

Synthesizing Qualitative Evidence in Education

Opportunities and Challenges of Meta-Aggregation

4/18/2025

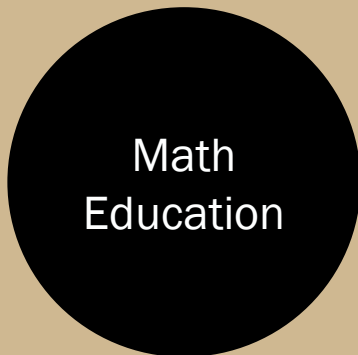
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Outline of Today's Talk

- Importance of qualitative synthesis in education
- Nature of current qualitative synthesis research in education (Maeda, 2022)
- Brief introduction to the meta-aggregation methodology
- Challenges in conducting Meta-aggregation
 - Appraising the quality of studies and findings
 - Data analytic procedures
- Future directions in qualitative research synthesis methodology

Research Commentary

Meta-Aggregation: Methodological Guidance and Lessons Learned on an Approach to Qualitative Synthesis for Mathematics Education Research

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In this Research Commentary, we address a call to translate qualitative educational research into practice by highlighting the potential of the qualitative synthesis methodology, which thus far has had limited guidelines and exemplars in mathematics education research. We contribute methodological guidance on one qualitative synthesis approach, meta-aggregation, by sharing experiences and lessons learned from using this approach and insights on meta-aggregation components synthesis in mathematics education research.

Keywords: Qualitative synthesis; Meta-aggregation

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Moving qualitative synthesis research forward in education: A methodological systematic review[☆]

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1. Introduction

Systematic review of research is a methodology used systematically to search for and synthesize knowledge generated through empirical studies to inform policy and decision-making and to uncover hidden patterns or trends that exist among relevant studies (Grant & Booth, 2009). Systematic review is distinguished from traditional narrative review because it is conducted in a way that is scientific and replicable and employs a transparent process for searching, identifying, and evaluating empirical evidence (Borenstein et al., 2009; Grant & Booth, 2009). For example, meta-analysis (e.g., Glass, 1976) is one type of systematic review that involves statistically synthesizing quantitative evidence by computing a weighted average effect size (Grant & Booth, 2009). Meta-analysis has

Why Synthesize Qualitative Evidence in Education?

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“With the expansive and ever-growing number of qualitative research studies in mathematics education, it is time to move beyond knowledge generation to knowledge application”

(Thunder & Berry, 2016, p. 335)

“

Need to provide **compelling and evidence-based generalizations** that extend beyond “what works” to “*how* it works” to inform decision making in education policy and practice.

Yore & Lerman (2008)

High quality research synthesis is likely to overcome some existing tendencies - such as “policy [that] privileges quantitative evidence and appears to disregard high-quality interpretative research evidence”

Thunder & Berry (2016)

A Common Concern About Synthesizing Qualitative Findings

How to make sense of them systematically?

The results of qualitative studies are not generalizable beyond the studied phenomena

(e.g., Pope et al., 2007)

Qualitative Synthesis provides:

- An accumulative, deep understanding of a studied phenomenon
- New insights into existing theories and knowledge
- Research-based evidence for the development, implementation, and evaluation of intervention
- Direction for policy, public perception and future research

(e.g., Maeda et al., 2022; Noblit, 2017)

