

# An Introduction to Qualitative Meta-Synthesis

A Method for Equity-Minded Researchers

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**An Introduction to Qualitative Meta-Synthesis:  
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The Institute for Meta-Synthesis (IMS) was established in 2020 with the goals of providing researchers with diverse on-ramps for building knowledge and skills in qualitative meta-synthesis. Between 2020 and 2024, IMS taught over 2,200 researchers through in-person workshops and seminars, webinars, and one-on-one coaching. We also provided online materials that were downloaded over 7,000 times. This user guide is a culmination of our lessons and materials. The guide is written in flexible, modular form to provide step-by-step support of your meta-synthesis project, whether you are a novice or a more experienced researcher in the method. The Institute for Meta-Synthesis is based at TERC, a STEM education research and development organization in Cambridge, MA, and funded by the National Science Foundation Building Capacity in STEM Education Research program.

For more information about the Institute for Meta-Synthesis, see <https://www.terc.edu/metasyntesis/>



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### DISCLAIMER



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**Institute for Meta-Synthesis**

# **Module 1: Introduction, History, Policy, and Basic Concepts**





# Institute for Meta-Synthesis

## Sub-Module 1a: Introduction

### About the User Guide

This user guide was created as a tool to help you learn how to conduct qualitative meta-syntheses. **Qualitative meta-synthesis** is a set of methods that involve collecting, analyzing, and synthesizing literature reporting on multiple qualitative studies to develop a comprehensive understanding of a particular phenomenon. It often involves a systematic gathering, review, summary, and assessment of existing qualitative research, with a focus on identifying patterns and themes across different studies. The objective is to create a new interpretation of the literature that goes beyond any single study, generating new insights and knowledge of the phenomenon being explored. Meta-synthesis is used in a variety of disciplines, including education, healthcare, and the social sciences. This guide addresses the steps of a particular type of qualitative meta-synthesis called **systematic thematic synthesis** (see [«Sub-Module 1c»](#) for more on this topic). We share the steps of this approach, from laying the foundation of a meta-synthesis project to writing and publishing a manuscript that synthesizes the existing literature around a chosen topic.

These steps are actively used by us, a team of meta-synthesis researchers at TERC (authors of this guide were led by Drs. Maria Ong and Nuria Jaumot-Pascual), and have been refined over the past 20 years. Prior to reading through this user guide, you should have an idea of a topic you would like to study for a qualitative meta-synthesis. The topic may be vague or specific, but this user guide will be most useful if you know what you would like to focus on.

This user guide contains eight modules. The first four modules focus on understanding the purpose of a meta-synthesis and the steps involved in collecting literature to conduct a qualitative meta-synthesis. The fifth and sixth modules discuss the coding process and how to draft sections of your meta-synthesis paper, including how to develop your synthesis findings and discussion. The seventh module addresses the writing process as it relates to publishing your meta-synthesis paper, and the eighth module focuses on writing a grant proposal for a meta-synthesis project. The modules and sub-modules, which address specific module topics, are listed in the table of contents and below in Table 1a.1. Finally, terms emboldened in orange may be found in the Glossary Terms section at the end of the user guide.

Table 1a.1. Structure of the user guide by module and sub-module

<p><b>Module 1: Introduction, history, policy, and basic concepts</b></p> <ul style="list-style-type: none"> <li>1a. Introduction</li> <li>1b. History and translating synthesis work into policy and practice</li> <li>1c. Basic concepts</li> </ul>	<p><b>Module 2: Pre-search process</b></p> <ul style="list-style-type: none"> <li>2a. The synthesis question and theoretical framework</li> <li>2b. Search, selection, and critical appraisal criteria</li> <li>2c. Search engines, databases, and other tools</li> <li>2d. Search terms, Boolean rules, and search strings</li> </ul>
<p><b>Module 3: Search and selection process</b></p> <ul style="list-style-type: none"> <li>3a. The start set</li> <li>3b. Inclusion and exclusion decision-making</li> <li>3c. Critical appraisal</li> <li>3d. Forward and backward snowballing</li> </ul>	<p><b>Module 4: Analysis – Introduction and preparation</b></p> <ul style="list-style-type: none"> <li>4a. The analysis process</li> <li>4b. Being strategic when reading academic literature</li> <li>4c. Creating analytical memos</li> </ul>
<p><b>Module 5: Analysis – Coding</b></p> <ul style="list-style-type: none"> <li>5a. Codes and coding</li> <li>5b. Creating a codebook</li> <li>5c. Deductive coding</li> <li>5d. Inductive coding</li> <li>5e. Hybrid coding</li> <li>5f. Computer-Assisted Qualitative Data Analysis Software (CAQDAS)</li> </ul>	<p><b>Module 6: Analysis – Themes, findings, and discussion</b></p> <ul style="list-style-type: none"> <li>6a. Thematic analysis</li> <li>6b. Findings and discussion</li> <li>6c. Conclusion and recommendations</li> </ul>

<p><b>Module 7: Writing and publishing</b></p> <ul style="list-style-type: none"> <li>7a. The nature of writing</li> <li>7b. Identifying an appropriate publication outlet</li> <li>7c. Structuring your meta-synthesis manuscript</li> <li>7d. The publication process</li> </ul>	<p><b>Module 8: Proposals for funding</b></p> <ul style="list-style-type: none"> <li>8a. Requests for proposals (RFPs)</li> <li>8b. Writing the front matter of a proposal</li> <li>8c. Writing the body of a proposal</li> <li>8d. Writing the back matter of a proposal (Part 1)</li> <li>8e. Writing the back matter of a proposal (Part 2)</li> </ul>
<p><b>Glossary Terms</b></p>	

See the flowchart in Figure 1a.1 to see how the modules connect to one another. As the arrows in the chart indicate, the method of creating a meta-synthesis is not always unidirectional. The process is often iterative, requiring returning to prior steps and refining decision-making or analyses. The result of a meta-synthesis is usually a paper and often (but not always) a publishable manuscript. Meta-syntheses can be costly in terms of time and labor. Ideally, a grant proposal comes at the beginning of a project to support the meta-synthesis activities, but funds are not always necessary or timely. This work can also be part of course assignments or undergraduate or graduate research, or be folded into another project.

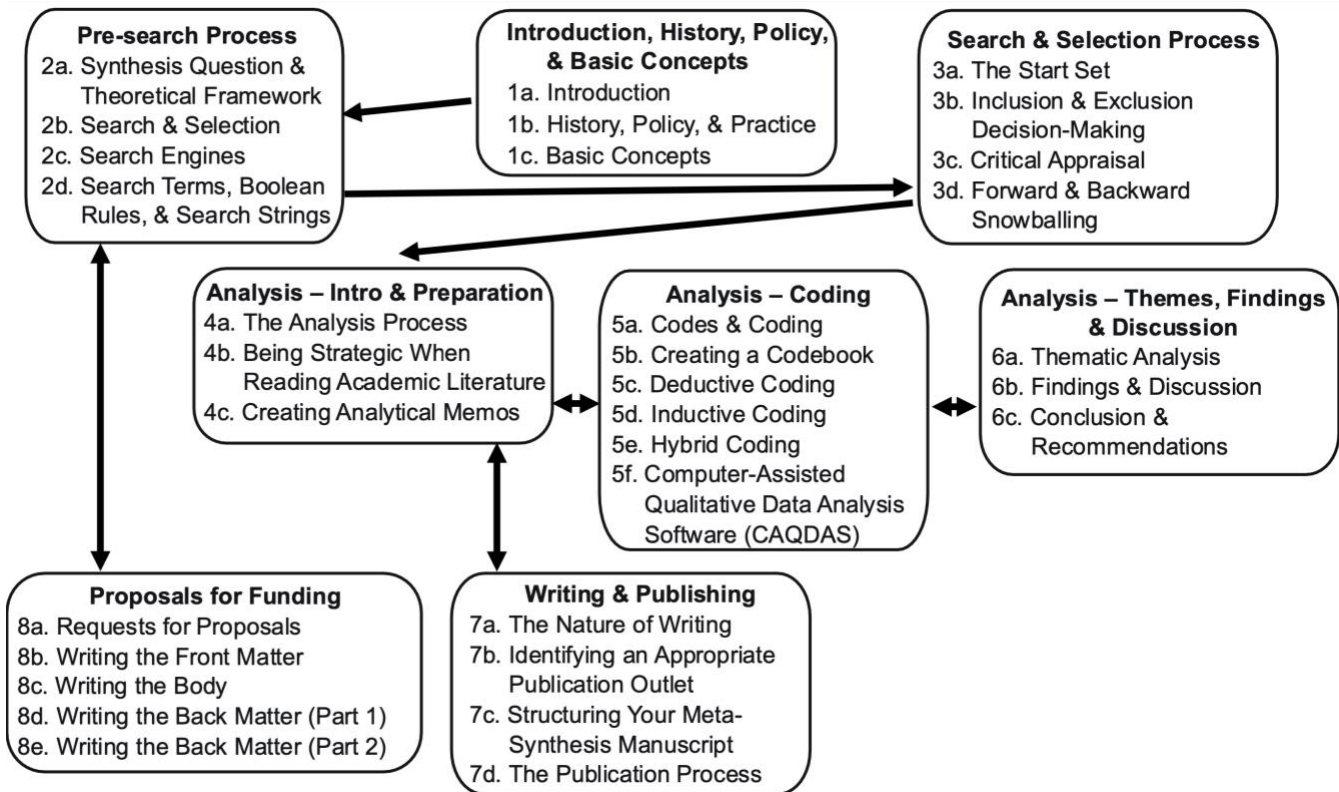


Figure 1a.1. Flowchart of modules and sub-modules of the user guide demonstrating their relationship with one another

Our team understands that different readers may be in different stages of conducting qualitative meta-syntheses. We created this guide in a modular fashion; so, if you are at a more advanced stage of your meta-synthesis project, you may find information on the precise module or sub-module about which you would like to learn. In other words, it is possible to use this user guide without carefully reading through each module. However, we highly recommend that you at least skim through modules with content with which you are already familiar, as we often refer to prior sub-modules for context. This will minimize confusion when encountering these sub-module references.

Activities are embedded in each sub-module for you to complete as you progress through the user guide. Although we provide recommended lengths of time to complete the activities *as exercises*, they are **not** guidelines for the length of time you should take to complete these phases of your actual meta-synthesis project. It will likely take much longer to complete each step of the meta-synthesis than what is described for each exercise in this guide.

Additionally, this user guide will refer to a group as “we,” which is in reference to our team (the authors of this user guide) and what we have done. However, the guide often refers to the individual reader (or team) as “you,” as it relates to the specific steps needed to conduct a qualitative meta-synthesis and to write a meta-synthesis paper or grant proposal.

## Important Considerations and Decisions to Make Before You Begin

Before delving into a meta-synthesis project, it is important to consider the following:

1. The topic you are interested in researching and synthesizing
2. The time you are able to commit to conducting a meta-synthesis
3. Whether you will conduct a meta-synthesis alone or with a team

These three factors are critical in helping you determine how to approach the next seven modules. Be aware that decisions about one factor will often affect the other factors. When considering the topic you are interested in researching and synthesizing, it is important to decide how much time you can commit to conducting a meta-synthesis. For example, if you only have six months to a year to dedicate to a meta-synthesis project, then you should consider choosing a topic that is more narrowly focused rather than a topic that is broad. Depending on the topic you have chosen and the time you are able to commit to this work, it is also helpful to think about whether you should conduct the project alone, or if you should recruit a partner or a team.

The three meta-synthesis projects led by Dr. Ong have always been conducted in team settings (with 4–5 people on each team). These projects lasted approximately three years from start to finish, with each member of the team working approximately eight hours per week. Our engineering and computing meta-synthesis projects informed one another and were further informed by Dr. Ong's initial meta-synthesis on women of color in general STEM (science, technology, engineering, and mathematics). In other words, each project refined the processes already developed by the team. For example, for the computing meta-synthesis project, we used an updated codebook initially created by the engineering meta-synthesis team. As will be discussed in «[Module 5](#)», this codebook was a living document that was refined over several years. Although each project had a different STEM disciplinary focus, the engineering and computing synthesis project teams were not starting from scratch. Nonetheless, it still took at least three years to complete each meta-synthesis project from start to finish, owing to the rigor of the process described in this user guide.

From our experience, working in a team has been a way to effectively and efficiently tackle the thousands of pieces of literature that needed to be identified, found, filtered, read, and analyzed in each meta-synthesis project. We recommend that you work with internal and/or external collaborators and potentially other experts as part of your team to make it easier to produce a high-quality meta-synthesis project in a reasonable timeframe. See Table 1a.2 for a list of some pros and cons to consider at various steps when working on a meta-synthesis alone or in a team. Once you have considered these factors, and regardless of your decision, you will feel more at ease as you progress through this user guide. Remember that, even when working in a team, not all steps need to be done by all members of the team. Members can work on specific steps individually according to their skills and time, as appropriate, and then bring the work to the team.

