

UPSTREAM FROM IMPACT: FRAMEWORKS FOR IMPROVING RESEARCH QUALITY

**NSF EEC GRANTEES CONFERENCE
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WORKSHOP OBJECTIVES

- 1. Introduce research quality frameworks for interpretive, quantitative, and mixed methods research designs,**
- 2. Identify a variety of research quality considerations that are relevant and salient across diverse research approaches and traditions, and**
- 3. Identify specific quality issues that may be particularly relevant or important for studies being carried out by workshop participants.**

WORKSHOP AGENDA

Quality in interpretive educational research (Sochacka, Walther)

Quality in quantitative study designs (Hunsu, Godwin, Main)

Quality frameworks for mixed methods designs (Jesiek)

Open discussion and Q&A on research quality frameworks

Group breakout to identify cross-cutting criteria and themes

Report out from groups on cross-cutting criteria and themes

Individual reflection on application of concepts to own research

Report out and wrap-up, including ideas for future initiatives

Quality in interpretive engineering education research



Presenters: Dr. Nicki Sochacka & Dr. Joachim Walther



*Engineering Education
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UNIVERSITY OF GEORGIA

The Q³ Project (Qualifying Qualitative Research Quality)

PECASE: A Quality Framework for Interpretive Engineering Education Research, NSF #1150668,
PI: Walther, Senior researcher: Sochacka.

Project Goals:

- To foster a discourse and build capacity around qualitative research quality
- To develop a theoretical understanding of research quality that reflects the perceptions and practices within our community

A procedural view of research quality



Making Data

Handling Data

Theoretical Validation

Procedural Validation

Communicative Validation

Pragmatic Validation

Ethical Validation

Process Reliability



Making Data

Handling Data

Validation: Do the findings appropriately capture & represent relevant aspects of the social reality observed?



Do we get to see what we think we see?



Are our interpretations grounded in the participants' social realities?



Are our findings relevant and meaningful beyond our study setting?

Theoretical Validation

concerns the fit between the social reality under investigation and the theory generated

What is, in terms of scope and nature, the specific social reality we want to investigate?

How will we be able to see / what could prevent us from seeing the full extent of this social reality?

How can we ensure that our interpretations do justice to the complexity of, but capture patterns of coherence within the social reality?

How do I know that the findings make a meaningful contribution to the relevant body of theory?

Procedural Validation

concerns features of the research design that inherently improve the fit between the reality studied and the theory generated

What are appropriate means by which we can 'see' the social reality under investigation?

What features can we build into the inquiry to mitigate threats to an authentic view of the social reality?

What features can we design into our process of interpretation to mitigate the risk of mis-constructing the social reality of our participants?

Communicative Validation

concerns the integrity of the interlocking processes of social construction with the relevant communication communities

How can we authentically co-construct meanings of participants' social realities on their own terms?

How can we maintain the meaning constructed in the communication community throughout our analysis?

How can we construct our findings within the meaning conventions of the relevant research community?

What are robust ways of co-constructing interpretive meaning in a communication community with other researchers?

Pragmatic Validation

concerns the compatibility of theoretical constructs with empirical reality

What theoretical constructs do we bring to the study?

What theoretical assumptions do we make about the nature of the reality under investigation?

How do we know whether these assumptions 'survive' the exposure to the social reality in the field?

What assumptions about the structure of the social reality does our research approach make?

How meaningful are our interpretations for the social reality under investigation? (Insight, resonance, change...)

How meaningful are the theoretical constructs we generate for social realities similar to the one under investigation? (Insight, affect, attention, utility, change...)

Ethical validation

concerns aspects of integrity and responsibility throughout the research process

What are our motivations and intentions for investigating this social reality?

How can we ensure legitimate and responsible decisions to inform our interpretations?

Do our findings do justice to the lived realities of our participants?

What are the impacts of our interests, biases, preconceptions or intentions on this investigation?

How can we meaningfully and equitably engage all members of the research team?

What are impacts of our research for the social reality investigated and for similar social realities?

Process Reliability

concerns the mitigation of random influences on the research process

How can we mitigate, as far as possible, random influences on our process of seeing the social reality under investigation?

How can we foster consistency of our process of interpretation?