Advancing Qualitative Synthesis Methodology



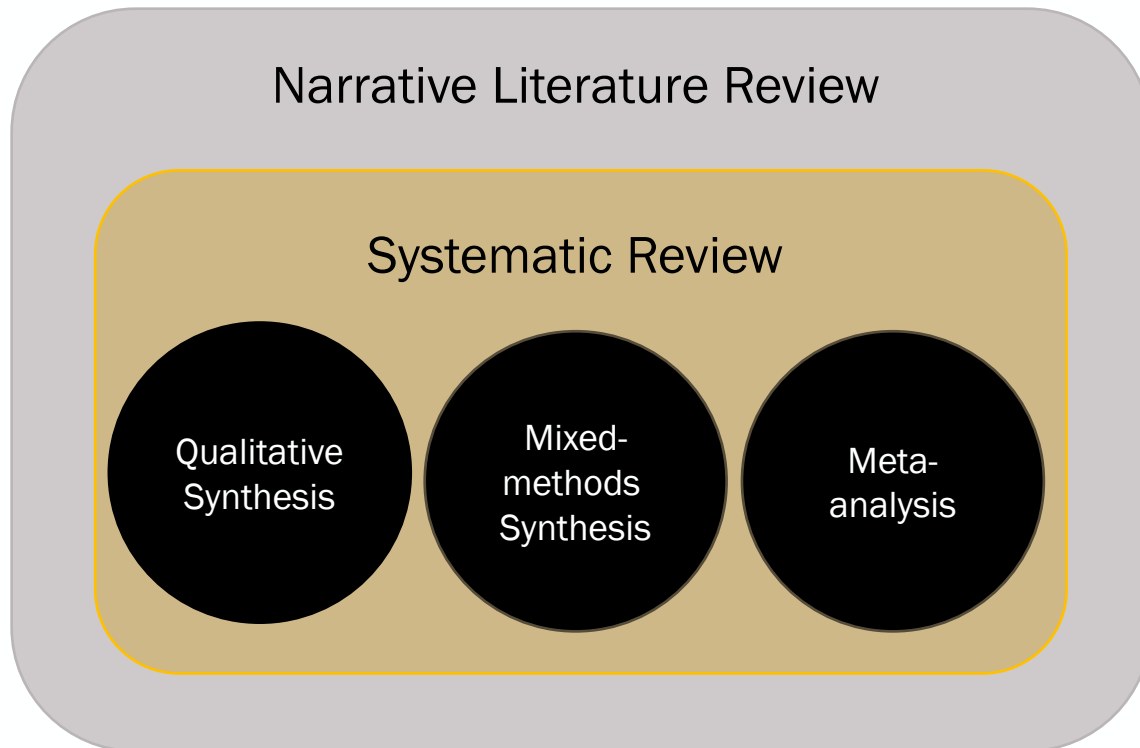
A key question has shifted from whether qualitative synthesis is a valid methodology to **how the methodology can produce valid empirical evidence** to inform decision making in education policy and practice.



Now is NOT the time to reinvent the methodology (Hannes & Macaitis, 2012), but rather **to commit to developing established guidelines and advancing existing methods** to minimize inconsistencies.

What is Qualitative Synthesis?

Types of Review



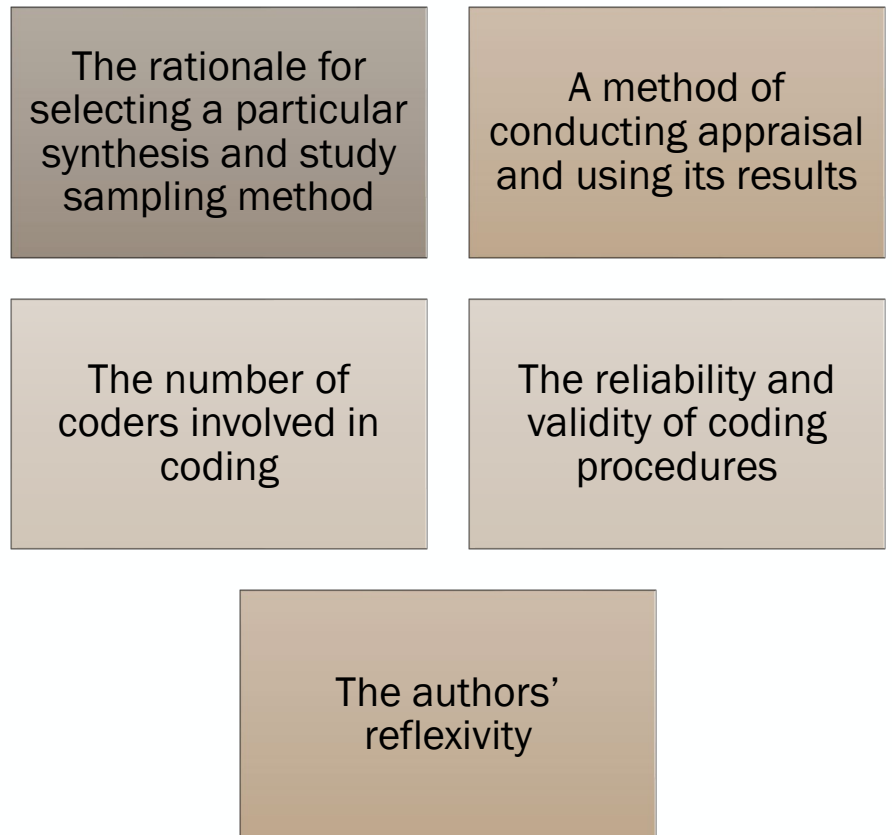
- More popular in Health Sciences
- Emerged in education 1980's
- Not a simple summarizing process
(Nye et al., 2016)
- Uses an interpretive or integrative process
(Dixon-Woods et al., 2005; Urquhart, 2010)
- Deepens understanding of complex phenomena through integration of multiple, interrelated qualitative studies (Lachal et al., 2017)