Table 1a.2. The benefits and drawbacks of working on a meta-synthesis project alone or in a team

TIME	
Team	Individual
<p><b>Pros:</b> Can divide the work among team members; there are more eyes to sift through the literature</p> <p><b>Cons:</b> Must manage/coordinate other people and their schedules, and build consensus</p>	<p><b>Pros:</b> Can work around your own schedule and at your own pace</p> <p><b>Cons:</b> Project can take a long time to complete if the topic is not narrowly focused</p>

PRE-SEARCH	
Team	Individual
<p><b>Pros:</b> Team members may have experience with different search engines/directories or know of appropriate theoretical frameworks that you may not be familiar with; access to team members' diverse areas of expertise</p> <p><b>Cons:</b> Must invest time in building consensus around search criteria</p>	<p><b>Pros:</b> Can freely select the topic, theoretical framework, and criteria on your own without consulting others</p> <p><b>Cons:</b> Risk losing the value of having diverse perspectives; must rely on own knowledge of theoretical frameworks/search engines/directories</p>

## SEARCH AND SELECTION

Team	Individual
<p><b>Pros:</b> Different team members may have access to different resources due to their institutional affiliations (e.g., an undergraduate intern may have access to a university’s digital holdings); dividing the work among team members</p> <p><b>Cons:</b> Must invest time in building consensus around inclusion/exclusion criteria and critical appraisal; need to make sure to stay organized among team members; need to train team members to make sure your approach is consistent across all members</p>	<p><b>Pros:</b> Can implement criteria without outside input; may be easier to stay organized (if you are already an organized person); do not have to spend time training anyone but self</p> <p><b>Cons:</b> May not have access to different resources beyond your own institutional affiliation; may be hard to stay organized (if you are not an organized person); must do all the work on your own</p>

## ANALYSIS

Team	Individual
<p><b>Pros:</b> Have different perspectives of the data (e.g., team members may bring a new definition to a code that you would not have considered alone); dividing the work among team members</p> <p><b>Cons:</b> Must make sure to have a codebook and clear definitions for codes so that everyone on the team understands and uses the codes accurately; you may need to arrive at a consensus with your team member(s) on data when you are coding and do not agree on your codes</p>	<p><b>Pros:</b> Easier to adjust codes or your codebook as you go along since you do not need to build consensus with others</p> <p><b>Cons:</b> Do not have the perspectives of other people; must do all the work on your own</p>

## WRITING AND PUBLISHING

Team	Individual
<p><b>Pros:</b> Can divide and conquer the different sections of the manuscript or proposal</p> <p><b>Cons:</b> Must blend the voices and writing styles of multiple people into one cohesive piece; must share the credit of authorship with others.</p>	<p><b>Pros:</b> Do not have to worry about dealing with multiple writing styles; can freely write in your own voice; claim sole authorship</p> <p><b>Cons:</b> Lose the value of having different perspectives; writing process may be slower</p>

## FUNDING

Team	Individual
<p><b>Pros:</b> Team members may have access to different sources of funding for the project; can assist with grant proposal writing</p> <p><b>Cons:</b> May be difficult to get enough funding for all team members; takes time to coordinate team members to develop a grant proposal and receive funding</p>	<p><b>Pros:</b> Do not have to worry about funding others; can potentially do the meta-synthesis without external funding depending on your employment situation and institutional affiliation</p> <p><b>Cons:</b> May not have funding dedicated to the project, so own labor may not be covered; may not have funds to purchase some of the literature, software, or other resources needed for analysis</p>





# Institute for Meta-Synthesis

## Sub-Module 1b:

## History and Translating Synthesis Work into Policy and Practice

### Objectives

In this sub-module, you will learn:

- How our team started our qualitative meta-synthesis work
- How we translated our synthesis work into policy and practice

### Main Concepts

Before we begin introducing you to the basic concepts of a meta-synthesis, we would like to describe some of our earlier synthesis work to illustrate the potential usefulness and impact of meta-syntheses. Our meta-synthesis experiences began with projects on women of color in STEM higher education and careers. This work laid the foundation for the next two syntheses on women of color in engineering (Ong et al., 2020) and computing higher education and professions (Jaumot-Pascual, Ong et al., 2021; Jaumot-Pascual, Silva et al., 2021). It is also the basis for the creation of this user guide.

In this sub-module, we will look at the team's progression of meta-synthesis work and how we used it to influence policy and practice beyond the publication of meta-synthesis manuscripts. See Figure 1.b.1 for a snapshot of five of our qualitative meta-synthesis projects, which have been funded by the National Science Foundation, and have built upon each other over the past 20 years.

In our work, one main synthesis question we ask is: In what ways do women of color in higher education and careers experience supports and barriers on their pathways in STEM? We define *women of color* as women who identify as African American or Black; Asian or Asian American; Latinx/e, Hispanic, or Chicana; Native, Indigenous, or Pacific Islander; or multiple races or ethnicities. All our work is conducted in the United States, and it is grounded in theory with a social justice lens, such as critical race theory or intersectionality. Keep this synthesis question and definition of women of color in mind as you go through this user guide.



Figure 1.b.1. A snapshot of our team’s meta-synthesis work

### *The Beginning of Our Meta-Syntheses Work: Translating Synthesis Work into Policy and Practice*

In 2006, our team leader, Dr. Maria Ong, began a small meta-synthesis project called *Inside the Double Bind* (NSF/DRL-0635577). For this project, Dr. Ong, her collaborator Dr. Gary Orfield, and Dr. Ong’s TERC-based team at the time—consisting of a postdoctoral fellow, a graduate researcher, and two undergraduate research assistants—developed a qualitative meta-synthesis on pieces that had been published about women of color in STEM since 1970. This meta-synthesis was eventually published in the *Harvard Educational Review* (Ong et al., 2011) and is now widely known and cited in the field of broadening participation in STEM education. For example, it was quoted in an amicus brief submitted to the U.S. Supreme Court in support of affirmative action in the *Fisher vs. the University of Texas* case (Levine & Ancheta, 2013).

From this meta-synthesis, our team created a policy brief for promoting women of color in STEM, drawing information directly from the meta-synthesis. In February 2009, Dr. Ong presented the policy brief to the Committee on Equal Opportunities in Science and Engineering—or CEOSE—which is a congressionally mandated advisory committee to NSF on issues of equity and inclusion (Dr. Ong was a CEOSE member at the time). Fellow CEOSE members invited her to organize the Mini-Symposium on Women of Color in Science, Technology, Engineering, and Mathematics, which took place in the fall of that year. This Mini-Symposium has since, directly or indirectly, influenced multiple publications on women of color. Further, the American Chemical Society (ACS) was a co-sponsor of the Mini-Symposium, and the ACS Women Chemists of Color organization was born at this event.

Following the Mini-Symposium, Dr. Ong authored a proceedings report (Ong, 2010). From this report, CEOSE made 10 recommendations to NSF and U.S. Congress for promoting women of color. NSF has acted on several of these recommendations, including funding multiple projects such as annual conferences and support programs for women of color in STEM. The recommendations were also referenced in the National Science Foundation’s Career-Life Balance Initiative. See Figure 1b.2 for a dendrogram detailing the impact this meta-synthesis had on policy and practice.

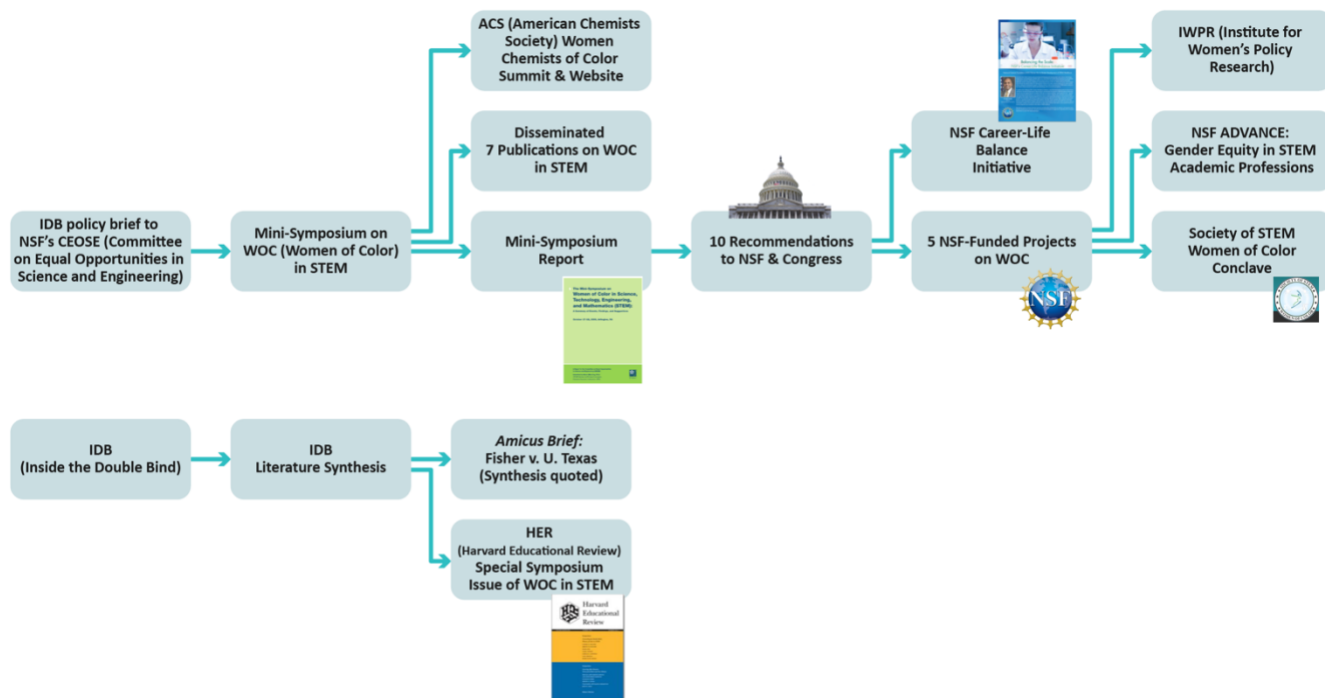


Figure 1b.2. Dendrogram of Dr. Maria Ong’s first meta-synthesis and its impact on policy and practice

### Extending Equity and Social Justice Meta-Synthesis Work into Computing and Engineering

Following the meta-synthesis on women of color in STEM, Dr. Ong continued her synthesis work with Dr. Nuria Jaumot-Pascual on the experiences of women of color in engineering higher education and professions (2014–2018; NSF/REE-1427129). This project was called *Engineering Beyond the Double Bind* and was funded by NSF. This work resulted in the publication of a meta-synthesis manuscript by Drs. Ong and Jaumot-Pascual and Lily Ko (Ong et al., 2020). This manuscript synthesized 16 years of literature on women of color in undergraduate engineering education and advanced recommendations for the field. This publication included detailed description of the systematic thematic synthesis methods used by our team and included in the current user guide.

Most recently, Drs. Ong and Jaumot-Pascual, along with two additional researchers from TERC, Christina B. Silva and Audrey Martínez-Gudapakkam, completed their meta-synthesis project on women of color in computing higher education and professions (2018–2021). This grant, which was also awarded by NSF, was called *Literature Analysis and Synthesis of Women of Color in Technology*

*and Computing*—which we called LASOW for short. For this meta-synthesis, we published two syntheses in 2021, and we are in the process of producing more manuscripts for publication. About a year into the project, Dr. Ong received an invitation to join the National Academies Advisory Committee on Addressing the Underrepresentation of Women of Color in Tech. The goal of the committee was to produce a Consensus Study Report that reflected the current knowledge base about women of color in technology education and careers.

At the first National Academies meeting, which took place in November 2019, the committee decided an important part of the report would be a literature review of recently published works on the topic of girls and women of color in STEM. A committee colleague, Dr. Allison Scott, Chief Executive Officer of the Kapor Foundation, and Dr. Ong were assigned to write the literature review chapter. With the support of the National Academies staff and other committee members, they drafted the literature review chapter for the report over the course of 18 months. Approximately 80% of the research included in the chapter was drawn from the parallel LASOW meta-synthesis project. There was full transparency of information sharing between the National Academies, NSF, and TERC, the home organization of Dr. Ong and the LASOW research team. The National Academies Consensus Study Report was released in December 2021 (National Academies of Sciences, Engineering, and Medicine, 2021).

Throughout 2022, Dr. Ong participated in a national symposium on the report and at multiple national briefings, including to the U.S. Congress and the White House Office of Science and Technology Policy. At these briefings, she presented highlights from the report’s literature review chapter. What was exciting about these events were the follow-up discussions with staffers in attendance who began thinking about how to practically apply the findings and recommendations to policy reform, such as requiring disaggregated demographic data. This could be an important change in policy that would give much-needed visibility to the representation of women of color in tech fields. Additionally, Dr. Ong appeared on three episodes of *Transforming Tech*, a podcast released in early 2024 by the National Academies that delved into key report findings (Burge, 2024).

Another potential set of policy-related outcomes is the recently launched Action Collaborative on Transforming Trajectories for Women of Color in Tech. The Action Collaborative comprises an ecosystem of universities, colleges, professional organizations, and national laboratories that forms goals grounded in the report’s recommendations and then aims to return to their respective organizations to make and sustain “resources and opportunities” for women of color (National Academies of Sciences, Engineering, and Medicine, 2024; Dr. Ong is an Advisory Member to the Action Collaborative). If carried out as designed, this could produce profound systemic change towards equity and inclusion of women of color in tech. See Figure 1b.3 for a dendrogram detailing the impact this meta-synthesis had on policy and practice.

Thus far, our team has written or contributed to five systematic thematic synthesis publications on the experiences of women of color in STEM as a whole, and in engineering and computing in particular (Ong et al., 2011; Ong et al., 2020; Jaumot-Pascual, Ong et al., 2021; Jaumot-Pascual, Silva et al., 2021; National Academies of Sciences, Engineering, and Medicine, 2021). We have now turned to teaching others how to conduct meta-synthesis projects with a specific focus on STEM education and equity.