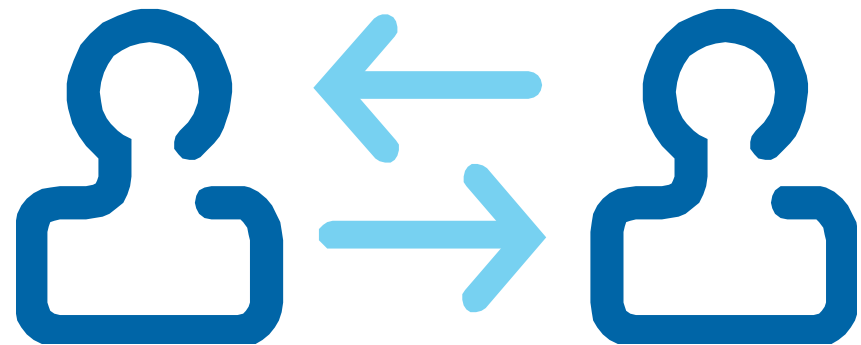
How can we capture & record the constructions of participants' social realities in a dependable way?

How can we document and authentically demonstrate the dependability of our entire process of investigation?

We investigate social realities



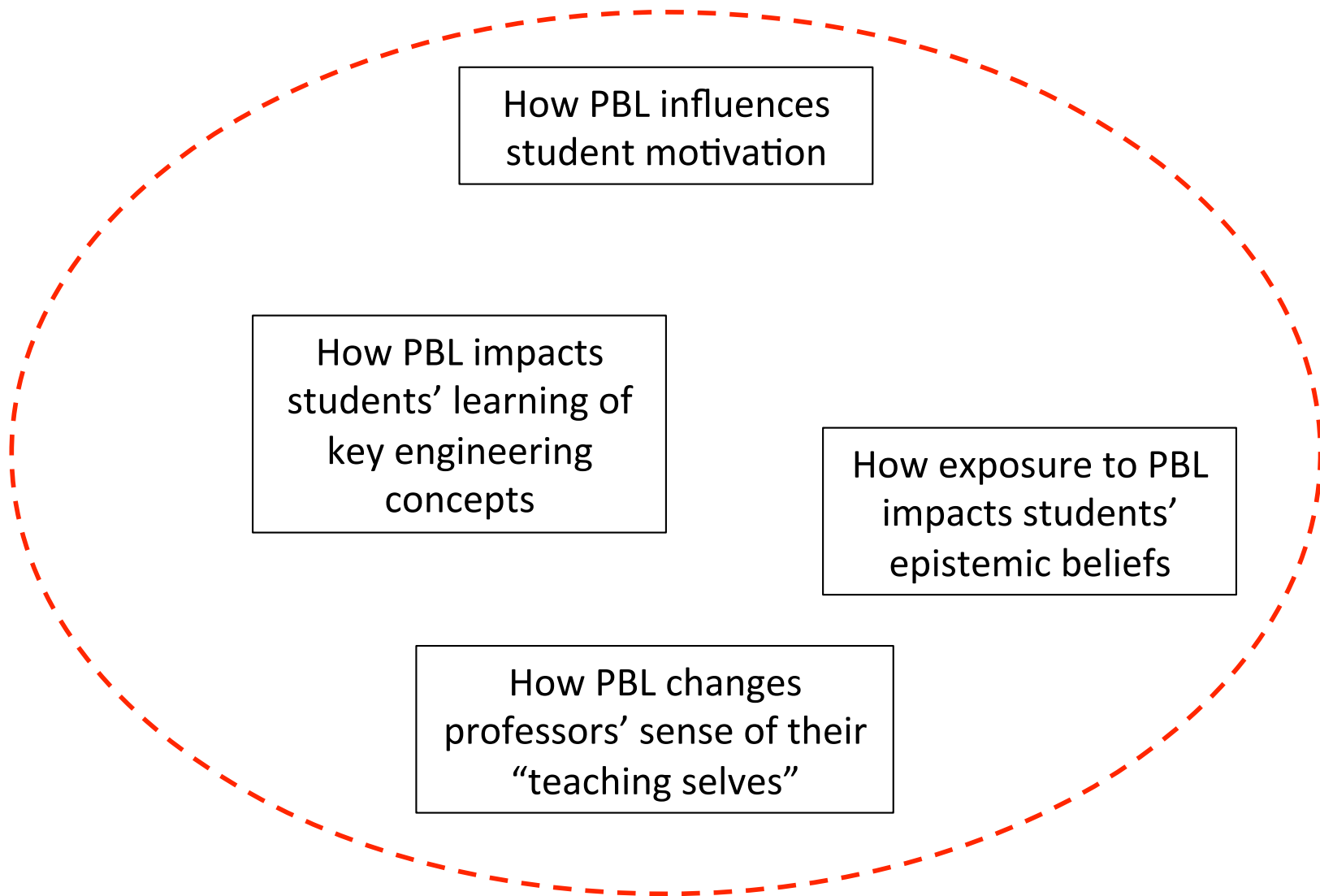
- The “object” of research is:
 - Socially-constructed
 - Emergent
 - Has tangible impacts on student learning or other aspects of the context of interest