Current Practices of Qualitative Synthesis in Education

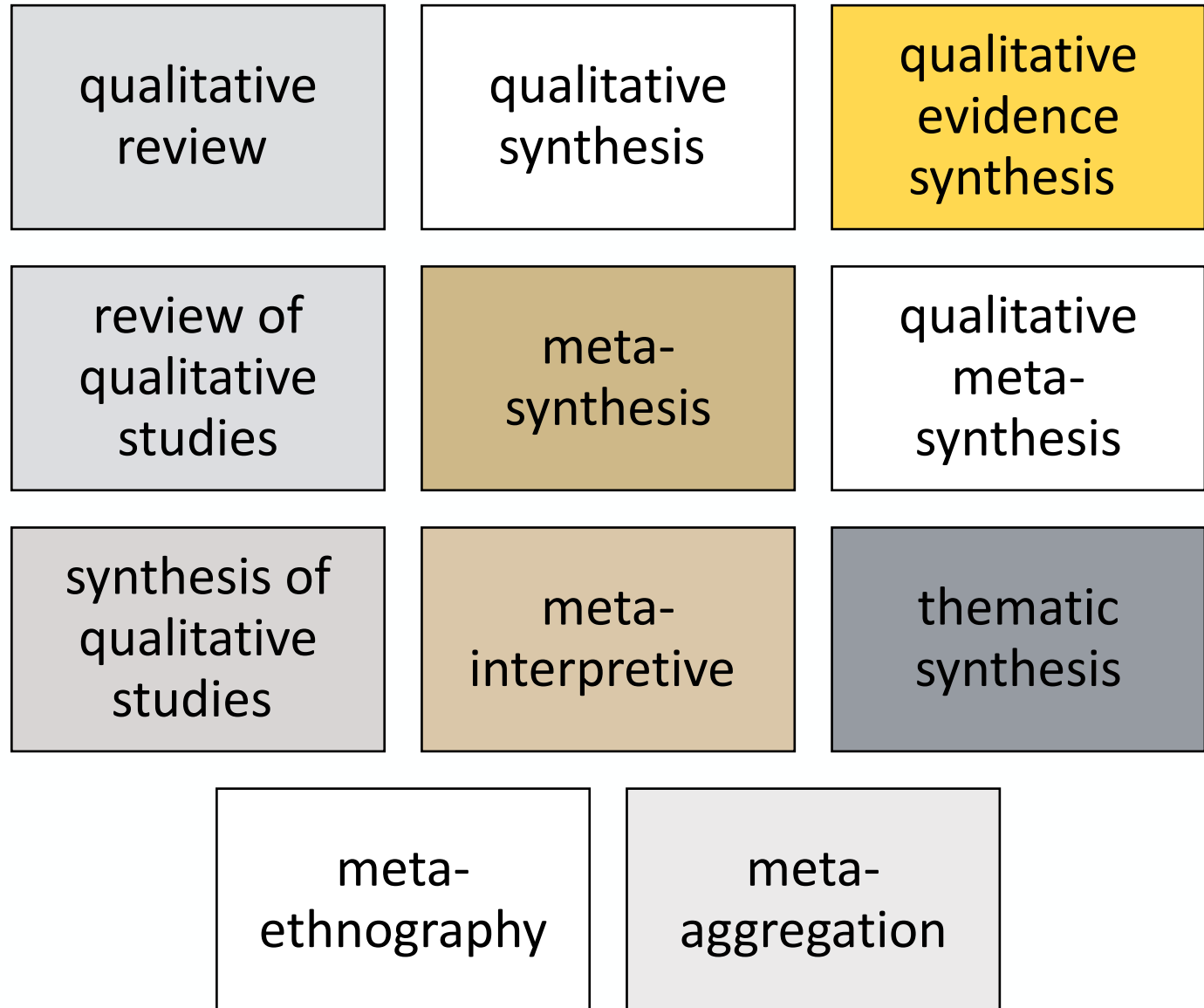
26 Qualitative Synthesis Studies reported between 1988 -2019

- Explicitly state the purpose and search procedures used to identify primary studies
- Limited use of Meta-aggregation
- Infrequent quality appraisal
- Inconsistent depth in reporting synthesis procedures

Existing Qualitative Synthesis Tends to Limit Reporting...