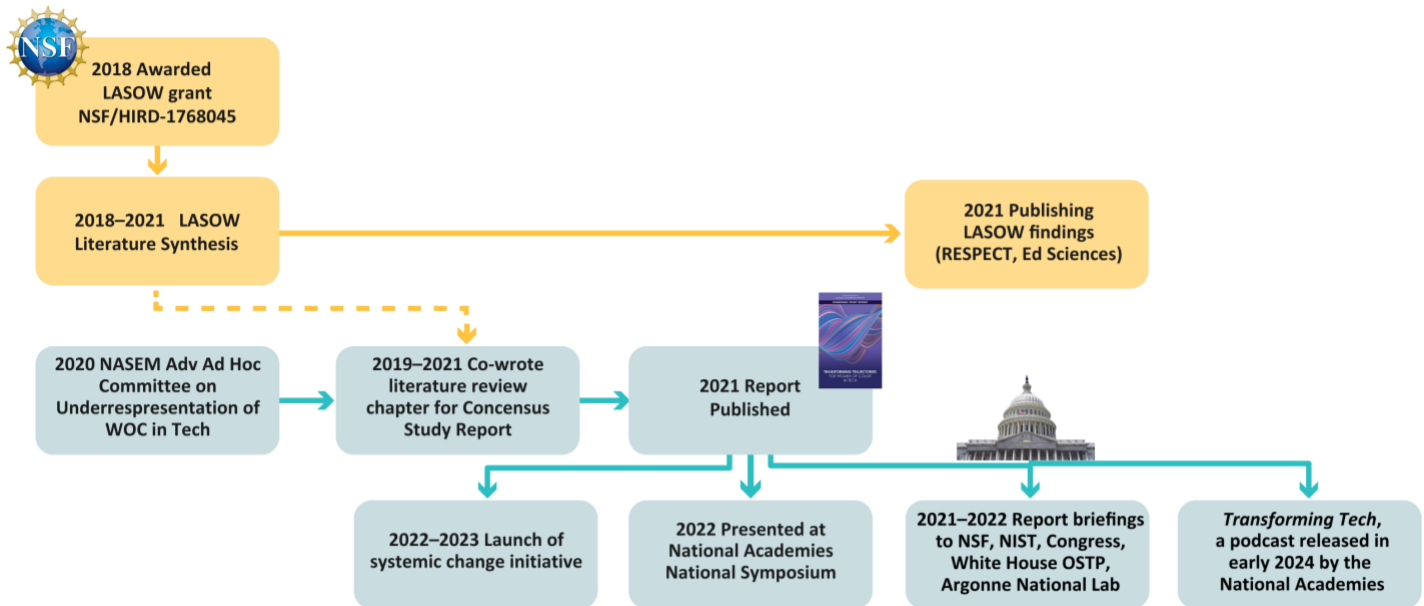


Figure 1b.3. Dendrogram of Drs. Maria Ong and Nuria Jaumot-Pascual’s computing meta-synthesis and its impact on policy and practice

### The Institute for Meta-Synthesis

In October 2020, with funding from NSF, we launched the *Institute for Meta-Synthesis: A Practicum through the Lens of STEM Equity and Inclusion Literature*, which we called the acronym IMS or the Institute for Meta-Synthesis for short. The purpose of IMS was to offer informational sessions about what is meta-synthesis, in-depth workshops and webinars for those interested in learning qualitative meta-synthesis techniques, and a permanent set of resources—including this user guide—to teach others about meta-synthesis methods with a special emphasis on STEM equity and inclusion literature, which is where our content expertise lies.

Our goals for the Institute were to equip participants with skills for executing successful meta-synthesis projects, publishing rigorous meta-syntheses, and constructing competitive meta-synthesis grant proposals, hopefully with a focus on educational equity and inclusion in STEM. Between 2020 and 2024, we taught over 2,200 scholars worldwide the introductory skills of qualitative meta-synthesis.

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## Sub-Module 1c: Basic Concepts

### Objectives

In this sub-module, you will learn:

- The multiple purposes of literature syntheses
- The similarities and differences between literature review and a qualitative meta-synthesis
- The characteristics of qualitative meta-synthesis

### Main Concepts

In this sub-module, we introduce the multiple functions a literature synthesis can serve, from fulfilling academic goals of gathering and reporting widely published material to supporting broader societal goals of improving lives. We then compare meta-synthesis to the more familiar concept of literature review. Finally, we describe various characteristics of existing qualitative meta-syntheses and describe our team's choice, systematic thematic synthesis, which is the design we describe throughout this user guide.

#### *The Purposes of Creating a Meta-Synthesis*

Synthesizing literature serves three main purposes: access, theory development, and informing policy and practice. For some scholars, conducting qualitative meta-synthesis work is part of their main scholarship area, where they may contribute to their discipline's body of knowledge and potentially help to address the issue of "small numbers" of participants in individual qualitative research studies.

#### **ACCESS**

New research literature is constantly being published. It would be impossible for any scholar to review all new publications, understand main findings, and draw conclusions for practice in a particular discipline or area. Thus, having access to a publication or paper that synthesizes collections of literature, which have been selected according to a set of criteria, provides scholars with access to overviews of a broader set of academic writing in an efficient manner.

#### **THEORY DEVELOPMENT**

Bringing together the findings and discussions of a set of primary research reports through synthesis can provide you with the opportunity to have a bird's eye view of the advances in that area. Qualitative meta-syntheses support the identification of patterns and the generation of new insights for the development of new theory, which can lead to the development of process frameworks and theories



that are generalizable or transferable beyond the findings of a single study. Some examples of theory development identified and provided by Paterson (2012) include:

- Providing an overview of a body of work and revealing more powerful explanations than those available in a single study. This can lead to greater generalizability and increased levels of abstraction (e.g., Sherwood, 1999).
- Revising current understandings of a particular phenomenon (e.g., Paterson, 2001)
- Exploring differences and similarities across settings, populations, and researchers' disciplinary, methodological, and theoretical perspectives
- Generating models or theories that can be explored in later research (e.g., Khan et al., 2001)
- Providing a historical overview of the study of a phenomenon
- Providing more powerful explanations for a phenomenon

Additionally, synthesizing literature also helps identify the gaps in the literature and provides direction for future research and further theory development.

### INFORMING POLICY AND PRACTICE

As illustrated in «[Sub-Module 1b](#)», given that qualitative meta-syntheses bring together a broad view of a phenomenon and access to recommendations from a broad set of primary research reports, syntheses can provide guidance for policy and practice. This is particularly applicable for studies that evaluate the effectiveness of certain programs or interventions.

### OFFSETTING SMALL NUMBERS

One of the most common critiques of qualitative research is that it is conducted with small numbers of participants, which limits the generalizability of findings from a statistical perspective (Pawley, 2019). Though generalizability is not necessarily the goal of qualitative research, qualitative meta-synthesis addresses the small numbers issue by aggregating the participants of all the qualitative studies it brings together to synthesize their findings into meta-findings. Consequently, these meta-findings apply to larger numbers of participants as compared to those of each single study included in the set.

### *Literature Review vs. Qualitative Meta-Synthesis*

There is often confusion regarding the similarities and differences between a literature review and a qualitative meta-synthesis. In this section, the two approaches are compared.

According to Rowley and Slack (2004), "[t]he **literature review** identifies and organizes the concepts in relevant literature" (p. 31). The purpose of a literature review is to "[distill] the existing literature in a subject field; ... to summarize the state of the art in that subject field. From this review of earlier and recent work, it becomes possible to identify areas in which further research would be beneficial" (Rowley & Slack, 2004, p. 32). A literature review is often used to frame a specific study that the author of the review will conduct. It is not *systematic*, meaning that it does not try to include all the existing literature on the topic of interest or to use methods that are replicable by others. It also does not use analysis methods (e.g., narrative analysis, thematic analysis) to arrive at its conclusions.



**Qualitative meta-synthesis** is an umbrella term for different synthesis designs that qualitatively synthesize primary studies. It is “the synthesis or amalgamation of individual qualitative research reports (commonly called ‘primary research reports’) that relate to a specific topic or focus to arrive at new or enhanced understanding about the phenomenon under study. It entails an interpretive process” (Hannes & Lockwood, 2012, p. 1). This interpretive process that Hannes and Lockwood mention refers to the use of formal analysis methods (e.g., narrative analysis, discourse analysis, thematic analysis) to develop meta-findings from the selected literature. Furthermore, qualitative meta-synthesis can integrate the literature to develop new theory and unify disparate ideas and types of literature. It includes designs such as meta-ethnographies, meta-summaries, meta-aggregations, critical interpretive syntheses, and thematic syntheses, among others (see Booth et al., 2016). There are different ways to identify the literature that will be included in a meta-synthesis; so, it can be systematic or not. The specific type of meta-synthesis that we present in the modules in this user guide is systematic and thematic. It uses methods that are reproducible by others and that seek to access a comprehensive set of literature on the topic. Table 1c.1 compares major features of each approach in terms of context, purpose, search and selection, and analysis.

Table 1c.1. Comparing literature reviews with qualitative meta-syntheses

	Literature Review	Qualitative Meta-Synthesis
<b>Context</b>	Is usually part of a larger manuscript that reports a study’s findings	Stands on its own
<b>Purpose</b>	Provides the framing for a manuscript Summarizes the state of the art in a subject field	Synthesizes the qualitative research in a specific area Seeks to arrive at new or enhanced understanding about the phenomenon under study, develop new theory, and unify the literature
<b>Search &amp; Selection</b>	Does not use systematic methods to identify the literature to include	Some meta-synthesis designs use systematic methods to identify the literature, and some do not
<b>Analysis</b>	Summarizes the literature as it is relevant to the specific study it frames	Uses formal analysis methods to develop meta-findings from a set of literature

If you would like to learn more about approaches to reviewing and synthesizing the literature, we have included an appendix that describe the differences and similarities of four of the most common types: **literature review**, **systematic review of the literature**, **qualitative meta-synthesis**, and **meta-analysis**. Appendix 1c looks at what these approaches have in common and what differentiates them.

## A Focus on Qualitative Meta-Synthesis

Given that the focus of these modules is qualitative meta-synthesis, we provide an overview of the different types of meta-syntheses. We concentrate on the specific type of meta-synthesis that our team uses, as this will be the focus of the rest of the modules in this user guide.

### CHARACTERISTICS OF QUALITATIVE META-SYNTHESSES

Several authors have created classifications for different types of meta-syntheses, such as Booth et al. (2016) and Dixon-Woods et al. (2005). The different types of qualitative meta-syntheses are determined by the different considerations given by synthesis authors when they are making decisions. For example, Booth et al. (2016) included the following considerations in their classification:

- Review question (fixed vs. emerging)
- Epistemology (e.g., generation of theory, testing of theory, aggregative, interpretive)
- Time/time frame (e.g., degree of iteration and integration, points of integration)
- Resources (e.g., personnel, funding, effort)
- Expertise (e.g., in qualitative research, in systematic reviewing, in topic area)
- Audience and purpose (e.g., academics, policymakers, practitioners)
- Type of data (e.g., thick/thin, likely number of relevant studies, unit of analysis)

In addition, we would also include:

- Systematic vs. non-systematic approaches to identifying the literature
- Type of data analysis (e.g., thematic analysis, content analysis)
- Type of literature included (e.g., qualitative only, multi-methods, research studies only, essays)

The different combinations of these considerations produce many different types of meta-syntheses. Booth et al. (2016), for example, described 19 different types (e.g., critical interpretive synthesis, meta-ethnography, thematic synthesis). Based on Booth's classification, we describe the type of qualitative meta-synthesis that our team uses as *systematic thematic synthesis*.

### SYSTEMATIC THEMATIC SYNTHESIS

**Systematic thematic synthesis** “compiles a comprehensive set of research on a phenomenon and uses thematic analysis to identify key themes across the research that expand theoretical understanding of the literature as a whole” (Ong et al., 2020, p. 2). This type of synthesis was first described by Thomas and Harden (2008). It is systematic because the methods that it uses for the search and selection of the literature are reproducible and seek to include the most comprehensive set of literature possible. This means that the synthesis authors establish a set of criteria that the literature will need to meet for its inclusion and that they will cast a broad net to identify as much literature as possible. This approach also uses thematic methods of analysis, which allow for the integration of qualitative, quantitative, and mixed methods while they retain contextual information necessary for interpretation. In the following modules of this user guide, you will learn the methods that our team uses for systematic thematic synthesis (e.g., Ong et al., 2020).

### Activity 1c.1.

Read [Ong et al. \(2020\)](#) (est. time to read 45 mins.). Take 10–15 minutes to answer the following questions:

- What makes this synthesis systematic?
- What makes it thematic?

### Activity 1c.2.

Skim [Booth et al.'s \(2016\)](#) article (est. time 10–15 mins). Then, study their classification of synthesis methods (pp. 20–21). Take 20–25 minutes to answer the following questions with your synthesis project idea in mind.

- What synthesis method would you choose for your project? Why?
- Are there any elements in your synthesis project that you could modify to fit it into one of the types listed in the classification?

## Additional Resources

- For more information on the definitions of different types of synthesis and reviews, check out “Evidence Synthesis and Systematic Reviews” by Temple University Libraries - <https://guides.temple.edu/c.php?g=78618&p=3879604>
- For a description of four approaches to reviewing and synthesizing the literature (literature review, systematic review, meta-synthesis, and meta-analysis), see Appendix 1c.

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## Appendix 1c:

### Four Approaches to Reviewing and Synthesizing Literature

There is often confusion around the similarities and differences between the different approaches to reviewing and synthesizing the literature. In this section, we explain four approaches: literature reviews, systematic reviews of the literature, meta-analysis, and meta-synthesis. These are not all the approaches that exist but are some of the most commonly found in academic literature. Before diving into each type to see the differences and similarities, understand that these four types of approaches have the common goal of bringing together the results from multiple studies. However, they differ in how they pursue this goal.

