

17-803 Empirical Methods

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# Mixed Methods Research

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**All methods have limitations. The strengths of one method can compensate the weaknesses of other methods.**

# What Do We Mean by “Mixed Methods”?

- ▶ Studies that use two or more approaches to data collection or analysis to corroborate, complement and expand research findings (**multi-methodology**) or combine and integrate inductive research with deductive research (**mixed methods**), often but not necessarily relying on qualitative and/or quantitative data.

<https://github.com/margaretstorey/mixed-methods/blob/main/mixed-methods.md>

# Three familiar strategies

# Sequential Explanatory Strategy



- ▶ Collection and analysis of **quantitative** data followed by collection and analysis of **qualitative** data.
- ▶ Why?
  - ▶ Use qualitative results to assist in explaining and interpreting the findings of a quantitative study.



# Sequential Exploratory Strategy



- ▶ Collection and analysis of **qualitative** data followed by collection and analysis of **quantitative** data.
- ▶ Why?
  - ▶ Use quantitative data and results to assist in the interpretation of qualitative findings.
  - ▶ Or, test elements of an emerging theory resulting from a qualitative study.



# Concurrent Triangulation Strategy

QUANT

+

QUAL

- ▶ Uses **different methods concurrently**, in an attempt to confirm, cross-validate, or corroborate findings.
- ▶ Why?
  - ▶ “What people say” could be different than “what people do.”
  - ▶ Collecting data from multiple sources helps improve validity.
  - ▶ By collecting qualitative and quantitative data simultaneously, each analysis can be adapted to explore emerging results from the other.

# Concurrent Triangulation Strategy

QUANT

+

QUAL

- ▶ Uses different methods concurrently, in an attempt to confirm, cross-validate, or corroborate findings.

QUANT  
*Data  
collection*



QUANT  
*Data  
analysis*

QUAL  
*Data  
collection*



QUAL  
*Data  
analysis*



*Data results  
compared*

# SIGSOFT standards project (draft)

<https://github.com/margaretstorey/mixed-methods>

# Essential

- ▶ **justifies** using multiple methodologies and/or methods
- ▶ provides a **purpose statement** that conveys the overarching multi or mixed method design intent (why)
- ▶ describes the **multi-methodology, multi-method** or **mixed method** design (what)
- ▶ describes **which phases** of the research study the different methods or methodologies are used in (when)
- ▶ describes how the design **aligns with the research question** or objective
- ▶ **integrates the findings** from all methods to address the research question/objective
- ▶ acknowledges the **limitations** associated with integrating findings (e.g., samples that are drawn from different populations may introduce limitations when the findings are integrated)

# Desirable

- ▶ **defines** the multi-methodology or mixed method design used
- ▶ describes and justifies **sample reuse** (or no reuse, or partial reuse) across methods
- ▶ illustrates the research design using a **visual model** (diagram)
- ▶ indicates the use of multiple methods or mixed method design in the **title**
- ▶ (for mixed-methods) includes, in the **literature review**, a mixture of quantitative, qualitative, and mixed methods related work
- ▶ **distinguishes the additional value** from using a multi-methodology or mixed method design in terms of corroboration, complementarity, and expansion (breadth and depth)

# Desirable

- ▶ discusses **discrepancies and incongruent findings** from the use of multiple methods
- ▶ describes the main **philosophical, epistemological, and/or theoretical foundations** that the authors use and relate those to the planned use of multi or mixed methods in the study
- ▶ describes the **challenges** faced in the design and how those were or could be mitigated
- ▶ describes how the methods and their findings relate to one or more **theories or theoretical frameworks**
- ▶ describes **ethical issues** that may have been presented through the blend of multi- or mixed methods

# Antipatterns

- ▶ **Uninvited guest:** A research method is not clearly introduced in the paper introduction/methodology and makes an unexpected entrance in the discussion or limitations sections of the paper
- ▶ **Smoke and mirrors:** Overselling a study as a multi-methodology or mixed method design when one approach at best offers a token or anecdotal contribution to the research motivation or findings
- ▶ **Selling your soul:** Employing an additional method to appeal to a methodological purist during the review process that does not contribute substantively to the research findings
- ▶ **Integration failure:** Poor integration of findings from all methods used

# Antipatterns

- ▶ **Limitation shirker**: Failure to discuss limitations from all methods used or from their integration
- ▶ **Missing the mark**: Misalignment of multi- or mixed method design with the research question/objective
- ▶ **Cargo cult research**: Using methods where the research team lacks expertise in those methods, but hopes they work
- ▶ **Design by committee**: Failure to agree on a crisp research question/objective (may be induced by different epistemological perspectives or use of heterogeneous methods)

# Antipatterns

- ▶ **Golden hammer:** relying on superficial, typically quantitative analysis of rich qualitative data
- ▶ **Sample contamination:** a mixed method sequential design where the same participants are used in multiple, sequential methods without accounting for potential contamination from earlier method(s) to later ones.
- ▶ **Ignoring the writing on the wall:** In a mixed method sequential design, failing to use findings from an earlier study when forming an instrument for a study in a later phase of the research

# Invalid Criticisms

- ▶ The method(ologie)s **do not contribute equally** (a non-equal design) or the minor method is limited (e.g. few participants).
- ▶ The mixed- or multi-method approach **isn't necessary** (when it is beneficial)
- ▶ The method(ologie)s have **different philosophical foundations** or are otherwise incompatible
- ▶ In an unequal design, the **wrong method is dominant** (this is a study design choice not a flaw)
- ▶ The method(ologie)s have **inconsistent findings**

# Credits

- ▶ Graphics: Dave DiCello photography (cover)
- ▶ Margaret-Anne Storey (University of Victoria). Multi-Methodology and Mixed Methods Research. Supplement to the SIGSOFT Standards. <https://github.com/margaretstorey/mixed-methods>
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- ▶ Easterbrook, Steve, Janice Singer, Margaret-Anne Storey, and Daniela Damian. "Selecting empirical methods for software engineering research." In Guide to advanced empirical software engineering, pp. 285-311. Springer, London, 2008.
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- ▶ Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. MIS Quarterly, 21-54.