Terminologies for Qualitative Synthesis



Four "more well-defined" Qualitative Synthesis Methods

Grounded Theory (e.g., Kearney, 2001)

- Theory-building

Meta-ethnography (Noblit & Hare, 1988)

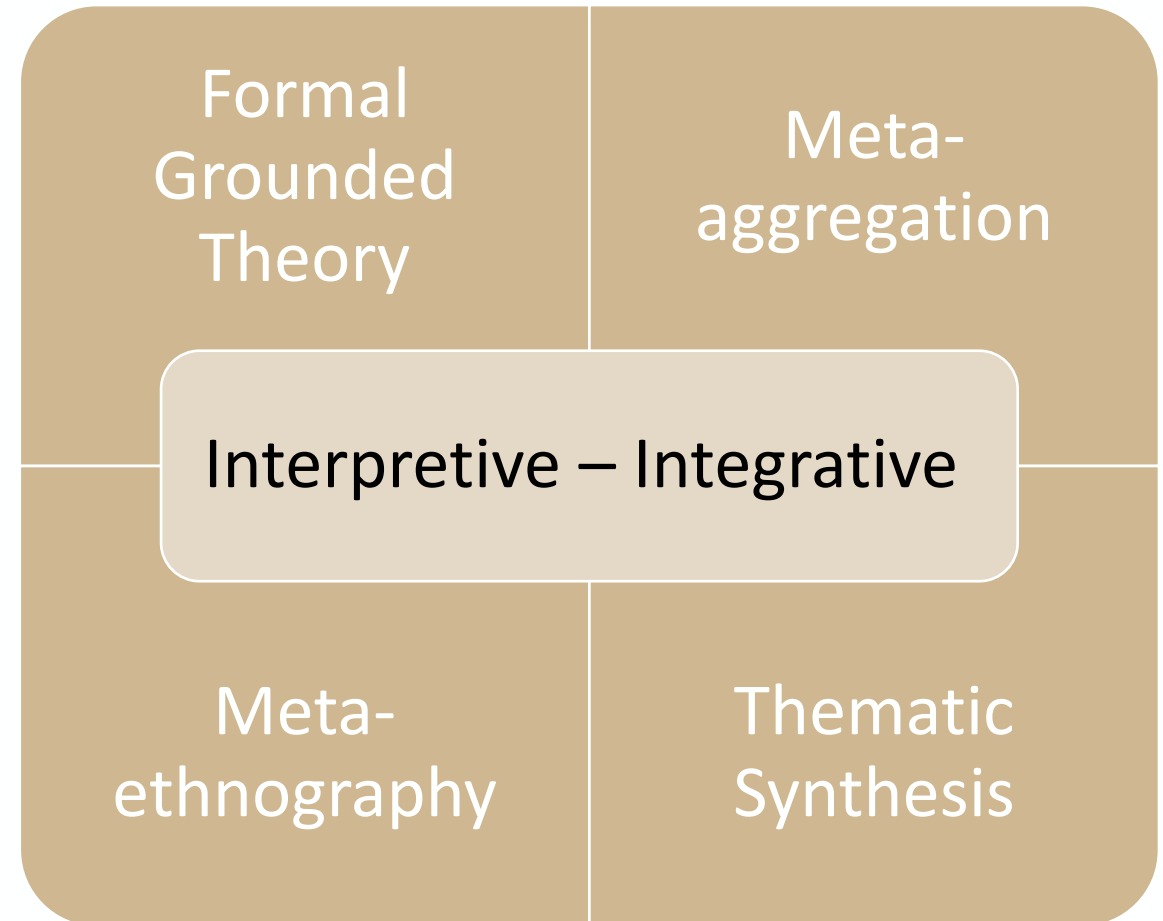
- Interpretive exploration of lived lives or experiences
- Higher-order interpretation of primary studies

Thematic synthesis (Thomas & Harden, 2008)

- Collective summary of themes

Meta-aggregation

- Practical recommendations grounded in data



Our Trajectory of Work & Meta-aggregation

Quality & Quantity
<https://doi.org/10.1007/s11135-022-01403-y>



Development of a critical appraisal tool for assessing the reporting quality of qualitative studies: a worked example

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Formative Assessment in Secondary Mathematics: Moving Theory to Recommendations for Evidence-Based Practice

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Mathematics teacher educators play a key role in supporting secondary mathematics teachers' development of effective, research-based formative assessment (FA) practices. We used qualitative research synthesis as a tool to identify actionable recommendations for mathematics teacher educators as they work with teachers on FA practices in secondary classrooms. These recommendations can strengthen the research-based practices of mathematics teacher educators as they support teachers' ...