Similarities and differences between the different approaches depend on:

- Whether they frame an empirical study or they stand alone
- Whether they use systematic methods to search and select the literature
- Whether they use formal analysis processes
- Whether they use qualitative or quantitative methods for the analysis

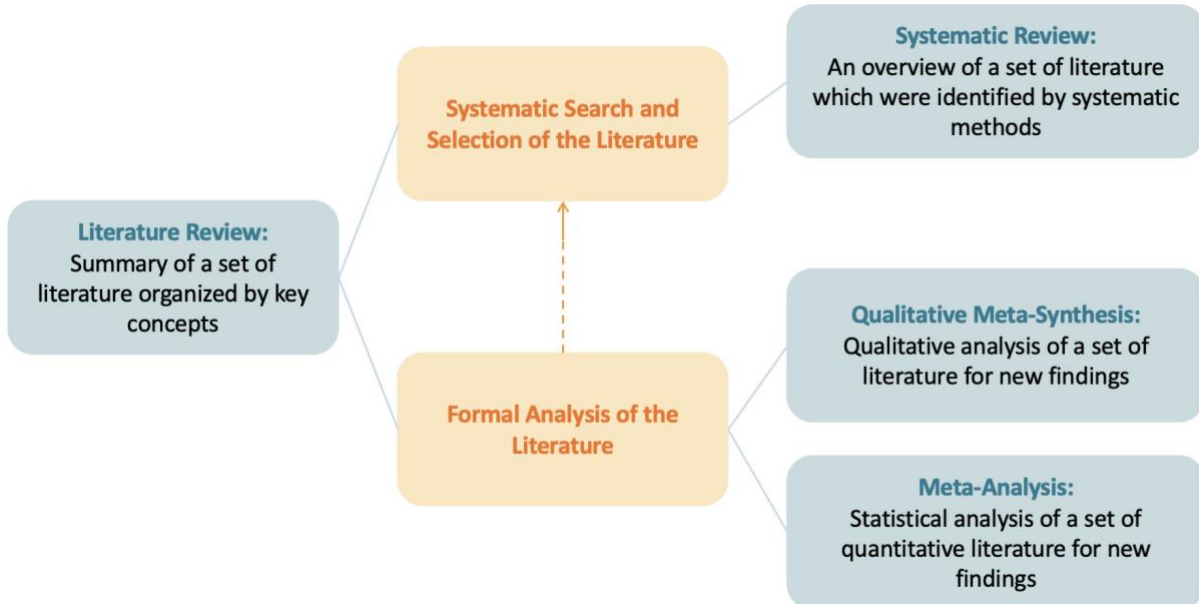


Figure 1c. Four approaches to reviewing and synthesizing literature

According to Rowley and Slack (2004), "The **literature review** identifies and organizes the concepts in relevant literature" (p. 31). The purpose of a literature review is to "[distill] the existing literature in a subject field; ... to summarize the state of the art in that subject field. From this review of earlier and recent work, it becomes possible to identify areas in which further research would be beneficial" (p.

32). This is often used to frame a study that the author of the review will conduct. It is not *systematic*, meaning that it does not try to include all the existing literature on the topic of interest or uses methods that are replicable by others, and it does not use analysis methods (e.g., narrative analysis, thematic analysis) to arrive at its conclusions.

There are also **systematic reviews of the literature**, which are a sub-category of literature reviews. A systematic review is a stand-alone manuscript that uses systematic methods to identify a comprehensive set of literature on the topic of interest that seeks to provide an overview of the literature in a specific area and to identify areas that need further research. According to Pham et al. (2014), systematic reviews typically address the “effectiveness of interventions, which often focus on randomized controlled trials” (p. 371). However, this has changed significantly in the recent past. Currently, systematic reviews are conducted in many other areas beyond the effectiveness of interventions and include studies that have used many other research methods besides randomized controlled trials (e.g., Denton et al., 2019). Borrego and colleagues (2014) have worked to spread the use of systematic reviews in engineering education, arguing that,

More reviews of prior work conducted more systematically would help advance the field by lowering the barrier for both researchers and practitioners to access the literature, enabling more objective critique of past efforts, identifying gaps, and proposing new directions for research. (p. 45)

**Meta-analysis** is “the statistical combination of results from multiple studies in order to yield results which make the best use of all available evidence” (Schmid et al., 2020, p. vii). As such, it pools results from studies to aggregate them mathematically to seek statistical generalization. Given its methodological orientation, meta-analyses exclusively synthesize the findings of comparable studies that used experimental designs.

**Meta-synthesis** is an umbrella term for different study designs (or types) that synthesize qualitative primary studies. According to Hannes and Lockwood (2012), it

is the synthesis or amalgamation of individual qualitative research reports (commonly called ‘primary research reports’) that relate to a specific topic or focus in order to arrive at new or enhanced understanding about the phenomenon under study. It entails an interpretive process. (p. 1)

Further, qualitative meta-synthesis integrates the literature with the purpose of bringing a new or enhanced perspective or understanding of a particular topic. It can also develop new theory and unify disparate ideas and types of literature. It includes meta-ethnographies, meta-summaries, meta-aggregations, realist reviews, critical interpretive syntheses, thematic syntheses, among others (see Booth et al., 2016). There are different methods to identify the literature that will be included in a meta-synthesis; therefore, it can be systematic or not. The specific type of meta-synthesis that we cover in these modules is systematic, using methods that are reproducible by others and that seek to access a comprehensive set of literature on the topic. The interpretive process that Hannes and

Lockwood (2012) mention in their definition refers to the use of analysis procedures (e.g., narrative analysis, discourse analysis, thematic analysis) to develop meta-findings from the selected literature.

Though there are similarities among the four approaches, there are several differences. One is that the literature review usually does not stand on its own, but provides the framing for a study, while a systematic review, a meta-analysis, and a meta-synthesis are studies in and of themselves. The difference between meta-synthesis and meta-analysis lay in the types of studies included in each and the methods used to synthesize them. A meta-analysis brings together quantitative studies using statistical methods, while a meta-synthesis brings together qualitative studies using interpretive methods. The main differences between a systematic review and a meta-synthesis lay in the literature selection and analysis methods. While a systematic review uses systematic literature search and selection methods, a meta-synthesis may or may not use these methods. And while a meta-synthesis employs analysis and interpretation methods to synthesize the literature's findings to develop overall findings, a systematic review usually does not.

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# **Module 2: Pre-Search Process**





# Institute for Meta-Synthesis

## Sub-Module 2a: The Synthesis Question and Theoretical Framework

### Objectives

In this sub-module, you will learn:

- About the overall steps of the pre-search process
- The utility of the synthesis question in qualitative meta-synthesis work
- The role of a theoretical framework in a synthesis

### Main Concepts

Now that you have an overall understanding of the existing review and synthesis designs and that you have considered how your meta-synthesis might influence policy and practice in your field, you are ready to start the meta-synthesis process. However, before looking for literature, there is a series of decisions that need to be made in order to frame your meta-synthesis. This module provides guidance around those decisions for a smooth synthesis process and to ensure your meta-synthesis follows rigorous methods.

#### *Pre-Search Process*

The pre-search process is the period during your project when you make the decisions that will frame and shape your qualitative meta-synthesis. It takes place before you start searching for or identifying the literature for your project. The pre-search process includes:

- Developing the synthesis question you will answer with your project
- Establishing the theoretical framework that will guide your work
- Determining the search, selection, and critical appraisal criteria that you will use to identify the studies that will be part of your meta-synthesis
- Deciding the search engines, databases, directories, or meta-engines that you will use to search for them

In this sub-module, we will talk about how to formulate a synthesis question and the importance of identifying a theoretical frame for your project. The other steps will be covered later in this module.

## Formulating a Synthesis Question

A **synthesis question** is the question that you want to answer with your meta-synthesis project. According to Major and Savin-Baden (2010), it is vital to develop a clear and bounded question for your meta-synthesis for the following reasons:

First, the synthesis demonstrates knowledge of the discipline or field through the articulation of a cogent question. Second, a good question determines what knowledge will be accumulated as well as produced through the synthesis process. Third, a good question and resultant knowledge determines what will happen next—what future research will be conducted and what practices and policies will be changed as a result. (pp. 43-44)

As Major and Savin-Baden suggest, a good synthesis question delimits the scope and guides the decisions you make throughout the project, such as the type of literature to include and the analysis methods you will use. An appropriate synthesis question is particularly important for a meta-synthesis project because it will help you decide on the pre-specified eligibility criteria that you need for your selection process (to be discussed in «**Sub-Module 2b**»). It will also help to guide the entire synthesis process. In qualitative synthesis work, you may begin a study by formulating a broad synthesis question that asks about a single phenomenon or concept. Oftentimes, this synthesis question is developed from reading the literature and looking at what is known and what is not known in the field. It can also arise from personal experience or from observations of a particular event.

For meta-synthesis work, there are different types of synthesis questions, which depend on the kinds of literature and topics in which you are interested. For meta-syntheses of literature on programs or interventions, Pearson et al. (2005) identify four types of synthesis questions (see Table 2a.1).

*Table 2a.1. Types of synthesis questions identified by Pearson et al. (2005) with synthesis question examples*

Type of Synthesis Question	Example
Revolves around effectiveness of a program	What is known about the effectiveness of program X among population A?
Understands program feasibility	What is known about the feasibility of program X to address issue A?
Understands the appropriateness of a program or intervention	What is known about the appropriateness of program X to address issue A?
Focuses on meaningfulness of a given phenomenon from the perspective of a specific population	What is known about the role of phenomenon X in the experiences of population A?

According to Finfgeld-Connett (2018), the synthesis question can also target three types of theory development, such as guiding you toward the explication of a process, describing the attributes of a process, or developing a theoretical framework (see Table 2a.2 for examples).

Table 2a.2. Types of synthesis questions identified by Finfgeld-Connett (2018) with synthesis question examples

Type of Synthesis Question	Example
Theory development	How does the literature support, contradict, or extend X theory?  How does the existing literature contribute to the understanding of phenomenon X?
Explicating a process	What is known about the main phases that constitute process X?
Describing the attributes of a process	What is known about the attributes of process X?

The range of synthesis questions for a meta-synthesis is broad; therefore, you need to think about your goals, the topic, and the type of literature available to help you as they shape your synthesis question.

We offer an example from our meta-synthesis on women of color in undergraduate engineering education (Ong et al., 2020). For this project, our synthesis question was – *What factors influence women of color’s persistence in undergraduate engineering education?* The focus of this question was on the meaningfulness of the persistence phenomenon from the perspective of women of color in engineering undergraduate education, which fits with Pearson et al.’s (2005) fourth category in Table 2a.1. The focus of our synthesis question was also on understanding how the existing literature contributed to the understanding of the persistence phenomenon for women of color in undergraduate engineering education, which fits in the theory development category in Finfgeld-Connett’s (2018) work in Table 2a.2.

### Activity 2a.1.

Identify the type of synthesis question in your project by considering the following questions: Are you trying to understand a program or look at a phenomenon from the perspective of a specific population? Are you trying to understand a process or develop a theory? Check Tables 2a.1 (Pearson et al., 2005) and 2a.2 (Finfgeld-Connett, 2018) for examples of synthesis questions that can help you identify what type of synthesis question you are looking to answer with your meta-synthesis.

In thinking about formulating an effective synthesis question for evidence-based healthcare practice, Booth (2006) states, “Formulating the question is fundamental to evidence-based practice, irrespective of the discipline involved” (p. 365). He recommends using the mnemonic device SPICE, which stands for Setting, Perspective, Intervention/phenomena of interest, Comparison, and Evaluation (Booth, 2004). You can practice using this frame in Activity 2a.2 in this sub-module and learn more about the SPICE framework in Appendix 2a.

### Activity 2a.2.

Frame and refine your synthesis question. Using the **SPICE** framework by [Booth \(2006\)](#) found in the worksheet in Appendix 2a, take 10–15 minutes to look over your initial synthesis question and answer the following questions:

**Setting** – Does your synthesis question include a specific geographic location or setting? Where is your synthesis question situated (e.g., higher education setting, elementary schools, U.S. hospitals, etc.)?

**Perspective** – Who is this synthesis for? What population is being studied? Whose perspective(s) are you considering?

**Intervention/Phenomena of Interest** – What intervention or phenomena of interest are you looking to examine?

**Comparison** – What are you comparing this intervention or phenomena of interest to (either explicitly or implicitly)?

**Evaluation** – What result are you looking to examine (e.g., experiences, retention, etc.)?

### *Selection and Use of a Theoretical Framework*

The selection and use of a **theoretical framework** need to be in line with your theoretical inclinations and relevant to the synthesis study’s topic or discipline. A theoretical framework helps to guide and direct the synthesis process. It can assist you with decision-making along the way as well as provide additional insights into how to look at or approach a particular synthesis question. Your choice of theoretical framework will also guide the development of your analysis and discussion for your synthesis project.

In qualitative meta-synthesis, the theory frames the meta-findings, analysis, and discussion of the study. It is often the lens through which you, as researcher, are examining the data (meaning the literature) you are collecting. It also indicates how you are positioning yourself in relation to the work. The theoretical framework oftentimes informs the methodology, or how the study is conducted, and it can also be used to provide broad explanations of phenomena during analysis of the data collected.

With few exceptions (e.g., Major & Savin-Baden, 2010), most meta-synthesis methodologists do not mention the need for a theoretical framework. We surmise that every researcher uses a theoretical framework whether they make it explicit or not. Our team intentionally uses and names the theoretical

frameworks used in our meta-synthesis work because we believe that it brings rigor and focus to our work. Using a theoretical framework, and being explicit by naming it, also helps to provide a rationale for our work's focus on minoritized groups in STEM fields, as highlighted in the next paragraph. The recommendations in this section arise from our experiences in using theoretical frameworks in our meta-synthesis work.

Together, your synthesis question and theoretical framework will keep your project clear and focused. For example, our team's synthesis project on women of color in engineering utilized critical race theory (CRT) and intersectionality as our theoretical frameworks to inform the synthesis question – *What factors influence women of color's persistence in undergraduate engineering education?* For this question, intersectionality is used to draw attention to the ways some individuals are simultaneously minoritized and oppressed in multiple ways, and CRT calls for an asset-based approach when examining the experiences of people of color.

If you are uncertain of which theoretical framework to choose, read several articles related to your synthesis topic, paying close attention to the literature they cite in the theoretical framework sections. We will come back to the importance of the synthesis question and theoretical framework in «[Sub-Module 7c](#)» – Structuring Your Meta-Synthesis Manuscript.