What is the social
reality under
investigation?

Problem-based learning



Theoretical Validation



Do we get to see
participants' full realities?
Do our findings adequately
represent it?

This quality facet can inform:

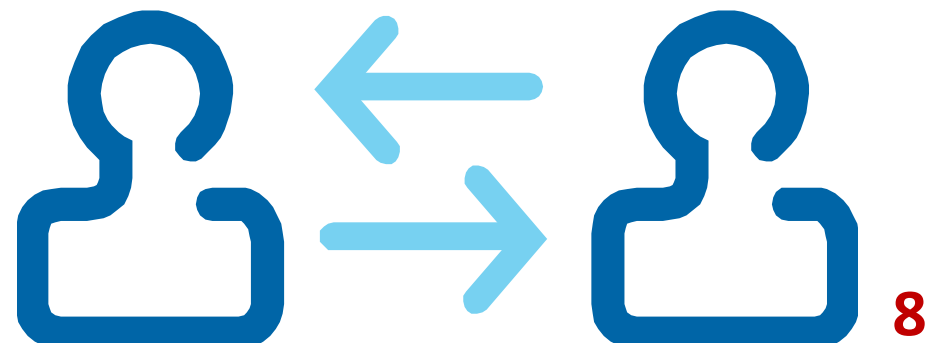
Theoretical frameworks, emergent research design, data gathering methods, exploration of bias, analytic procedures, etc.

The data and findings are socially constructed



The process of research comprises several interlocking acts of socially constructing meaning:

- With our participants
- Within a research group
- With the research community



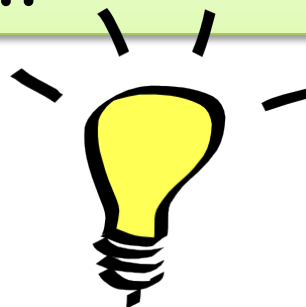


Interpretive research is to...

... understand participants' experience-near constructs well enough to be able to...

... place them in an illuminating connection with ...

... the experience-distant constructs theorists have fashioned to describe the general patterns of social life (Geertz 1974)



Professors' teaching identities

HANDLING DATA

MAKING DATA



How can we authentically
co-construct accounts of
participants' social realities?

This quality facet can inform:

Data gathering techniques, exploration of researcher's
positionality and influence, rapport with participants, etc.



What are robust ways of co-constructing interpretive meaning in the research team?

This quality facet can inform:

Collaborative interpretation procedures, member checking, iterative analysis, data visualization, etc.

Ethical Validation



If our research does justice
to all stakeholders, it will
lead to better findings.

This quality facet can inform:

Motivation and intent for studies, engagement of participants
and co-researchers, impact and use of research findings, etc.