Lolkus et al.: Formative Assessment Recommendations

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Developing Formative Assessment Practices in Instruction: Recommendations from a Meta-Aggregation¹

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Secondary mathematics teachers' use of formative assessments have shown promise for developing models of their students' mathematical thinking and informing their instruction. While the complexities of secondary mathematics teachers' formative assessment practices are often captured in qualitative research, there is a critical need for synthesized recommendations to connect formative assessment theory to practice. In a meta-aggregation synthesis from 11 qualitative manuscripts, we explored in-service teachers' formative assessment practices in US secondary mathematics classrooms. Our synthesis led to nine recommendations for in-service secondary mathematics teachers throughout three phases of their instruction: (a) prior to gathering evidence of student thinking; (b) while gathering, supporting, and responding to student thinking; and (c) reflecting on formative assessment practices. We close with connections to equitable teaching practices in secondary mathematics classrooms.

... isal is considered as one of the essential steps in any type of various appraisal tools are available in the literature, the reliability tools tend to be limited due to inconsistencies in their conceptualizations. In addition, limited practical guidelines are available and use these appraisal form for their own synthesis studies. Our aim is to develop and modify components of existing tools and work to address a gap laid out in existing research. Specifically, we set out to (a) develop the development of the appraisal tool over time, (b) attend to the content validity of the appraisal tool, (c) provide a guidance on how to produce an appraisal tool that could be used by all levels of researchers, (d) explain the process we undertook to establish a reliable and valid appraisal tool for qualitative syntheses, share the developed 22-question critical appraisal tool as an example of how to use the results of a critical appraisal synthesis. The developed tool will help focus qualitative synthesis on transparency and completeness of the information reported in qualitative studies to increase the credibility of a qualitative synthesis.

... esis · Appraisal · Credibility · Trustworthiness · Systematic

What is Meta-Aggregation?

Key Features and Philosophical Foundation

- Established by the **Joanna Briggs Institute (JBI)** in the early 2000s
 - Designed to bring summarized, high-quality evidence to practitioners in healthcare
- Grounded in the systematic review process with clear procedures for inclusion, extraction, and synthesis.
- Aims to inform **practice-level theories** and to develop **lines of action** relevant to policy and practice.
- **Pragmatic and non-interpretive**
 - Emphasis on preserving original meanings
 - pursues **unbiased knowledge development** without being influenced by the researcher's preconceptions.
 - Avoids reinterpretation of primary data.

Strengths of Meta-Aggregation

- Well structured guideline
- Remains close to original findings
- Synthesize any types of qualitative findings
- Produce evidence-based recommendations for practice

Key Steps of Conducting Meta-Aggregation

Alignment with Systematic Process & Unique to Meta-Aggregation

Study Identification

1. Develop a clearly defined objective and question
2. Set detailed inclusion and exclusion criteria
3. Implement a comprehensive search strategy
4. Appraise quality of the included studies

Data Analysis

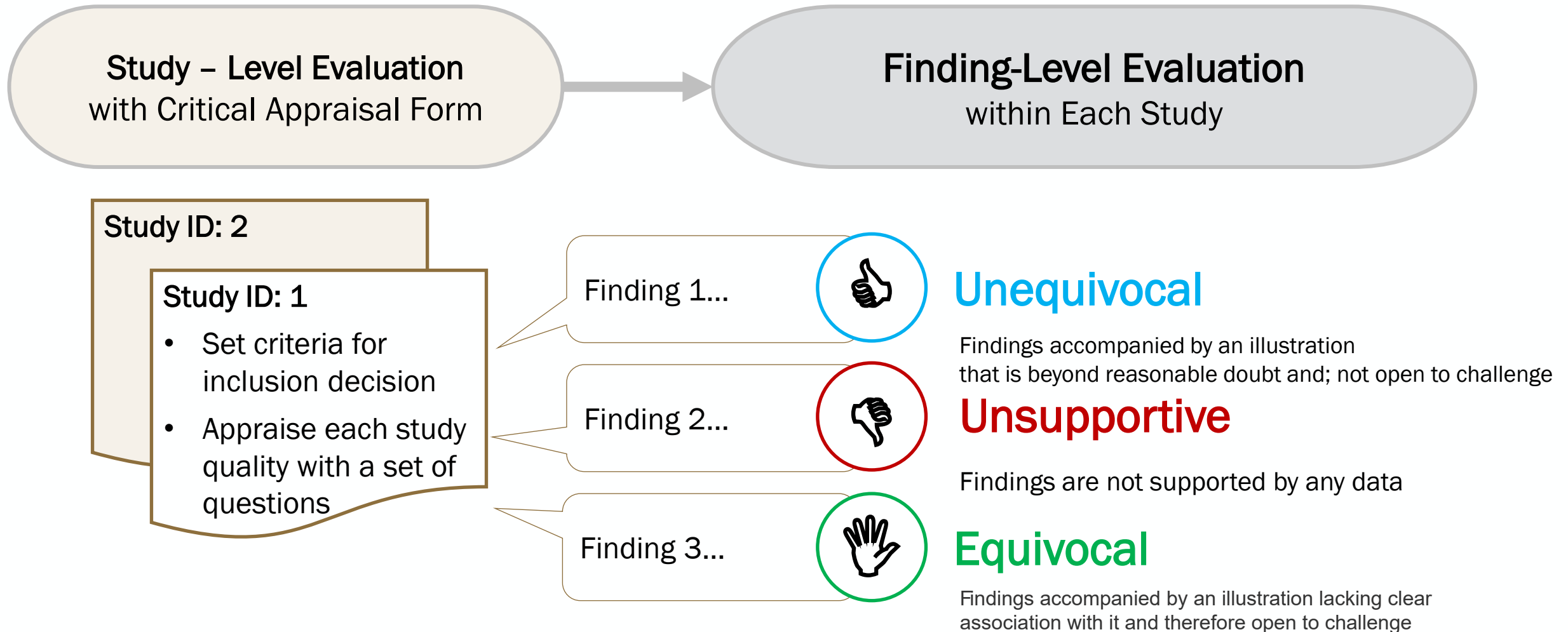
1. Extract relevant findings (e.g., interpretations of authors) from each study
2. Assess credibility of each extracted finding
3. Analyze extracted data
 1. Categorize findings for similarities
 2. Synthesize categories
 3. Describe themes and synthesis statements
4. Transform statements to recommendations

