STUDY DESIGN: QUALITATIVE VS. QUANTITATIVE

OUTLINE

- Review Qualitative and Quantitative
- Mixed Methods
- An example of mixed methods in action
QUANTITATIVE VS. QUALITATIVE

Advantages and disadvantages of each?

Why Quantitative?

- Broad
- Objective
- Reliable
- Replicable
- General
- Well established
- Comparable
- Large n
- Few variables
- Less bias
- Statistics
WHY QUALITATIVE?

- Detailed
- Realistic
- Rich
- Descriptive
- Unstructured
- Interactive
- Original
- Robust
- Flexible

COMPARING INQUIRY STRATEGIES

<table>
<thead>
<tr>
<th>Table 1.2 Alternative Strategies of Inquiry</th>
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<tbody>
<tr>
<td>Quantitative</td>
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<tr>
<td>Experimental designs</td>
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<td>Non-experimental designs, such as surveys</td>
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Mixed Methods permits moving between phases of a research study using **qualitative** data to inform **quantitative** instruments or to identify variables (or vice versa!)
EXAMPLE: MY RESEARCH

Quantitative BARSTL Survey
Large population

Examining study population to select a small number of participants that are representative of the large population

Qualitative TBI Interview
Small population
Very detailed

large sample size with detailed analysis

QUANT TOOL: BARSTL: BELIEFS ABOUT REFORMED SCIENCE TEACHING AND LEARNING SURVEY

- 32-item Likert-type questionnaire; participants select their degree of agreement with the statements

During a lesson, students need to be given opportunities to test, debate and challenge ideas with their peers.

1: Strongly Disagree  2: Disagree  3: Agree  4: Strongly Agree

- Possible scores: 32 - 128 points, with higher scores reflecting reformed, student-centered beliefs

Sampson et al., 2013
QUANTITATIVE DATA

\[ p = <0.001 \]

Cohen’s \( d = 0.21 \)

\[ \text{N=308} \]
Average = 86.3
Range = 49

\[ \text{N=308} \]
Average = 87.9
Range = 48

QUAL TOOL: TBI (TEACHER BELIEF INTERVIEW)

- Semi-structured interview consisting of seven questions
- Questions target different aspects of pedagogy

- How do you maximize learning in your classroom?
- How do you describe your role as a teacher?
- How do you know when your students understand a concept?
- How do you know when to move on to a new topic in your class?
- How do your students learn science best?
- How do you decide what to teach, or what not to teach?
- How do you know when learning is occurring?

Luft & Roehrig, 2007
Example interview question: How do you know when your students understand a concept in class?

Ideally, when they can explain it back to you or explain it back to somebody else in their own words.

That’s what we did in tutoring a lot – that was if someone, especially in group tutoring if somebody answered a question, and other people were just sitting there.

We’d always have them go around and each explain in their own words before we’d move on to the next topic.

In later classes, if someone brings up a topic again or maybe emails you later to ask about it, I would say that that would show they understood.

And of course, on tests and stuff, if they perform well, then I would take that as a measure of their understanding as well.

Asking a specific question like, “Okay, if relative humidity increases as air rises, then that would mean it decreases when it sinks,” they’re kind of like twisting the question around and furthering their understanding of the concept, that kind of thing.

YOUR TURN

- Take a moment to brainstorm and jot down potential qualitative geoed research questions for undergraduate students.
- Discuss with your neighbor.
- Will your research study be qualitative, quantitative, or mixed methods? Write down any ideas on your worksheet.