

SoTL in Mathematics: Moving from Anecdotes to Analysis

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Posing a Question

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SoTL Questions

- Goal of causation or generalization:
 - Will this new text/pedagogy improve student learning?
 - Will altering this assignment result in better learning for calculus students?
 - Can I adjust structural aspects of the classroom to reduce anxiety in general education courses?
 - What do math majors remember about functions at the end of their undergraduate studies?
- Lack of random selection and allocation is a serious issue, though SoTL work that is observational in nature, or works with a smaller population is valid and useful.

Focus

- Be Specific!
 - Will **cooperative groups** improve student learning in **statistics**?
 - Will altering this assignment result in better learning of **the Mean Value Theorem**?
 - Can I adjust **grading policies** to reduce anxiety in **my** general education courses?
 - What do math majors remember about functions at the end of their undergraduate studies?

Areas of study

- Affective: behavior, attitudes
- Environmental: class composition (gender/race, etc.), classroom structure
- Cognition: skills development, process recognition, concept connections
- Pedagogy: instructional methods

Need for the research

- Data that implies a problem
- Previous research
 - Generalize to new population
 - Extend or refine results
 - Replication
- Anecdotal evidence of a problem

Literature Reviews – why?

- Evidence of importance
- Build on previous work
- Expand previous work
- New approach

Overall goal to add to the body of knowledge about teaching and learning

Performing a search

- NOT Mathematical Reviews!
- Keyword search
 - JSTOR Education
 - JSTOR Mathematics
 - ERIC
 - Education (Wilson)
 - EBSCO
 - GoogleScholar
- Citations lead to new searches
- When are you done?

Existing Organizations

- [RUME](#) Special interest group of the MAA
- [NCTM](#) – publishes the Journal of Research in Mathematics Education
- AERA – [SIGs](#) Special interest groups of
- [RCML](#) – publishes FOCUS

Organize search results

- Use color coding to link articles
- Spreadsheet

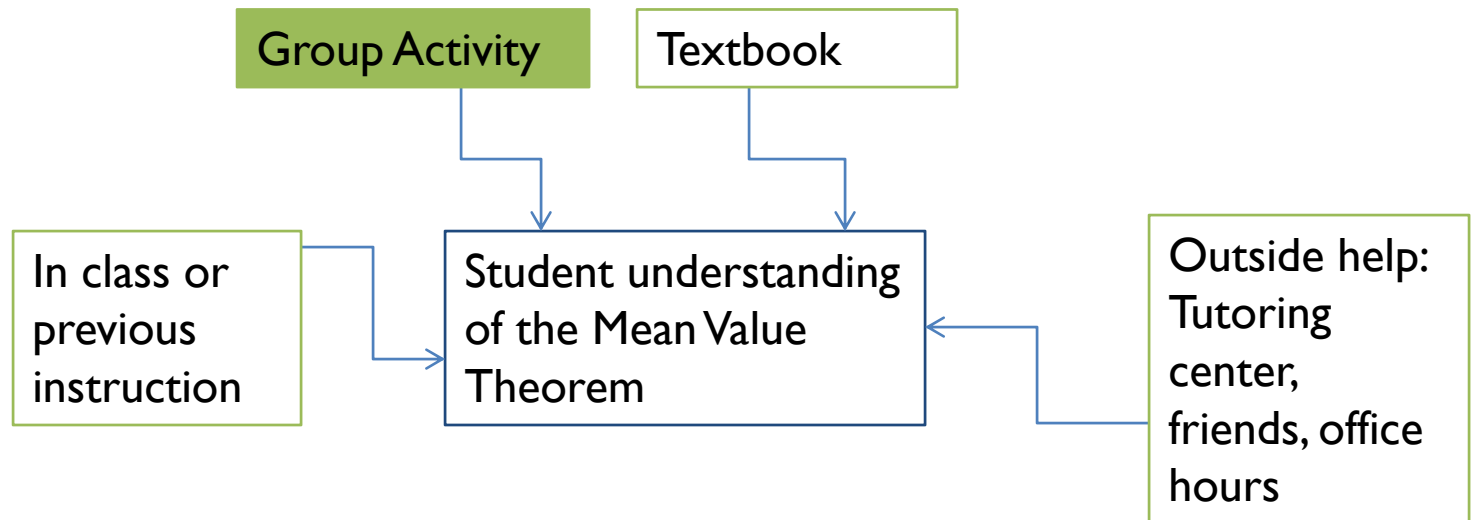
Article	Previous Work	Design	Extension
Complete citation	Notes here about using this as background reference for why this is an appropriate project	Notes here about how your work uses a documented design or moves beyond an existing design	Notes here about how your project adds to the work cited