Extracted Evidence for Synthesis

Comparing Quantitative and Qualitative Synthesis

Aspect	Meta analysis	Meta- Aggregation
Primary unit of analysis	Effect size for each outcome variable	“Credible” qualitative findings
Number of outcomes per study	Typical one or a few to avoid statistical bias	Multiple findings per study as long as they are methodologically sound and relevant
Effect size selection	Prioritized based on relevance, statistical independence, and comparability	All findings deemed credible and relevant are extracted, even if many per study
Handling of multiple outcomes	Requires statistical adjustment (e.g., clustering, multilevel models)	Treated as distinct entries; findings are grouped into categories during synthesis
Goal of Outcome retrieval	To quantify effects and synthesis across studies	To preserve original meaning and aggregate similar meaning for practical use

Two Layers of Credibility Judgement in Meta-Aggregation



Challenges in Meta-Aggregation

Appraising Study Quality

- No consensus on how to define quality in qualitative research

Methodological Trustworthiness

- Evaluate the methodological soundness and any risk for producing biased results or conclusions due to the implemented methods in primary studies

Conceptual Insightfulness

- Look for richness and new understandings of the phenomena studied

Reporting Accuracy, transparency, completeness

- Evaluate the thoroughness in reporting design, procedures, analysis, and results of a primary study

“

Reporting Quality: the extent to which a paper provides clear, detailed, and easy to understand information about a study (transparency), provides correct and true information (accuracy), and includes sufficient information (completeness) to allow readers to understand a study

(Hong & Pluye (2019, p. 7)