## Additional Resources

- For the SPICE framework worksheet, see Appendix 2a.

## References

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# Institute for Meta-Synthesis

## Appendix 2a: SPICE Framework Worksheet

In the article by [Booth \(2006\)](#) entitled, “Clear and present questions: Formulating questions for evidence-based practice,” the author discusses the importance of questioning in healthcare fields. He notes how the questions we ask stem from our background knowledge and things that we are curious to explore. To assist others developing synthesis questions that are clear and focused, he developed the SPICE framework:

- **Setting** – where?
- **Perspective** – for whom?
- **Intervention/Phenomena of Interest** – what?
- **Comparison** – compared with what?
- **Evaluation** – with what result?

### *Example*

For example, if we were considering doing a meta-synthesis on women of color in engineering undergraduate education, our responses could look like:

- **Setting** – United States, higher education, undergraduate level, predominantly white institutions
- **Perspective** – women of color, undergraduates, Black and Latine women, majoring in engineering
- **Intervention/Phenomena of Interest** – academic success, persistence
- **Comparison** – white men and women, undergraduates, majoring in engineering
- **Evaluation** – graduation rates, retention rates from year to year, cumulative GPA, major GPA

Our possible synthesis question might be:

**How are Black and Latine women of color majoring in engineering persisting in predominantly white institutions relative to their white peers?**

## Questions to Answer

Take 10–15 minutes to answer these questions in as much detail as possible.

For the purposes of your meta-synthesis work, you may find it helpful to adjust this framework as follows:

- **Setting** – Does your synthesis question include a specific geographic location or setting? Where is your synthesis question situated (e.g., higher education setting, elementary schools, U.S. hospitals, etc.)?
- **Perspective** – Who is this synthesis for? What population is being studied? Whose perspective are you considering?
- **Intervention/Phenomena of Interest** – What intervention or phenomena of interest are you looking to examine?
- **Comparison** – What are you comparing this intervention or phenomena of interest to (either explicitly or implicitly)?
- **Evaluation** – What result are you looking to examine (e.g., graduation rates, retention, etc.)?

Using key words from your responses, **formulate a synthesis question to guide your meta-synthesis work here:**



## Sub-Module 2b: Search, Selection, and Critical Appraisal Criteria

### Objectives

In this sub-module, you will learn:

- To distinguish between different types of literature for inclusion or exclusion
- How to establish search, selection, and critical appraisal criteria

### Main Concepts

Now that you have formulated your synthesis question and selected your theoretical framework, you are ready to identify and search for literature and conduct decision-making steps about whether these literature pieces will be included in or excluded from your study—in other words, the search and selection processes. In this sub-module, we explain the different types of literature you might consider for inclusion or exclusion and how to establish criteria for your literature searches and selection processes.

Recall from «[Sub-Module 1c](#)» that **systematic thematic synthesis** is our team’s selected type of qualitative meta-synthesis, and thus the method that we share throughout this user guide. The search and selection processes play major roles in systematic thematic synthesis. This method is *systematic* because the search and selection processes follow specific protocols, are as exhaustive as possible, and are replicable. *Thematic synthesis* explores theory and involves the assessment of the literature to include research conducted with high standards (Booth et al., 2016). If you are conducting a different type of meta-synthesis (see Booth et al., 2016, and Appendix 2b for alternative options), some of these methods may be useful to you, but not everything will be relevant to your synthesis.

#### *Types of Literature for Inclusion or Exclusion*

The set of literature to be synthesized is a key component of a meta-synthesis given that it determines what can be reported in terms of content and breadth. You should ensure that the literature fits the topic and purpose of your synthesis, and you should strive to include a comprehensive set of literature that will provide a full picture of the topic. For these purposes, you will need to establish a set of criteria that will guide the search and selection of the literature.

Before setting the criteria, you should set the parameters of your qualitative meta-synthesis. The first three parameters are:



1. The type of synthesis you want to conduct (e.g., thematic synthesis, meta-ethnography; see Booth et al., 2016). In this user guide, the focus of the modules will be on conducting a systematic thematic synthesis.
2. The focus of the synthesis (e.g., specific topic it will tackle, historic vs. current trends, population, type of study design).
3. The synthesis question you are trying to answer (see «Sub-Module 2a»).

In this sub-module, the focus will be on the fourth parameter, which is:

4. The types of literature and studies to include.

You will need to decide what types of literature you want to include in your synthesis project. See Table 2b.1 for examples.

Table 2b.1. Types of literature to consider including in your synthesis

Type of Literature	Examples
Peer-Reviewed	Articles in <b>peer-reviewed journals</b> (e.g., <i>Journal of Higher Education</i> , <i>Journal of Engineering Education</i> )
Non-Peer-Reviewed	Journal articles and other publications that do not undergo peer review process (e.g., <i>Harvard Educational Review</i> )
Empirical Research	Research and evaluation studies that collect data from participants and analyze data to develop findings
Non-Empirical Work	Opinion pieces, thought pieces
Published	Journal articles, books and book chapters
Gray Literature	Dissertations, reports, white papers, conference proceedings

If you are tackling a synthesis in a well-established area, such as self-efficacy in STEM or science identity, where many empirical studies are published, consider including only peer-reviewed literature (meaning published literature that have been read by established colleagues in the field at the time of submission and advised for publication). We recommend this for two reasons: (1) it will ensure that the literature meets the standards held by reviewers and publishers, since they will be well-acquainted with commonly cited works; and (2) it will automatically limit the set of literature for your meta-synthesis, thus preventing the number of works from becoming overwhelming.

If you are tackling an emergent area of study, however, published, peer-reviewed publications may be quite narrow. In these cases, the inclusion of **gray literature** is key to ensure that the most recent research is accounted for in the synthesis and to see where emerging researchers are focusing their research. According to Mahood, Van Eerd, and Irvin (2014), gray literature can be reflective of up-to-date and high-rigor research on certain topics.

Gray literature is anything that contains unpublished studies and/or manuscripts that have not been peer reviewed, and they can include:

- Book chapters
- **Conference proceedings**
- Dissertations
- Government reports
- **White papers**

If these types of gray literature are relevant to your synthesis, it may be necessary to use complementary tools to find them, such as:

- ProQuest Dissertations & Theses (<https://www.proquest.com/index>)
- Social Science Research Network (SSRN) eLibrary (<https://www.ssrn.com/index.cfm/en/>)

For example, if you plan on conducting a qualitative meta-synthesis of all the published studies on women of color undergraduate students in engineering over the last 20 years, peer-reviewed research publications will be relatively scarce. You will need to decide whether to include gray literature, such as evaluation reports on graduate engineering education programs and initiatives that were commissioned by an organization or funder but not published in a journal. Also, given that many dissertations on topics related to social justice are conducted by members of minoritized populations, the inclusion of dissertations in your synthesis work may contribute to **citational justice** (Mott & Cockayne, 2016; for more information on citational justice, see «**Sub-Module 8b**»). It may be wise to include these reports, dissertations, and other types of publications, such as conference proceedings, in your meta-synthesis.

### *Search Criteria*

If you have conducted searches in academic search engines, databases, and other tools, you are familiar with the experience of an overwhelming number of results that seem impossible to tackle. By setting criteria that will guide your work, you can better manage the large number of results. You need to think about how you are going to search, select, and appraise the rigor of the literature under consideration. However, even if you are using the criteria at different moments of the process, in the end, all these criteria should be applied to the results of your searches. In this way, you will obtain a set of literature that conforms to your needs for the meta-synthesis. Remember to keep track of your decisions related to criteria and searches to maintain an **audit trail** to “enhance the credibility of [your] study outcomes by making transparent the series and sequence of judgments made during the life of your study” (Sandelowski & Barroso, 2007, p. 229).

For the search criteria, you need to consider how search engines, databases, and other tools work and how you can input search terms and dates to obtain the most inclusive, yet most targeted, results. Some of the criteria that will be helpful to consider during the search process include:

- Population
- Type of study
- Type of context
- Year of publication

For example, in our study, when we wanted to search for literature on women of color in undergraduate engineering education, some of the search criteria (Example 2b.1) included:

**Example 2b.1. Search criteria for literature on women of color in undergraduate engineering education**

- Discipline: Studies need to include programs in engineering.
- Population: Studies need to include women of color in undergraduate programs.
- Publication date: Studies need to be published between 2001 and 2021.

*Selection Criteria*

Selection criteria will be applied once you have found literature that is potentially relevant, and you need to weed out studies that are not. You will need to establish criteria that may not be easily entered in search text boxes, such as the type of publication we want to include and the national origin of study participants. Continuing our example of seeking literature on women of color in undergraduate engineering education, some of the selection criteria (Example 2b.2) included:

**Example 2b.2. Selection criteria for literature on women of color in undergraduate engineering education**

- Type of publication: Peer-reviewed and gray literature (e.g., dissertations, reports, conference proceedings).
- Participants' origin: National U.S. participants and immigrants attending undergraduate programs based in the U.S. and its territories.
- Empirical research: Articles and other literature need to be empirical studies (e.g., no opinion essays).

## Critical Appraisal Criteria

Not all studies are made available to the public with the same degree of attention to methodology and standards of rigor. To ensure that a synthesis puts forth rigorous meta-findings, it is necessary to include a set of criteria that addresses the minimum acceptable standard for a study's inclusion in a synthesis. We will look at critical appraisal criteria in more detail in «Sub-Module 3c», and we will explore the implementation of the search and selection criteria in «Sub-Module 3a». However, returning to our example on women of color in undergraduate engineering education, some of the critical appraisal criteria (Example 2b.3) included:

### Example 2b.3. Critical appraisal for literature on women of color in undergraduate engineering education

- Research elements: Articles and other literature need to include the basic research elements (e.g., research questions/hypotheses/purposes, theoretical framework, literature review, research methods, findings substantiated with evidence).
- Coherence: Each piece of literature needs to be internally coherent (e.g., the findings and evidence used are aligned).

### Activity 2b.1.

Take 20–30 minutes to create a list of search, selection, and critical appraisal criteria that would be appropriate for your topic, based on the synthesis question(s) you developed in Sub-Module 2a and the focus of your synthesis project.

## Additional Resources

- Table 1 on page 585 of the following article by Ong, Jaumot-Pascual, & Ko (2020) offers an example of search, selection, and critical appraisal filtering criteria that are applied to literature for inclusion in a meta-synthesis. Note that the criteria stem from the project's synthesis question. The article is open access.

Ong, M., Jaumot-Pascual, N., & Ko, L. T. (2020). Research literature on women of color in undergraduate engineering education: A systematic thematic synthesis. *Journal of Engineering Education*, 109(3), 581–615. <https://doi.org/10.1002/jee.20345>

- Walsh and Downe (2006) brought together different assessments of the quality of qualitative research that existed in the literature and created a summary framework. For a list of criteria for appraising qualitative research studies, see pages 114 and 115 of their article.

Walsh, D., & Downe, S. (2006). Appraising the quality of qualitative research. *Midwifery*, 22(2), 108–119. <https://doi.org/10.1016/j.midw.2005.05.004>

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## Appendix 2b: Comparison of Examples of Systematic and Non-Systematic Meta-Synthesis Approaches

Approach	Definition	Target Literature	Meta-Synthesis?	Systematic?
Thematic Synthesis	Thematic synthesis is an approach to synthesizing qualitative research where “the reviewers 'go beyond' the primary studies and generate new interpretive constructs, explanations or hypotheses” (Thomas & Harden, 2008, p. 1).	Comprehensive literature searches that seek to find all the existing literature on the topic of the synthesis	Yes	Yes
Meta-Ethnography	A meta-ethnography’s purpose is to “synthesize qualitative findings across investigations to create new holistic interpretations” (Finfgeld-Connet, 2018, p. 3).	Ethnographic research reports that are topically related	Yes	No
Meta-Study	A meta-study’s purpose is to “analyze theories, methods, and findings across primary qualitative investigations” (Finfgeld-Connet, 2018, p. 3).	A sample of primary research reports that is representative of the topic of interest	Yes	No

## Sub-Module 2c: Search Engines, Databases, and Other Tools

### Objectives

In this sub-module, you will learn:

- How to identify the best search engines, web directories, databases, and meta-engines for your meta-synthesis project
- How index terms, free-text words, Boolean rules, and truncation can help you efficiently search for literature
- How to be aware of various biases that affect literature search results and what to do

### Main Concepts

When planning your strategy to find the literature to include in your synthesis, you need to decide what literature search tools you will use, and which tools will be helpful for each step. Sandelowski and Barroso (2007) suggest the use of “browsing and berry-picking” search strategies, such as hand searching in journals central to a field and “area scanning,” which refers to “browsing materials that are physically collocated [e.g., in a library] with materials retrieved earlier in a search” (p. 43). However, we assume that you most likely will be using electronic means to search and select the literature for your synthesis project and may use other strategies to identify hard copies of literature pieces and to complement your electronic searches when necessary. Thus, this user guide focuses on electronic search strategies. There are various options available online that we will examine below.

#### *Search Engines, Web Directories, Databases, and Meta-Engines*

**Search engines**, such as Google Scholar, use computer algorithms to search the Internet and identify items that match the words entered into the search bar. The information is compiled by artificial intelligence technology. The advantage of using a search engine is that you can sometimes get free access to full texts of articles, as well as organizational reports and recent publications. The disadvantage is that it can be time-consuming to narrow down your search or assess how trustworthy the information is.

A **search directory** (or web directory) is a catalog of websites or other resources organized by category by an individual or organization to make it easier for people to find information. College libraries often have directories of resources compiled according to the needs identified among their target population.

A **database** compiles resources on a specific discipline that an individual or an organization has selected for their rigor and relevance. They contain references for journal articles and typically offer the widest possible retrievals of peer-reviewed material. They may have full-text articles available for download. Since some databases may also require a subscription, you will have to be associated with an institution with access to those databases, use interlibrary loan (ILL), or pay for a subscription to access the articles.