Use of the framework

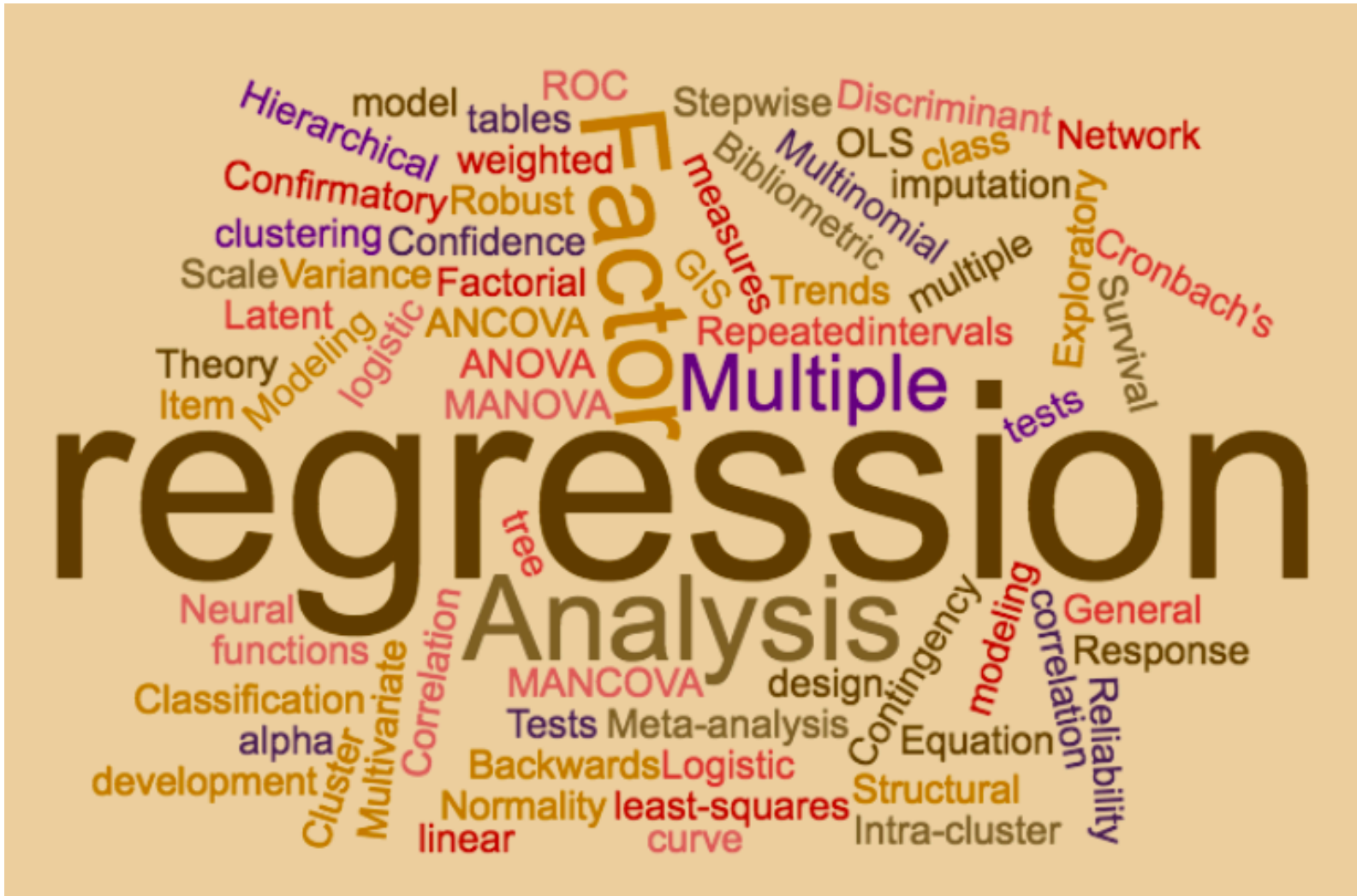


- As both a planning and process tool
- As multiple lenses to examine quality issues or challenges
- As a conceptual language to articulate quality strategies and features
- (NOT as a checklist)