Use your search

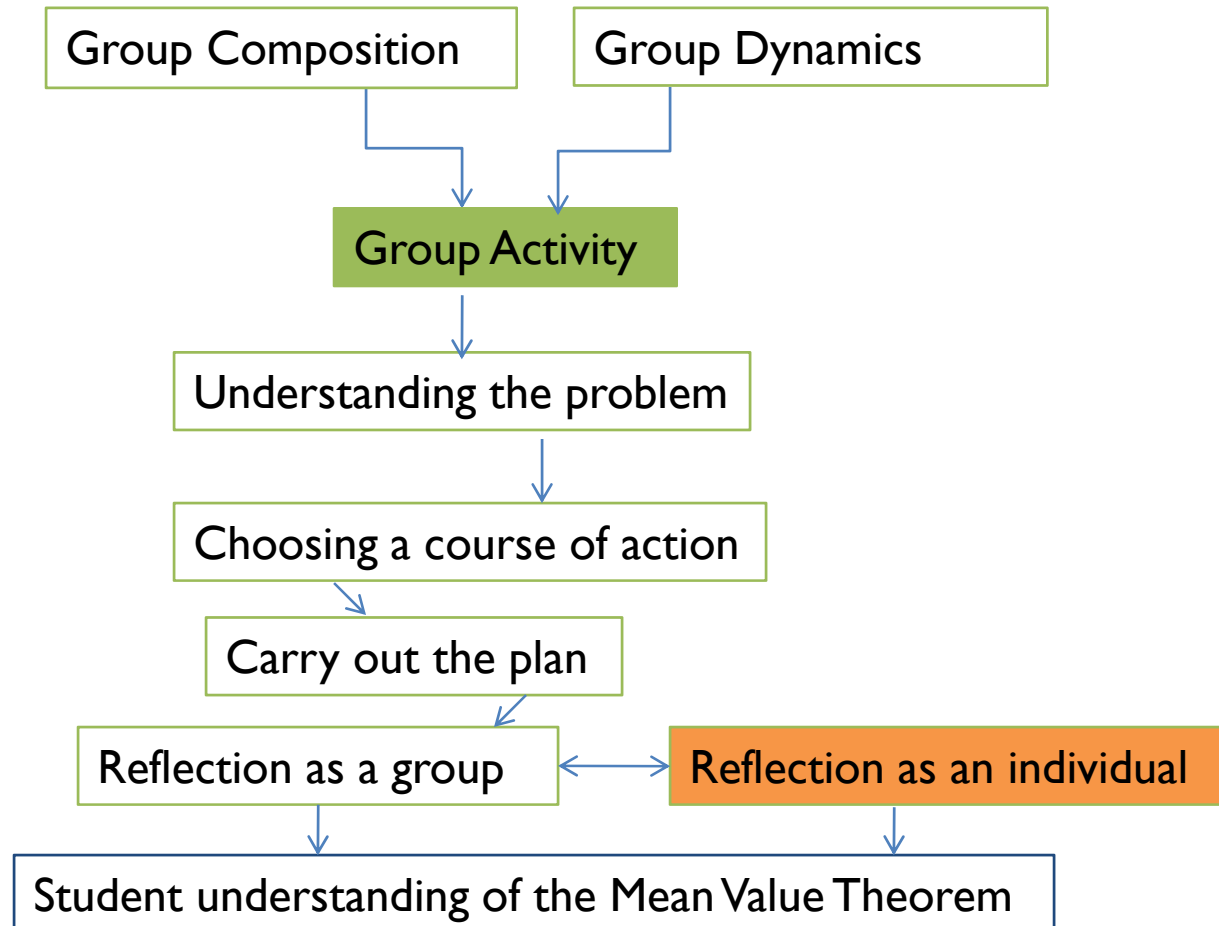
- Further modify your question
- Utilize a model or framework established by others
- Ask other authors to use their surveys – particularly if psychometric measures are established.