Examples of databases are:

- Science Direct (<https://www.sciencedirect.com/>)
- WorldCat (<https://www.worldcat.org/>)
- Web of Science (<https://www.webofknowledge.com>)
- Scopus (<https://www.scopus.com/>)
- PubMed (<https://pubmed.ncbi.nlm.nih.gov/>)

Different databases index different journals. Therefore, it is often necessary to include more than one to have a broader reach.

There are also other tools, such as **meta-engines**, that have the capacity to conduct searches in several search engines at the same time. Having a one-stop place for searches is certainly convenient. However, the sheer volume of resources that such a gateway combs through makes results less precise than those of other search tools.

Whether you begin your search process by using a search engine, database, or other tools, it is important for you to test a variety of methods to assess which ones give you the highest number of relevant retrievals and to use a relatively large number of these tools. As you can see, each search tool has its own features, advantages, and drawbacks. For example, one may be focused on a particular discipline, while another provides access to an interdisciplinary range of publications; one may be updated on a regular basis, while another uses artificial intelligence to retrieve its results; one may solely focus on dissertations, while another only includes peer-reviewed literature. Our recommendation is to use a combination of tools for your search to counteract the drawbacks of one with the strengths of another and to take advantage of the different features of each. We will now introduce some strategies that you can use to make your searches more efficient and systematic, and then go into greater detail in «**Sub-Module 2d**».

### Activity 2c.1.

With your specific meta-synthesis project in mind, take 15–30 minutes to create a list of search engines, databases, or other tools that would be appropriate for your selected topic.



## Efficient Searching

Other strategies to make the search process as efficient as possible include understanding how to effectively use index terms, free-text words, Boolean rules, and truncation (Heyvaert et al., 2017).

**Index terms**, or subject headings, are terms assigned to articles by authors and managers of bibliographic databases. These may be technical terms that are used in the specific area of your meta-synthesis that are not commonly used otherwise. Index terms may be specific to a particular database.

On the other hand, **free-text words** are terms located within the title of the article, the abstract, or the full text of the publication. This includes key words associated with the topic or synthesis question for your meta-synthesis project that you generate or identify in relevant articles. For a very targeted search, index terms might be the best strategy. However, if your intention is to be comprehensive in your searches, using both index terms and free-text words would cast a broader net.

**Boolean rules** are rules that determine what your search will generate based on “true” and “false” logic statements. The combination of keywords, operators (such as **AND**, **OR**, and **NOT**), parentheses, and quotation marks will assist you with narrowing or broadening your literature search.

Boolean rules also include **truncation**, which is where you replace the letters within keywords with symbols as wildcards. For example, if a search engine allows you to use \* as a truncation sign, then we can do a search for “biolog\*” that would refer to all the words that start with “biolog,” such as “biology” and “biological.” We will explain how to use Boolean operators and truncation (or wildcards) in the next sub-module ([«Sub-Module 2d»](#)).

Whatever search engines, databases, or other tools you use during your meta-synthesis project, it is essential for you to document all the decisions you make throughout the process as part of your audit trail. Heyvaert and colleagues (2017) particularly recommended that you keep detailed records of the bibliographic databases you search, the terms and combinations of terms you use, and the rationale for your decisions.

You should also record the number of retrieved publications in each search and how many you keep from each. These decisions can be tracked using Microsoft Suite, Google Suite, or other file applications available to you. If you are working in a team, consider using a cloud-based application to share your decisions. The more organized and detailed you are in documenting what you have done and why, the easier it will be to write up your meta-synthesis manuscript later. A template for a search engine tracker is provided in Table 2c.1.

Table 2c.1. Template for Search Engine Tracker

Search Engine Name					
Link					
Terms Used	Number of Total Hits	Approximate Number to Keep	Description: Types of Literature, Topics Covered, etc.	Recommendation (Keep Engine or Not Keep)	Notes

As noted earlier, it is important to maintain a well-documented audit trail that includes your decisions about search engines or other tools and the numbers of retrievals throughout the meta-synthesis process. These will enhance the credibility of your study meta-findings (Sandelowski & Barroso, 2007).

### Activity 2c.2.

Once you have created your list of search engines, databases, and other tools from Activity 2c.1, take 15–30 minutes to research the Boolean rules of each and record them. We will revisit these Boolean rules in Sub-Module 2d: Search Terms, Boolean Rules, & Strings.

### Activity 2c.3.

Using Table 2c.1., start your own spreadsheet file to keep track of the various search engines, directories, databases, and meta-engines you test for your meta-synthesis project.

Use one excel tab per search engine, database, directory, or meta-engine.

### *Biases that May Influence Search Results*

Synthesis authors also need to be aware of the different biases that may influence which research reports are identified by their search and selection strategies, particularly if they are working on a systematic thematic synthesis. Some of these biases include fugitive literature, publication bias, location bias, and multiple publication bias.

Fugitive literature “refers to potentially relevant works that are likely to escape the notice of searchers primarily because they are either not published or are published in venues not accessible via electronic databases” (Sandelowski & Barroso, 2007, p. 49). Heyvaert et al. (2007) call this location bias.

Publication bias refers to “the tendency for authors to submit, and for journals to accept, manuscripts for publication based on the direction, magnitude, or significance of the study findings. ... The issue under consideration is whether the retrieved studies are representative of all studies conducted on the topic” (Heyvaert et al., 2017, p. 84).

Multiple publication bias “implies that interesting, controversial, or intriguing results are likely to be repeatedly reported in multiple publications” (Heyvaert et al., 2017, p. 85).

If you suspect location or publication bias, you can supplement the findings with additional electronic search engines and other search tools that include gray literature by using Sandelowski and Barroso’s (2007) “browsing and berry-picking” search strategies, and by contacting experts in the field. If you identify multiple publication bias, you may want to consider bundling reports from a single study—in other words, treating the collection as one big report—when conducting analysis and developing meta-findings to avoid overrepresenting it (see Heyvaert et al., 2017, pp. 85–86, for more details on multiple publication bias).

## Additional Resources

- Review our team’s list of the most commonly used search engines and other search tools labeled “Search Engines List.” This document is in Appendix 2c.
- Keep track of the various search engines, directories, and databases you want to use in your meta-synthesis project using our “Search Engines Template,” which may be found in Table 2c.1.
- Read: The Beginner's Guide to Boolean Search Terms [blog post] - <https://www.socialtalent.com/blog/recruitment/the-beginners-guide-to-boolean-search-terms>
- Read: Mahood, Q., Van Eerd, D., & Irvin, E. (2014). Searching for grey literature for systematic reviews: Challenges and benefits. *Research Synthesis Methods*, 5(3), 221–234. <https://doi.org/10.1002/jrsm.1106>
- Read: “What are the top 100 search engines for academic research?” <https://www.teachthought.com/learning/100-search-engines-for-academic-research/>

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Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. Springer.

## Appendix 2c: Selected Search Engines, Databases, Directories, and Meta-Engines for Academic Research

### General

- 1. Google Trends**  
(<https://trends.google.com/trends/?geo=US>): Find searches that correlate with real-world data.
- 2. Internet Public Library**  
(<https://www.ipl.org/>): Find resources by subject through the Internet Public Library's database.
- 3. Microsoft Academic Search**  
(<https://www.microsoft.com/en-us/research/project/academic/>): Access to more than 38 million different publications, with features including maps, graphing, trends, and paths that show how authors are connected.
- 4. OAlster**  
(<https://www.oclc.org/en/oaister.html>): Millions of digital resources from thousands of contributors, featuring open access resources.
- 5. RefSeek**  
(<https://www.refseek.com/>): One billion documents, web pages, books, journals, newspapers, and more, without sponsored links or commercial results.
- 6. Virtual LRC**  
(<https://www.virtuallrc.com/>): Custom Google search, featuring academic information websites curated by teachers and library professionals around the world to share resources for academic projects.
- 7. Wolfram|Alpha**  
(<https://www.wolframalpha.com/>): Find links, answer questions, do analysis, and generate reports

### Meta-Engines

- 1. Dogpile**  
(<https://www.dogpile.com/>): Results from Google, Yahoo!, and Bing, with categories including Web, Images, Video, and even White Pages.
- 2. MetaCrawler**  
(<https://www.metacrawler.com/>): "Search the search engines," returning results from Google, Yahoo!, and Bing.

## Databases and Archives

- 1. Ag Data Commons**  
(<https://data.nal.usda.gov/>): Data access system maintained by the US Department of Agriculture's (USDA) National Agriculture Library. Holds data files managed directly by NAL and links to datasets and resources located on other websites.
- 2. arXiv e-Print Archive**  
(<https://arxiv.org/>): (Cornell University) e-prints in math, science, and related subjects, with over 756,000 documents.
- 3. Astrophysics Data System**  
(<https://ui.adsabs.harvard.edu/>): The SAO/NASA Astrophysics Data System (ADS) is a Digital Library portal for researchers in astronomy and physics, operated by the Smithsonian Astrophysical Observatory (SAO) under a NASA grant. The ADS maintains three bibliographic databases containing more than 10.7 million records.
- 4. BioMed Central**  
(<https://www.biomedcentral.com/>): Dedicated to open research, with over 250 quality peer-reviewed journals in biology, clinical medicine, and health.
- 5. Catalog of U.S. Government Publications**  
(<https://catalog.gpo.gov/F?RN=156786945>): Descriptive records for historical and current publications, with direct links where available.
- 6. Chemistry Commons**  
(<http://network.bepress.com/physical-sciences-and-mathematics/chemistry/>): Almost 20,000 scholarly open access articles on various aspects of chemistry.
- 7. CIA World Factbook**  
(<https://www.cia.gov/the-world-factbook/>): Major reference information around the world, including history, people, government, and economy.
- 8. Elsevier Open-Access Journals**  
(<https://www.elsevier.com/open-access/open-access-journals>): Peer reviewed journals that are free to access and download from Science Direct.
- 9. JSTOR Open Access Books**  
(<https://about.jstor.org/oa-and-free/>): Scholarly books, journal articles, images, and media that are free to access.
- 10. Library of Congress**  
(<https://www.loc.gov/>): Searchable source documents, historical photos, and extensive digital collections.
- 11. National Agricultural Library**  
(<https://www.nal.usda.gov/main/>): (U.S. Department of Agriculture) global information for agriculture.
- 12. National Archives**  
(<https://www.archives.gov/>): Online, public access to historic documents, research, and government information.

### 13. OpenDOAR

(<https://v2.sherpa.ac.uk/opensoar/>): Directory of Open Access Repositories. Freely available academic research information.

### 14. Physics Commons

(<http://network.bepress.com/physical-sciences-and-mathematics/physics/>): Almost 25,000 scholarly open access articles on physics.

### 15. PubMed

(<https://pubmed.ncbi.nlm.nih.gov/>): More than 24 million citations for biomedical literature from MEDLINE, life science journals, and online books, including links to full-text content from PubMed Central and publisher web sites.

### 16. SciTech Connect

(<https://www.osti.gov/>): Science, technology, and engineering research information from the U.S. Department of Energy.

### 17. Smithsonian Institution Research Information System

(<https://sir.is.si.edu/>): More than 7.4 million records from the Smithsonian's museums, archives, and libraries.

## *Books and Journals*

#### 1. Directory of Open Access Journals

(<https://doaj.org/>): Searchable journal of full-text quality controlled scientific and scholarly journals.

#### 2. Google Books

(<https://books.google.com/>): Index of the world's books, millions for free and others you can preview.

#### 3. Google Scholar

(<https://scholar.google.com/>): This search engine specializes in articles, patents, and legal documents, and also has a resource for gathering citations.

#### 4. ScienceDirect

(<https://www.sciencedirect.com/>): Scientific, technical, and medical research in peer-reviewed journals, articles, book chapters and [open access](#) content.

#### 5. SpringerLink

(<https://link.springer.com/>): Electronic journals, protocols, and books; browse publications by collection and content type.

#### 6. Vadlo

(<https://vadlo.com/>): Life sciences search engine offering protocols, tools, forums, and PowerPoints for scientific research and discovery.

#### 7. WorldCat

(<https://www.worldcat.org/>): Items from 10,000 libraries worldwide, with books, DVDs, CDs, and articles.

## STEM

- 1. Analytical Sciences Digital Library**  
(<https://home.asdlib.org/>): Peer-reviewed, web-based educational resources in analytical sciences, featuring a variety of formats for techniques and applications.
- 2. CiteSeerX**  
(<https://citeseerx.ist.psu.edu/>): Searchable access to the Scientific Research Digital Library.
- 3. MathGuide**  
(<http://www.mathguide.com/>): Database of high-quality Internet math resources.
- 4. SciCentral**  
(<https://www.scicentral.com/>): A source for literature searches, journals, and databases.
- 5. Science.gov**  
(<https://www.science.gov/>): More than 50 databases and 2,100 selected websites from 12 federal agencies.
- 6. Strategian**  
(<https://www.strategian.com/>): All fields of science. Free full-textbooks, patents, and reports, full-text journal and magazine articles, special collection of vintage biology.
- 7. ZbMATH Online Database**  
(<https://www.zbmath.org/>): Millions of entries from thousands of serials and journals dating back to 1826.

## Social Science

- 1. Behavioral Brain Science Archive**  
(<https://www.cambridge.org/core/journals/behavioral-and-brain-sciences>): Searchable archive of psychology and brain science articles.
- 2. Social Science Research Network**  
(<https://www.ssrn.com/index.cfm/en/>): Social science research from specialized networks including cognitive science, leadership, management, and social insurance.
- 3. PsycLine**  
(<http://www.psycline.org/>): Access to more than 2,000 psychology and social science journals online; needs a username and password.

## Open Access and Other

- 1. Elsevier Open Access Journals**  
(<https://www.elsevier.com/about/open-science/open-access/open-access-journals>): A large collection of open access journal titles with peer-reviewed articles.
- 2. Fish Thinkers Blog**  
(<https://fishthinkers.wordpress.com/2017/03/29/5-free-ways-around-the-great-paywall-of-academia/>): How to access free publications.

