strong>Major finding:</strong> Interest is most significant predictor of selection of major</td>
</tr>
<tr>
<td>3. Theories, theoretical frameworks, and</td>
<td>• <strong>How investigated:</strong> Quantitative and qualitative research</td>
</tr>
<tr>
<td>philosophies associated with topic</td>
<td>• <strong>Theories:</strong> Social cognitive career theory, identity and possible selves</td>
</tr>
</tbody>
</table>
Framework

1. CONTEXT
   • Topic
   • Research questions
   • Literature/Theory
   • Philosophical Perspective

2. TYPE
   • Qualitative
   • Quantitative
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3. DESIGN/TECHNIQUES
   • Research Design
     ▪ Sampling
     ▪ Data Collection
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     ▪ Interpretation
## 2. Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Data Collection</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative</td>
<td>Qualitative</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Quantitative</td>
<td>Quantitative and/or Qualitative</td>
<td>Quantitative</td>
</tr>
<tr>
<td>Mixed</td>
<td>Quantitative &amp; Qualitative</td>
<td>Quantitative &amp; Qualitative</td>
</tr>
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Framework
## 3. Design/Techniques

<table>
<thead>
<tr>
<th>Type</th>
<th>Design Examples</th>
<th>Technique Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative</td>
<td>• Basic Interpretive Design</td>
<td>• Sampling: Convenience, Purposeful</td>
</tr>
<tr>
<td></td>
<td>• Case Study Design</td>
<td>• Collection: Interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Analysis: Constant comparative analysis</td>
</tr>
<tr>
<td>Quantitative</td>
<td>• Quasi Experimental Design</td>
<td>• Sampling: Convenience, Purposeful, Random</td>
</tr>
<tr>
<td></td>
<td>• Correlational Design</td>
<td>• Collection: Surveys</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Analysis: ANOVA, t-test</td>
</tr>
<tr>
<td>Topic/Question</td>
<td>Lit/Theory</td>
<td>Design</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>What are the gendered experiences of undergrad female students in geoscience programs?</td>
<td>Ambivalent sexism Stereotype threat</td>
<td>Qual</td>
</tr>
<tr>
<td>What factors predict if undergrad students select and persist in a geoscience major?</td>
<td>Social cognitive career theory</td>
<td>Quant</td>
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</table>
## Recommendation

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<th>2. Type</th>
<th>3. Design/Techniques</th>
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<tbody>
<tr>
<td>Topic</td>
<td>Lit/Theory</td>
<td>Design</td>
</tr>
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</table>

The table above outlines the recommendation framework, with columns for context (Topic), type (Lit/Theory), design and techniques, data collection, and analysis.
Conclusion

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Questions? More information?

Contact
Julie Sexton
University of Northern Colorado
julie.sexton@unco.edu