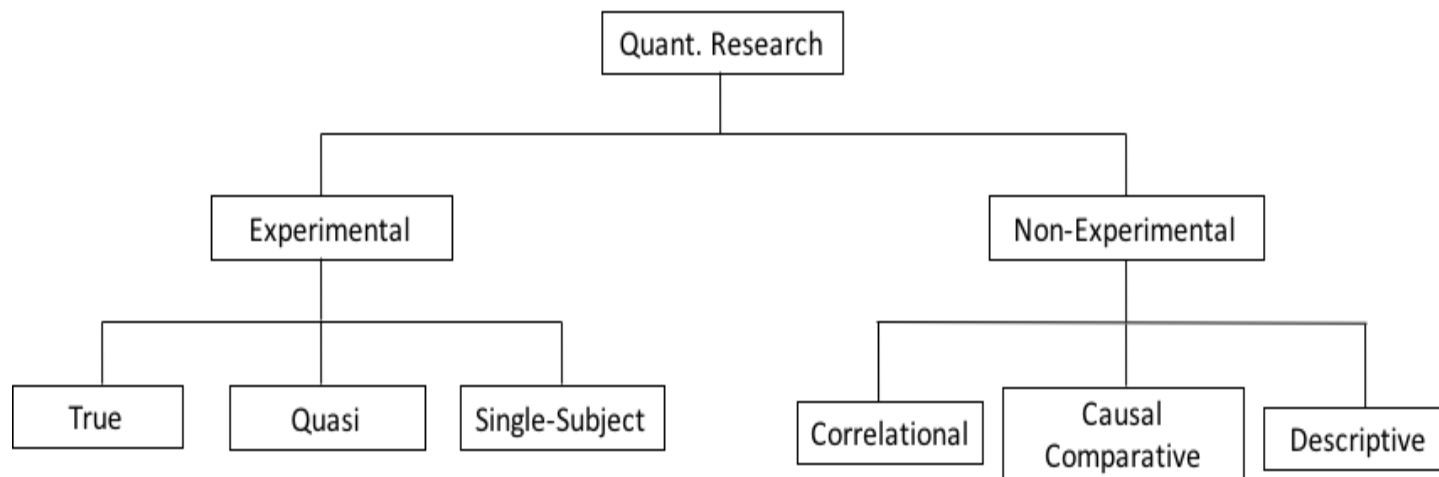
Definition: Quantitative Research Methods

Quantitative methods emphasize **objective measurements and the statistical, mathematical, or numerical analysis of data** collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data **using computational techniques**. Quantitative research focuses on gathering numerical data and **generalizing it across groups of people** or to **explain a particular phenomenon**.

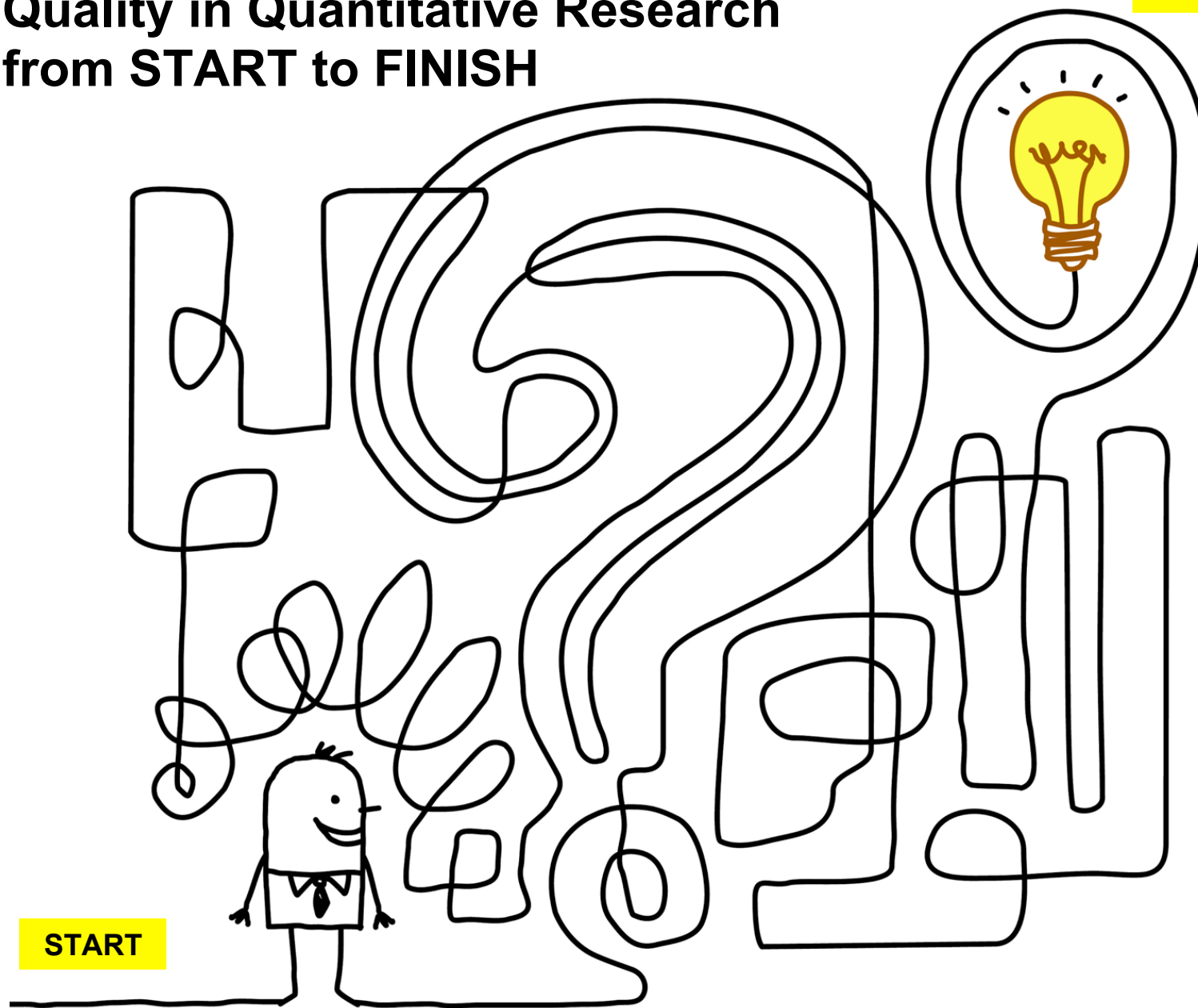
Quantitative Research Methods Used in Engineering Education Research