- 3. LearnTechLib**  
(<https://www.learntechlib.org/about/editlib-to-learntechlib/>): Open access to resources related to the intersection of learning and technology.
- 4. Networked Digital Library of Theses and Dissertations (NDLTD)**  
(<http://www.ndltd.org/>): A digital library of electronic and digital theses and dissertations.
- 5. Onlineschools.org**  
(<https://www.onlineschools.org/open-access-journals>): List of open access resources.
- 6. Open Access Button**  
(<https://openaccessbutton.org/about>): Access to free, full-text articles.
- 7. ProQuest Dissertation & Theses**  
(<https://www.proquest.com/pqdtglobal>): A digital library of electronic and digital theses and dissertations.
- 8. PsycEXTRA**  
(<https://www.apa.org/pubs/databases/psycextra/content-providers>): Conference materials, factsheets, and other hard-to-find content in the field of psychology
- 9. Social Science Research Network (SSRN) eLibrary**  
(<https://www.ssrn.com/index.cfm/en/>): A repository of scholarship in the social sciences.
- 10. Unpaywall**  
([http://unpaywall.org/?utm\\_source=email](http://unpaywall.org/?utm_source=email)): Open access through software integration with other databases.
- 11. Wiley Open Access Journals**  
(<https://authorservices.wiley.com/open-research/open-access/browse-journals.html>): A large collection of journal titles with open access, peer-reviewed articles.



## Sub-Module 2d: Search Terms, Boolean Rules, and Search Strings

### Objectives

In this sub-module, you will learn:

- How to identify and generate search terms
- How Boolean operators function
- How to easily build, test, and use search strings to conduct searches related to the intended meta-synthesis project
- How to conduct searches using search strings

### Main Concepts

The next step in the pre-search process is determining the search terms you want to use. These search terms, in conjunction with Boolean operators, will create the search strings you will use within your chosen search engines, databases, directories, or meta-engines. In this sub-module, we describe what are search terms, Boolean operators, and search strings to help you begin your search and selection process.

#### *Search Terms*

According to Finfgeld-Connett (2018), “Researchers typically begin searching the literature by generating a comprehensive list of topically relevant search terms ... that are adapted to optimize the unique features of each reference database” (p. 22). When thinking about the terms that you will use to search for the literature to include in your meta-synthesis, you can use three main strategies (Heyvaert et al., 2017):

1. Use **index terms**, which are predetermined by the organizations publishing journals and conference proceedings and create categories that are relevant for the specific discipline. Since all authors must select a subset of index terms for publishing, using these terms increases the likelihood of literature returns in your searches that fit your criteria
2. Use **free-text** (or keywords, which are the words used in the titles, abstracts, and full text of a publication)
3. Use a combination of index terms and free-text

Although index terms allow for more precise searches, they may not retrieve all the relevant papers because different publications may use different terms, which may not coincide with those that the authors use. Thus, using a combination of the two may produce results that have more potential for inclusion.

When choosing the terms that you will use for the searches, also consider which categories of descriptors are likely to bring back relevant results and which are not. List all the categories for your synthesis that will have a role in the inclusion or exclusion of literature. Useful categories typically include, but are not limited to:

- Population (e.g., gender, race/ethnicity, ability, national origin)
- Disciplinary area (e.g., engineering, biology, all STEM disciplines)
- Methodological focus (e.g., study design, data collection or analysis methods)
- Theoretical framework (e.g., critical race theory, community cultural wealth)
- Type of study (e.g., evaluation, basic research)

### Activity 2d.1.

With your specific meta-synthesis project in mind, take 5–10 minutes to list the main categories of search terms that you will need to use.

Here is an example. As we mentioned earlier, we undertook a meta-synthesis that focused on studies on women of color in undergraduate engineering education that used CRT and related theories. For the theoretical framework category, we wanted to include formal terms such as “Critical Race Theory,” “Latino Critical Race Theory,” and “Tribal Critical Race Theory,” as well as neologies (or newly coined words or phrases) such as “LatCrit” and “TribalCrit” that referred to the same theories but in abbreviated form. At the same time, we knew that using a general term, such as “critical theory,” would not be useful because it would bring up troves of literature that use Marxist or feminist frameworks that were not part of our meta-synthesis.

Next, we needed to think about the population category to identify which types of terms would be useful. We considered both the gender and race/ethnicity categories to identify terms such as “Black,” “Hispanic,” “Native,” “Asian,” and so on. We further needed to think about alternative terms to those we already selected, such as “African American” and “Indigenous.” Some terms had more than one alternative, and some had many variants, such as “Latino,” “Latina,” “Latine,” and “Latinx.” We also had to consider historical terms that were not in contemporary use, such as “Afro-American,” to include older literature. We hope that this example illustrates that decisions about terms will have an impact on which literature will appear in your searches, so you’ll want to consider them carefully.

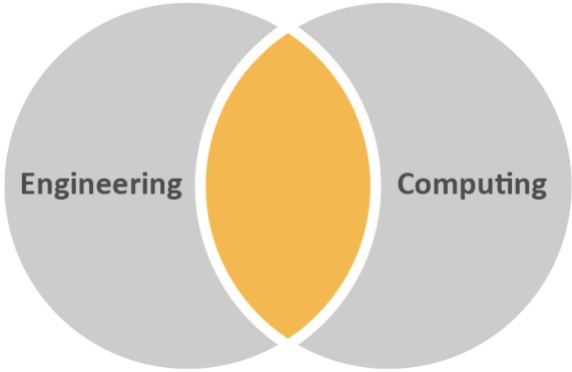
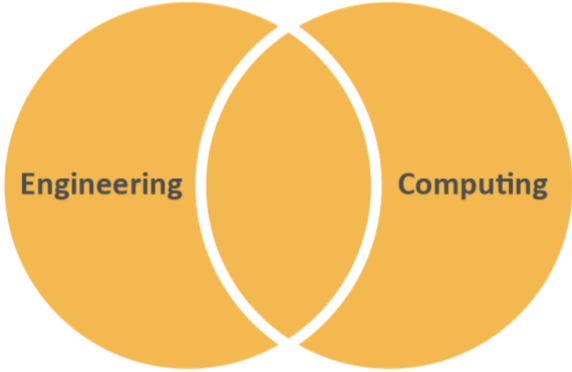
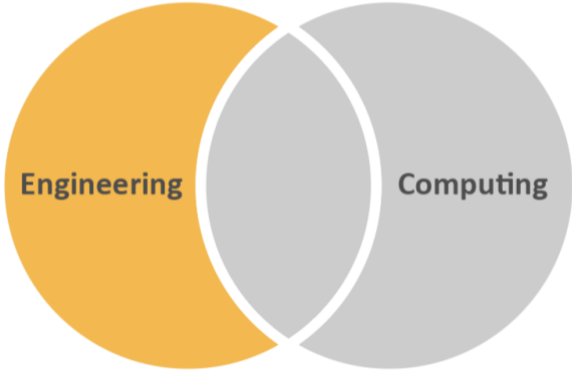
### Activity 2d.2.

Once you have your main categories from Activity 2d.1, take 15–20 minutes to list the relevant search terms for each of them.

### *Boolean Rules and Operators*

**Boolean rules** are commands that determine the results that your search will generate based on “true” and “false” logic statements. These rules work through the use of operators and truncation. Boolean operators, such as **AND**, **OR**, and **NOT**, are variables that indicate whether something is “true” or “false” in a search (see Table 2d.1 for examples). They are used in combination with index or free-text terms to organize and filter your searches (see Figure 2d.1 for examples). If you want separate concepts to be included in the *same* article reference, then you would use the operator **AND** in the search bar. However, if you are trying to use synonyms of a concept to locate all possible references associated with that topic, then you would want to use the operator **OR**. This operator broadens your search to encompass as much relevant material as possible. To exclude a topic while focusing your search on a specific concept, then you would want to use the Boolean operator **NOT**.

Table 2d.1. How to use the Boolean operators **AND**, **OR**, and **NOT** using engineering and computing as example subjects in a Venn diagram

<p><b>Boolean operator: AND</b></p> <p>Using <b>AND</b>, this search will identify pieces that include both engineering and computing</p>	<p style="text-align: center;"><b>AND</b></p>  <p>A Venn diagram with two overlapping circles labeled 'Engineering' and 'Computing'. The intersection of the two circles is shaded orange, representing the AND operation.</p>
<p><b>Boolean operator: OR</b></p> <p>Using <b>OR</b>, this search will identify pieces that include engineering, or computing, and with both engineering and computing</p>	<p style="text-align: center;"><b>OR</b></p>  <p>A Venn diagram with two overlapping circles labeled 'Engineering' and 'Computing'. The entire area of both circles is shaded orange, representing the OR operation.</p>
<p><b>Boolean operator: NOT</b></p> <p>Using <b>NOT</b>, this search will identify pieces that include engineering and exclude computing</p>	<p style="text-align: center;"><b>NOT</b></p>  <p>A Venn diagram with two overlapping circles labeled 'Engineering' and 'Computing'. The 'Engineering' circle is shaded orange, while the 'Computing' circle and their intersection are shaded gray, representing the NOT operation.</p>

## TRUNCATION

As we mentioned in the previous sub-module «Sub-Module 2c», we can use **truncation** (or wildcards) by replacing sections of a word with an asterisk to allow for derivative words to be found (e.g., “wom\*n” to find “woman,” “women,” and “womyn”). Truncation can assist with locating references to concepts that have different spellings (e.g., U.S. versus U.K. spellings of words) or if the concept can have different tenses, plurals, or associations (e.g., using “ecolog\*” in a search can result in “ecology,” “ecological,” and “ecologies”). The use of the asterisk (\*) truncates terms and allows for variability in the term. In this case, “Latin\*” would bring back results for “Latin,” “Latino,” “Latina,” “Latinx,” “Latine,” and their plural forms. Thus, the use of Boolean rules in the construction of the search strings ensure that the resulting literature fit our needs as much as possible. Table 2d.2 shows examples of words with truncations and their results.

Table 2d.2. Examples of truncation

Word with Truncation	Example of Results
Latin*	Latin, Latino, Latina, Latine, Latinx, and plural forms
Engineer*	Engineer, engineers, engineering
Wom*n	Woman, women, womxn, womyn

## Building Search Strings

A **search string** is a combination of search terms and Boolean operators that you insert in a search engine’s search bar. The previous sub-module stressed the need to learn the Boolean rules of each chosen search engine. Below we demonstrate how to build the search strings for a set of searches. With an interest in including as comprehensive a set of literature as possible, we want to cast the broadest net possible with our search terms. To accomplish this, we build search strings of all possible combinations of our search terms with Boolean operators so that each string includes terms from each of our essential categories. Using the example in the previous section on search terms for a meta-synthesis that focuses on studies on women of color in undergraduate engineering education that used CRT and related theories, we would have four categories: **theoretical framework**, **discipline**, **gender**, and **race/ethnicity**. Here are two examples of strings for this meta-synthesis topic using Google Scholar’s standard operators (**AND** and **OR**):

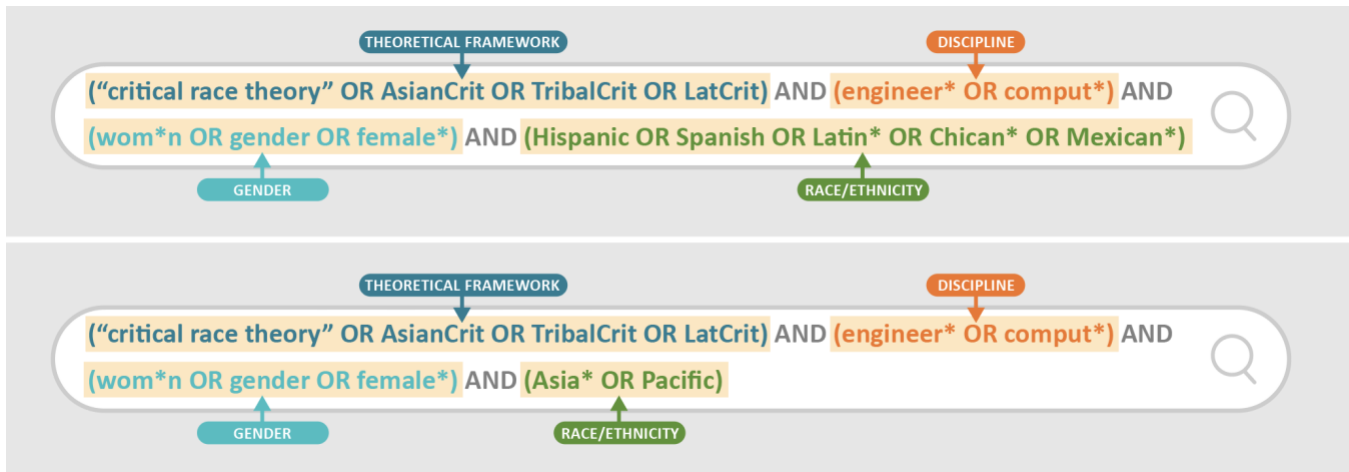


Figure 2d.1. Two examples of search strings with four categories

With the use of parentheses, we grouped the words from one category together. You want to make sure to use parentheses to group compound Boolean operators. Note that we used quotation marks around “critical race theory” in order to search for the specific word combination or exact phrase. When doing a Boolean search, use quotation marks whenever your keyword consists of more than a single word. Going back to the search string examples, the use of **OR** ensured that at least one of the words inside of the parentheses appeared in the results. The use of **AND** ensured that all results included terms from each of the categories in our synthesis.

Keep in mind that different search engines and other search tools might use different operators. For example, Google Scholar uses the vertical bar ( | ) in place of **OR**, and the operator **AND** is implied between closed parentheses. Some search engines and tools may also require you to use hyphens to group words. Also note that they may have limits on the number of words that can be entered into a single search string. Currently, for instance, Google Scholar limits its term and operator queries to 32 words.