Using Flowcharts

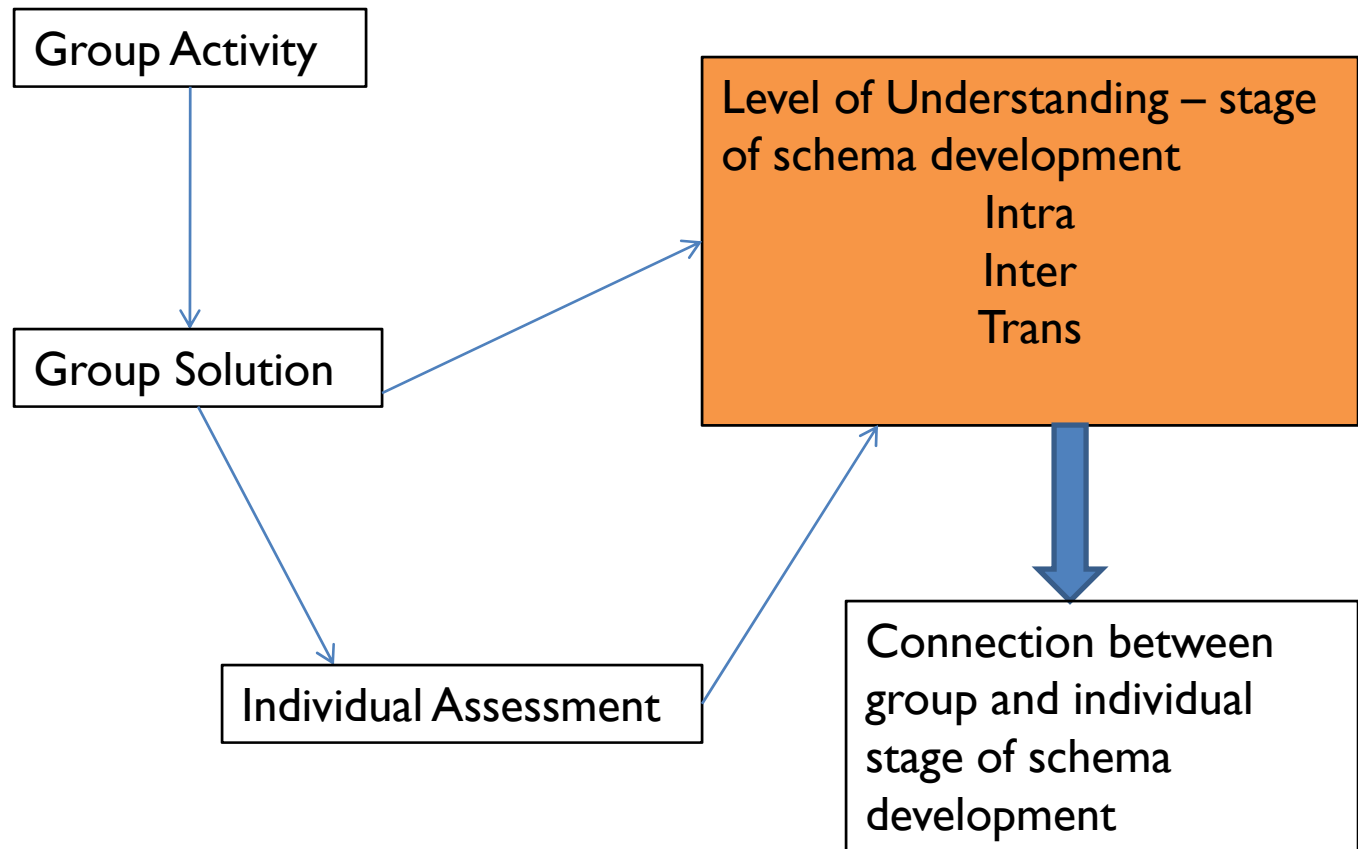
- Helps to identify other variables that need to be controlled or measured.
- Provides an avenue for refinement.



Linking to a Theory



Another version: activity to learning



Functional example

- What do math majors remember about functions at the end of their undergraduate studies?
 - Multiple representations
 - Usefulness in a variety of situations
 - Operations with functions

Now What?

- Done:
 - Identified a question
 - Completed a literature review
 - Refined the question
 - Designed a framework
- Next:
 - Evidence collection
 - Analysis
 - Reporting
- Also:
 - Human Subjects/IRB
 - Ethical Considerations

Human Subjects

- If you intend to publish results, you must get approval from your Institutional Review Board
- IRB on each campus
 - Policies vary
 - Usually *exempt* status
 - Requires informed consent of subjects
 - Project must be completely designed before seeking approval
- [UWEC IRB](#)

Ethical Considerations

- Understand that your epistemological views affect the questions you pose and how you interpret results.
- If you firmly believe that a particular method/curriculum/structural factor promotes student learning, can you justify not using this factor for the sole purpose of a control group?
- Is there any deception involved in the study?
- Will non-participation negatively affect a student?



Questions ??