Critical Appraisal Tool

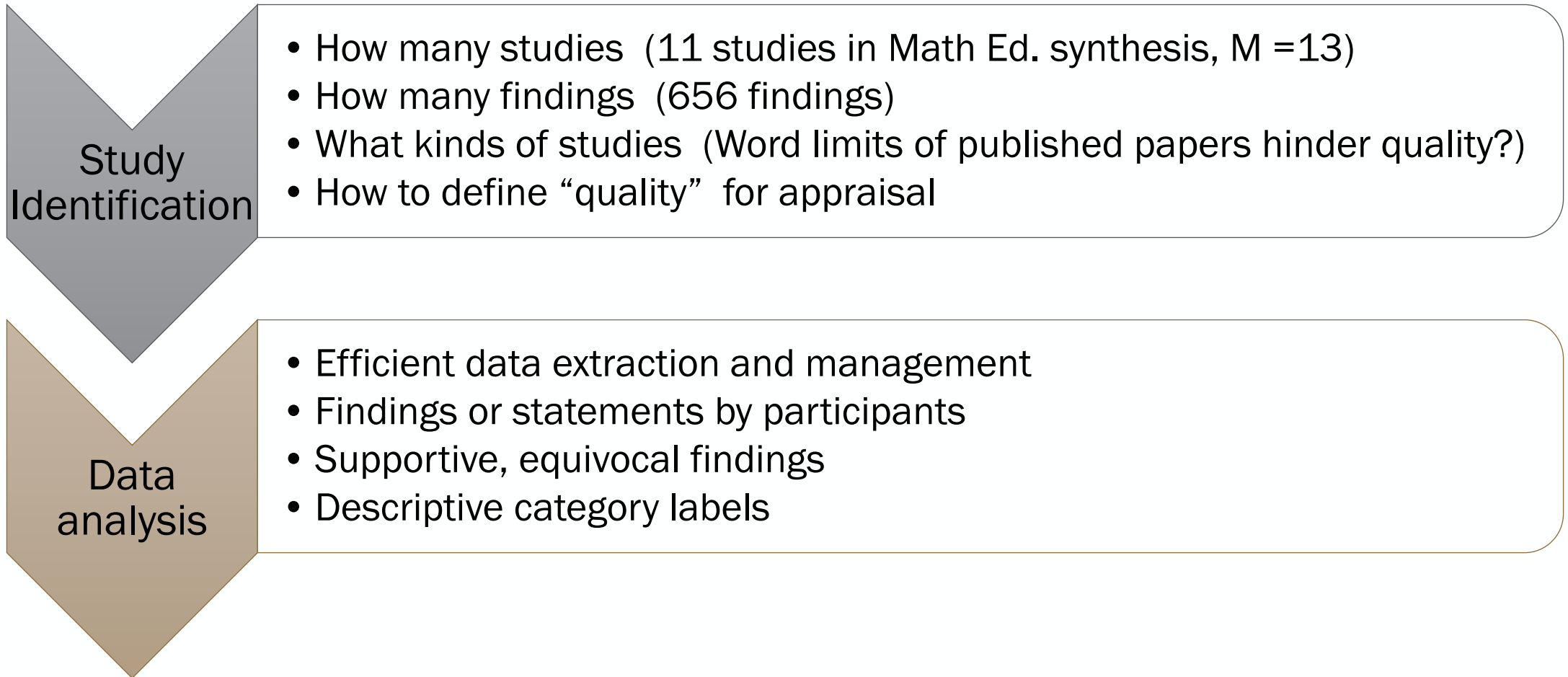
Maeda et al. (2022) 22 questions based on 8 criteria

Table 2 Key questions for pre-screening: The *what* and *how* of the study?

Criteria	Question(s)
Purpose of study	Did author(s) provide research questions? If not, is there any purpose statement to guide the investigation?
Research design	<i>Alignment between research questions and qualitative design:</i> Is qualitative research design used for addressing the research purpose?
Sampling	Did author(s) describe the setting/context for data collection? Did author(s) provide description about the participants?
Data collection	Did author(s) provide any description of data collection procedure? (<i>e.g., how interviews were conducted?</i>)
Data analysis	Did author(s) provide description of data analysis procedure? (<i>e.g., If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data?</i>)
Findings	Did the authors' reported results address the research questions?
Value of the research	Did author(s) provide the implications of the study findings? Did author(s) state the contribution to the field? Or did author(s) state how does the study fit into the existing literature?