Quantitative Research Designs



Quality in Quantitative Research from START to FINISH



Quality Research in Education

- Poses significant questions that can be investigated empirically
- Links empirical research to relevant theory
- Uses research designs and methods that permit direct investigation of the question
- Is guided by coherent and explicit chain of reasoning
- Replicates and generalizes across studies
- Attends to contextual factors

Validity in quantitative research has moved from a “checklist” approach to making an argument for validity evidence.



Move away from “validated” studies/approaches/instruments



Move toward developing an argument for how each study builds a case for validity

EVALUATING THE QUALITY OF MIXED METHODS RESEARCH DESIGNS

What is a mixed methods research?

“Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration” (Johnson et al., 2007).

Three approaches to evaluating quality (Creswell et al., 2011):

- Methods Orientation
- Research Process Orientation
- Timing of Phases Orientation

METHODS ORIENTATION

(CRESWELL & PLANO CLARK, 2011, CH. 8)

A “good” mixed methods study involves:

- Collection of quantitative and qualitative data
- Rigorous procedures for data collection and analysis
- Integration of data sources for better understanding
- Use of a mixed methods study design that integrates all features of the study within that design
- Framing of the study in relation to philosophical assumptions
- Reporting research using terminology that is consistent with that used in the mixed methods field

RESEARCH PROCESS ORIENTATION (O'CATHAIN ET AL. 2008)

Good Reporting of a Mixed Methods Study (GRAMMS)

1. Describe the justification for using a mixed methods approach to the research question
2. Describe the design in terms of the purpose, priority and sequence of methods
3. Describe each method in terms of sampling, data collection and analysis
4. Describe where integration has occurred, how it has occurred and who has participated in it
5. Describe any limitation of one method associated with the presence of the other method
6. Describe any insights gained from mixing or integrating methods

TIMING OF PHASES ORIENTATION (SCHIFFERDECKER & REED, 2008)

- Identify study design as mixed methods
- Decide on prominence of each type of data in each study phase (data collection, analysis, and results)
- Develop sampling strategies that provide adequate data and follow accepted guidelines for each data collection method
- Determine how and when data are collected, analyzed, and integrated
- Set realistic time requirements for each phase of the study
- Explore relevant software tools or methods to integrate data
- Review other mixed methods papers for ideas about how to report results and display data

OPEN DISCUSSION AND Q&A

BREAKOUT ACTIVITY #1

WHAT EVALUATION CRITERIA, CONCEPTS, AND THEMES ARE (AND ARE NOT) MOST SALIENT ACROSS THE THREE RESEARCH TRADITIONS?

BREAKOUT ACTIVITY #2

WHAT SPECIFIC QUALITY ISSUES ARE MOST RELEVANT OR IMPORTANT FOR YOUR RESEARCH?

WHAT OPPORTUNITIES EXIST FOR IMPROVING HOW YOU EVALUATE RESEARCH QUALITY IN YOUR OWN WORK, AND/OR IN THE WORK OF OTHERS?