

Participatory Meta-Research: Opportunities for Engaging Pre-Service Teachers in Educational Research

Matthew Mauntel
University of New Hampshire

Sheree Sharpe
University of New Hampshire

Rebecca Butler
University of New Hampshire

Bitna Choi
University of New Hampshire

Maryam Aswad
University of New Hampshire

Jerome Amedu
University of New Hampshire

Keywords: Meta-Analysis, Meta-Synthesis, Pre-service Teachers, Algebra

As the body of research in the RUME community grows, synthesizing data across these studies becomes more important. This goal can be accomplished through *meta-research*, a method for aggregating studies in a field of research involving both meta-analysis and meta-synthesis. A *meta-analysis* consists of a systematic search, data extraction, and aggregation of quantitative data to explain phenomena in greater detail than individual studies alone (Cooper, 2017). *Meta-synthesis* is the qualitative partner to meta-analysis, and involves a “deliberate process of selecting studies with an emphasis on synthesizing, analyzing, and interpreting across the selected studies” (Thunder & Berry, 2016). Qualitative data is then extracted from the articles, appraised for quality, and then analyzed using any of the traditional qualitative techniques. The results of a meta-synthesis can highlight gaps in a given field, look for themes across studies, and condense swaths of research, making it more useful for practitioners (Erwin et al., 2011).

Participatory synthesis (Wimpenny & Savin-Baden, 2012) takes the perspective that by engaging various participants in the process of meta-research, a study can “ensure all voices are heard”, present the “possibility of reciprocal learning”, and “progress knowledge within a field” (p.697). For educational research, this presents a great opportunity for pre-service teachers. By participating in meta-research, a pre-service teacher can be exposed to research and interventions that might be relevant to their future classrooms. At the same time, the results of the research can be made richer by incorporating their viewpoints into topics they view as relevant and knowledge they consider useful for the classroom. In addition, if the team is diverse, it presents the opportunity to make the work more equitable by incorporating decisions from a diverse range of viewpoints.

This poster has two purposes. First, we will describe some of the latest techniques of meta-analysis and meta-synthesis through the lens of a current project (Sharpe et al., in prep) looking at algebraic teaching interventions for grades K-12. This includes illustrating the use of cutting-edge software for conducting a meta-synthesis such as Covidence and Raayan and looking at a new technique for extracting qualitative data from an article using artificial intelligence. Second, we will describe some of the challenges and opportunities that have resulted from this process to highlight how pre-service teachers and researchers could benefit. This includes discussions about the definition of an algebraic teaching intervention for screening, a look at some of the interventions that were discovered during search/screening that might be applicable for teaching, and a discussion about what information from an article would be useful for a practicing educator. Our hope is that this poster and the resulting discussion will encourage others to engage in meta-research and consider pre-service teachers as undergraduate researchers for such projects.

References

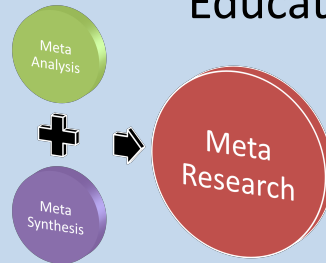
- Cooper, H. (2017). *Research synthesis and meta-analysis: A step-by-step approach (5th ed.)*. Thousand Oaks, CA: SAGE Publications, Inc.
- Erwin, E. J., Brotherson, M. J., & Summers, J. A. (2011). Understanding qualitative metasynthesis: Issues and opportunities in early childhood intervention research. *Journal of Early Intervention*, 33(3), 186-200. <https://doi.org/10.1177/1053815111425493>
- Sharpe, S., Mauntel, M., Choi, B., Aswad, M., Butler, B. (In Prep). PROTOCOL: A systematic review of what type of algebra teaching approach works, for who, and under what conditions: meta-analysis and meta-synthesis.
- Thunder, K., & Berry, R. Q. (2016). Research commentary: The promise of qualitative metasynthesis for mathematics education. *Journal for Research in Mathematics Education*, 47(4), 318-337. <http://dx.doi.org/10.5951/jresmetheduc.47.4.0318>
- Wimpenny, K., & Savin-Baden, M. (2012). Exploring and implementing participatory action synthesis. *Qualitative Inquiry*, 18(8), 689-698. <https://doi.org/10.1177/1077800412452854>

Participatory Meta-Research: Opportunities for Engaging Pre-Service Teachers in Educational Research

What is **Meta-Research**?

A “**meta-analysis** uses a statistical procedure that aggregates and condenses a body of Quantitative research studies to a common standard metric, such as a mean effect size” (Finlayson & Dixon, 2008; Thunder & Berry, 2016, p.319).

A **qualitative meta-synthesis** uses a “deliberate process of selecting [qualitative research] studies with an emphasis on synthesizing, analyzing, and interpreting findings across the selected studies” (Thunder & Berry, 2016, p.319).



Participatory Meta-Research

Participatory synthesis (Wimpenny & Savin-Baden, 2012) takes the perspective that by engaging various participants in the process of meta-research (p.697), a study can

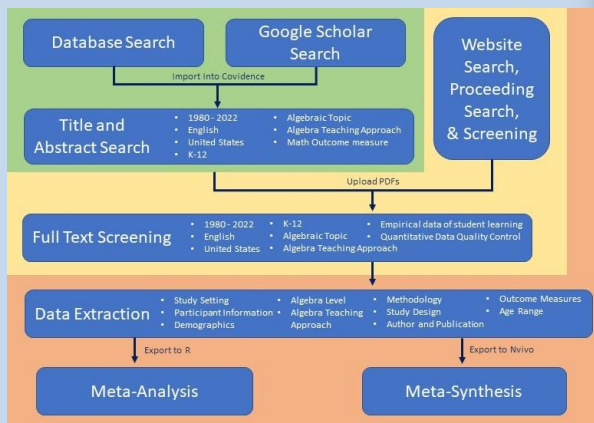
- “ensure all voices are heard.”
- present the “possibility of reciprocal learning.”
- “progress knowledge within a field.”

For **Pre-Service teachers** this might mean:

- Exposure to research and interventions for the classroom.
- The ability to influence the direction of research.
- Engage with under-represented perspectives and provide their own perspective.

Participatory Meta-Research can provide a **rich research experience** for undergraduate pre-service teachers/mathematics students while incorporating valuable perspectives into the research synthesis process.

Meta-Research Process



Tools for Meta-Research

Searching:

- Citationchaser.com
- AI assisted Searching/ChatGPT

Extraction

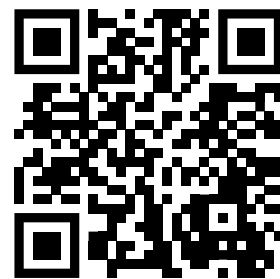
- Meta-Reviewer
- AI Supported Memo'ing
- Covidence

Screening

- Raayan.ai
- Covidence
- AI Screening

Analysis

- R
- Nvivo



This material is based upon work supported by the National Science Foundation under grant #2142659. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the NSF.