Lessons Learned from Conducting Meta-Aggregation

Practical insights from applying meta-aggregation in educational research



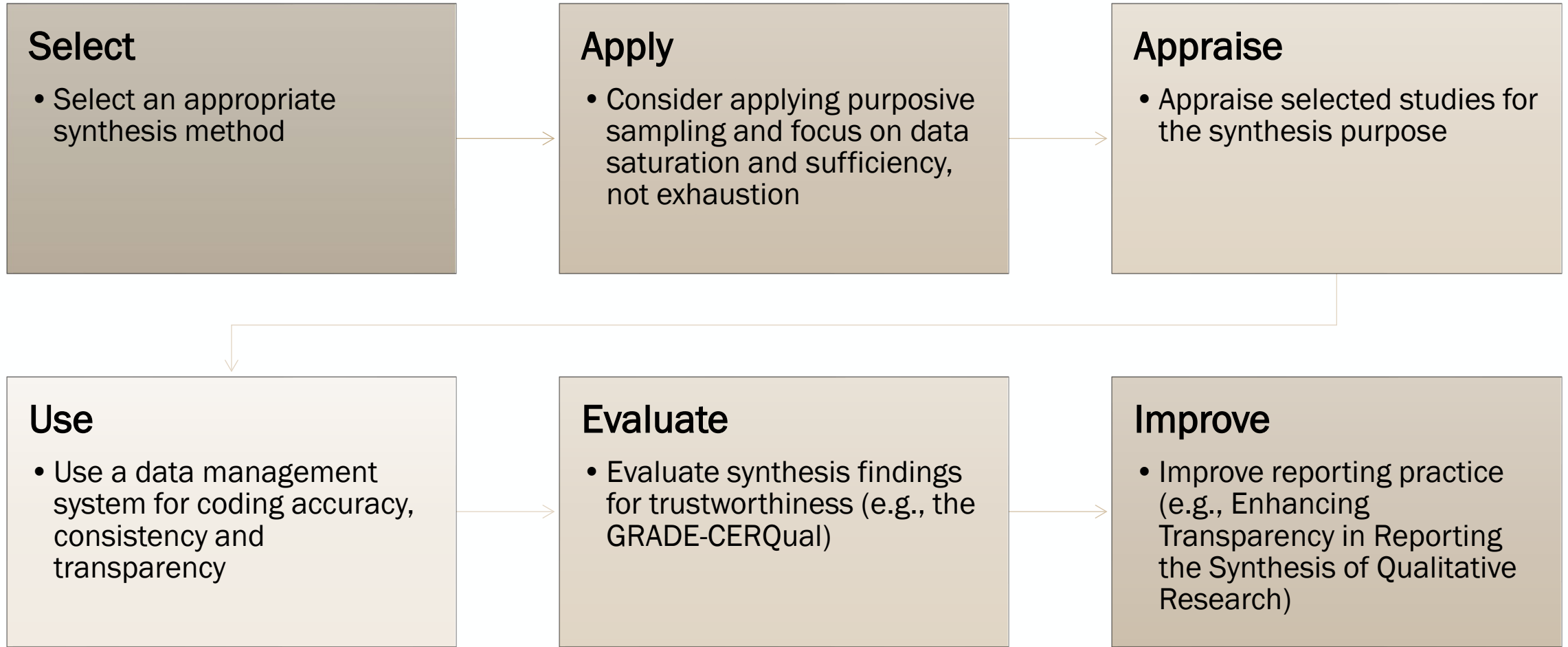
Example of Data Analysis for Meta-Aggregation

Table 3

Example of Phases II and III in the Data Analysis for Meta-Aggregation

Meta-aggregation step	Examples from our study
Extract primary claims and first code them as unequivocal, credible, or unsupported.	<ol style="list-style-type: none"> 1. “This implies that teachers need more support in sharing the learning targets with students and making explicit connections between the learning targets and what happens in their classrooms.” (Philhower, 2018, p. 255) (Credible; found implicit data that supported this claim) 2. “Mr. Patrick’s knowledge of learning trajectories has led him to interpret certain curriculum standards based on his appraisal of what students can handle, and what will ultimately serve them best in the long run.” (Wallinga, 2017, p. 101) (Unequivocal; found a direct participant quote that supported this claim)
Assign descriptive codes to unequivocal and credible claims.	<p>Supporting teachers</p> <p>Connecting to learning targets</p> <p>Knowing learning trajectories</p> <p>Understanding curriculum/standards</p>
Synthesize the codes into synthesis findings. Categorize using desired framework.	<p>Framework Section: Knowledge of curriculum and content connects to FA when teachers—</p> <ul style="list-style-type: none"> • use learning targets (supported by 46 primary claims across seven primary studies) • draw on prior teaching experiences (51 claims, eight studies) • know how and when to adjust curriculum (46 claims, six studies)
Group findings using a thematic statement	Teachers use their knowledge and experience with curriculum to support their use of FA.
Aggregate thematic statements to write a detailed synthesis statement	A rich understanding of the interconnection among past, present, and future mathematical learning objectives helps teachers use FA throughout instruction to monitor and make sense of student thinking and modify the curricula in response.
Translate the synthesis statement into lines of action	Make learning targets/objectives a clear and continual focus of FA strategies.

Recommendations for Conducting Qualitative Synthesis



Future Direction of Qualitative Synthesis Research Methodology



A key question has shifted from whether qualitative synthesis is a valid methodology to **how the methodology can produce valid empirical evidence** to inform decision making in education policy and practice.



Now is NOT the time to reinvent the methodology (Hannes & Macaitis, 2012), but rather to **commit to developing established guidelines and advancing existing methods** to minimize inconsistencies.



Integration of Automated Process in Qualitative Synthesis

Key Steps of Conducting Meta-Aggregation

Balancing Automated Processes and Human Expertise

Study Identification

1. Develop a clearly defined objective and question
2. Set detailed inclusion and exclusion criteria
- 3. Implement a comprehensive search strategy**
 - Integration of automated process
- 4. Appraise quality of the included studies**
 - Integration of automated process

Data Analysis

1. Extract relevant findings from each study
 - Integration of automated process
2. Assess credibility of each extracted finding
 - Integration of automated process
3. Analyze extracted data
 - Integration of automated process
 - Categorize findings for similarities
 - Synthesize categories
 - Describe themes and synthesis statements
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Thank You

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