

A Framework for Study Design in Engineering Education Research

Research Questions, Theoretical Grounding, Methodology, Methods, Sampling, Analysis & Validation Strategies

Research Goals/Questions:

The following research goals/questions drive this study:

Name what your goals are for this study. Goals could include what you intend to examine, what you hope to explain, or you could write your research questions. The purpose is that these goals/questions drive the rest of our study -everything from our selected theory, methodology and methods derive from these goals/questions.

Theoretical Grounding:

The philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria (Case & Light, 2011)

Methodology:

The strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of method to the desired outcomes (Case & Light, 2011)

Borrego et al. (2009) have a great discussion of seven methodologies that are “emerging” in engineering education research. This is a great initial source to learn about different methodologies and to separate them from methods.

Clarifying the Study Bounds:

Per Creswell (2005), a key component of a study is to define the bounds of the study – what is and what is not being studied. This allows for a key opportunity for the research team to intentionally designate who or what is within the bounds of the study and to also clarify what are outside of the bounds of the study. Here are some questions that may be answered when defining the bounds of the study:

- What population is being considered and why?
- What populations are not being considered in this study? Why and what ramifications (if any) might this have on transferability or generalizability of the results.
- What context is being examined and why? How might this affect transferability or generalizability of the results?
- What timeframe is being considered? Is this a view of the current state or are you also examining historical views also?

Methods:

The techniques or procedures used to gather and analyze data related to some research question or hypothesis (Case & Light, 2011)

Data Sources:

What forms of data are you collecting? (interviews, surveys, focus groups, observations, etc.). This is driven largely by your methodology – certain forms of data align more strongly with certain methodologies.

Sampling:

Where are you getting your data from? This should be in-line with your study bounds.

Analysis:

How do you intend to analyze those data? Point to “established” sources/methods to justify how you intend to process the data toward answering your research questions.

Validation Strategies:

Qualitative and quantitative data have different ways in which to show evidence of reliability and validity in the analysis of the data. Some traditional reference for validation strategies for qualitative data include Creswell (2007), Lincoln and Guba (1985) and Miles and Huberman (1994). Quantitative data typically uses various statistical methods as evidence of reliability and validity of the results. The key in selecting statistical methods is to appropriately align the method with the data type (continuous, nominal, etc.) and the size of the data set (number of responses).

References

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