### OTHER SEARCH RULES OR FUNCTIONALITIES

In addition to the Boolean rules, consider using what Heyvaert et al. (2017) call “search limits” (p. 90), such as the publication language or type, and other functions that a search engine or other tool may have that allow the inclusion of other elements that further define your searches. For example, in some engines, you can restrict the searches to a certain range of years, or you may be able to restrict searches to only the abstracts. Both will allow for more precise results. At the same time, the use of these strategies may leave out relevant pieces. Imagine that in the example used in this sub-module, the authors of a particular study did not mention their theoretical framework in the abstract. Their study would not appear in a search that was limited to the abstract, leaving out a relevant piece. Thus, we recommend that you make sure to refer to the Help button or link for each search engine, database, directory, or meta-engine that you use to familiarize yourself with the search rules and functionality capabilities.

## Conducting Searches with Search Strings

Once the search strings are built, the search process consists of entering the strings into the search engine (or another chosen search tool) and sorting through the results. At this stage, it is very important to stay organized because, despite the precision of your search terms and strings, many searches will return thousands of results. We will talk about the process of sorting through results in Module 3, but we would like to introduce a couple of ideas here regarding that process:

- Keep track of the results.**  
 Record how many and which results have been sorted through, the reasons they were included or excluded, and so on. As noted earlier, it is important to keep a well-documented audit trail that includes your activities, results, and decisions to support the credibility of your study (Sandelowski & Barroso, 2007). Spreadsheets are a simple, yet very useful, way of keeping track. An example of how to track your search results can be seen in Table 2d.3.
- Decide how far into your search you are willing to spend time sorting through results.**  
 Our team decided that, for each search, we would continue sorting as long as there were results that were potentially relevant to the synthesis. Once we stopped finding potentially relevant results, we sorted through subsequent results for three additional pages and then stopped. This helped the team manage time and resources devoted to the search process.

Table 2d.3. Example of search result tracker

Search engine used (if start set)				
Search string used (if from start set) or article snowballing from				
Link to list of results				
Number of results on search engine or article snowballing from				
Number of results kept				
APA citation for literature piece of interest	Link to literature result	Criterion 1	Criterion 2	Criterion 3

### Activity 2d.3.

Take 15–30 minutes to begin constructing and testing search strings using Boolean operators and truncation.

## Additional Resources

- Watch a demonstration about how to develop search terms, Boolean rules, & strings:  
<https://tinyurl.com/IMSSearchTermsEnginesStrings>
- Keep track of your searches. An example of a tracking spreadsheet may be found in Table 2d.3.
- Watch this YouTube video by WaldenULibrary for further guidance on Boolean operators:  
<https://www.youtube.com/watch?v=bCAULDuMcso>

## References

Finfgeld-Connett, D. (2018). *A guide to qualitative meta-synthesis*. Routledge.

Heyvaert, M., Hannes, K., & Onghena, P. (2017). *Using mixed methods research synthesis for literature reviews*. Sage.

Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. Springer.



# Module 3: Search and Selection



## Sub-Module 3a: The Start Set

### Objectives

In this sub-module, you will learn:

- What a start set is, how it is developed, and its purpose and role in a meta-synthesis
- Of the need to use multiple strategies to access the literature

### Main Concepts

Before you begin the search and selection process, you will need to create a start set of literature that you will then build the rest of the literature in your meta-synthesis upon. The development of your start set is the foundation of your meta-synthesis and will be used to further expand the pieces of literature you include in your synthesis through additional searches.

#### *The Start Set*

Now that you have gone through the pre-search process in «[Module 2](#)», you have the main elements to start searching for the literature that you will include in the synthesis: search, selection, and critical appraisal criteria; search engines, databases, or other tools and their Boolean rules; and search terms and strings. You are now ready to start conducting searches using your selected search tools by inputting your search strings with the appropriate search parameters (e.g., publication date range, searching full text vs. only abstracts and titles).

Once you conduct the searches using the strings you created, it is important to keep track of the results obtained in each step, such as how many hits result from each search, how many you select for further inspection, and how many you discard. Table 3a.1 is an example of a simple system to track the search engines, databases, or other tools, search strings, and results for each initial search. At this stage, you will be implementing the search, selection, and critical appraisal criteria that you have selected for your study. (We will take a closer look at how to apply these criteria in «[Sub-Modules 3b and 3c](#)».) As a result of your searches and the implementation of your criteria, you will obtain the initial group of full-text pieces of scholarship that will contribute to answering your synthesis question. This is called the **start set** (Wohlin, 2014). You will use the literature in the start set as the basis for the subsequent systematic search and selection process, called snowballing, to search for further scholarship.

Table 3a.1. Search string tracker

Search engine or other tool used		
Type of search (e.g., full text, title)		
Search string used	Total results	Number kept

The purpose of conducting a systematic search and selection processes is to find all the existing literature that is relevant to the synthesis question, so that it can be included in the synthesis. However, even search engines and meta-engines claiming to have wide access due to the reach of their crawlers (which are artificial intelligence programs created to scour websites for literature) do not find everything. In some cases, it is a matter of lag time between publication and online availability; in other cases, it has to do with how accessible a specific study report is due to where it was published. For example, a relevant piece of scholarship may not appear in your initial searches because the journal where it was published is not indexed. However, you may be able to find it through snowballing if other studies cite it.

Given that all subsequent literature searches are dependent on the start set through forward and backward snowballing (we will look at snowballing in detail in «Sub-Module 3d»), you need to be systematic in the searches using your selected search engines, databases, and other tools to ensure that you cast the broadest possible net to identify the largest quantities of potentially relevant scholarship.

### Accessing the Literature

Nowadays, you can access a lot of the relevant literature for a synthesis online. In some cases, the search engine, database, or other tools you use may provide access to the full text. Sometimes you may find the full text through the website of the organization where the publication originated, a social networking platform for academics (such as Academia.edu or ResearchGate), an open access website (such as those we shared in «Sub-Module 2c»), or simply through a general web search engine.

However, not all relevant literature will be freely available online, particularly books, reports, and the latest publications. An academic library may be the best tool to access these publications. One of our team members has an affiliation with the University of Georgia and, thus, access to its academic library search engine; so, we use it as an example here (see Figure 3a.1). In addition to the library’s electronic and physical holdings, it is possible to request publications through interlibrary loan. This type of loan effectively provides library users with access to literature in any library within its network. Remember that public libraries sometimes have partnerships with university libraries and may allow you to access

their holdings. An example of this is the GALILEO Consortium in Georgia, which includes the University System of Georgia, Georgia Technical Colleges, public and private schools, and Georgia’s Public Libraries.

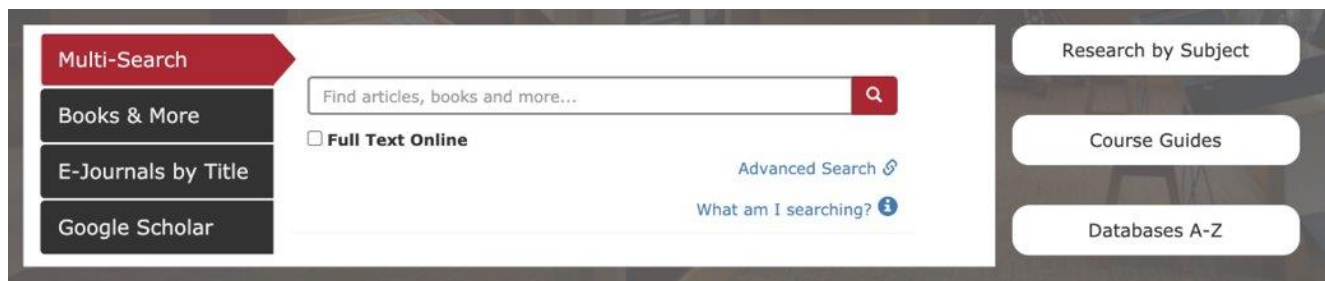


Figure 3a.1. Search engine from the University of Georgia’s academic library

Another strategy is to contact members of your professional network who may have access to additional literature. Sometimes a publication is not available through any of the outlets you have access to. In these cases, we recommend directly contacting the authors of the piece. We have found that authors are usually open to sharing their scholarship and having it be part of syntheses because it contributes to the dissemination and overall visibility of their work. An example of an email request to an author can be seen in Figure 3a.2. An e-mail template can be found in Appendix 3a.

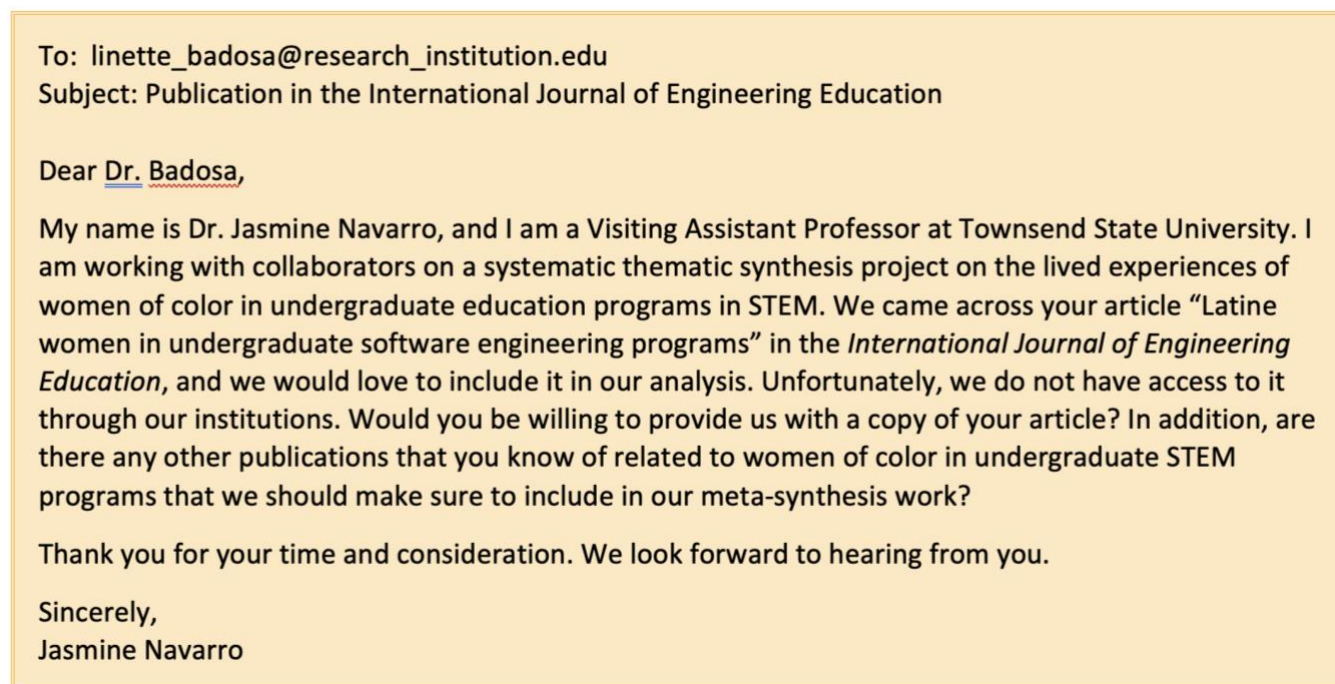


Figure 3a.2. Example of an email request to author

### Activity 3a.1.

With your specific meta-synthesis project in mind, take 10 minutes to think about the following:

- Is there a type of literature or study that you may not find through the traditional searches?
- What might be alternative and more effective ways of searching for them?

### Activity 3a.2.

Using the search engines and other tools you selected and the search strings that you created in Module 2, take 10–15 minutes to conduct a few searches for your literature start set.

- What do you notice about the results of your searches?
- Is there a type of study or literature format that is not coming up in your searches?
- Are there other search engines, databases, or other tools that would be helpful to find this type of literature?

## References

Wohlin, C. (2014, May). Guidelines for snowballing in systematic literature studies and a replication in software engineering. In *Proceedings of the 18th international conference on evaluation and assessment in software engineering* (pp. 1–10). Association for Computing Machinery.  
<https://doi.org/10.1145/2601248.2601268>



## Appendix 3a: Template Email

To: **AUTHOR EMAIL**

Subject: Publication in **JOURNAL NAME**

Dear Dr. **AUTHOR'S NAME**,

My name is **NAME**, and I am a **TITLE** at **INSTITUTIONAL AFFILIATION**. I am working with collaborators on a systematic thematic synthesis project on **SYNTHESIS TOPIC**. We came across your article, "**ARTICLE TITLE**," in the **JOURNAL NAME**, and we would love to include it in our analysis. Unfortunately, we do not have access to it through our institutions. Would you be willing to provide us with a copy of your article? In addition, are there any other publications that you know of related to **SYNTHESIS TOPIC** that we should make sure to include in our meta-synthesis work?

Thank you for your time and consideration. We look forward to hearing from you.

Sincerely,

**YOUR NAME**



# Institute for Meta-Synthesis

## Sub-Module 3b: Inclusion and Exclusion Decision-Making

### Objectives

In this sub-module, you will learn:

- How to conduct the initial screening phase of the literature to separate publications that will be used in the meta-synthesis project from those that will not be used (Filter 1)
- How to apply search and selection criteria to further include or exclude literature (Filter 2)
- To create and use a tracking form for the intended meta-synthesis project

### Main Concepts

Now that we have conducted literature searches, we need to make decisions about which pieces we need to keep and which ones we need to discard for the meta-synthesis. In this sub-module, we will look at the different phases in the process where we will screen the literature to make inclusion and exclusion decisions to arrive at the literature to be included in the meta-synthesis.

#### *Filter 1: The Initial Screening Phase*

The main goal of Filter 1, which is the initial screening phase, is to conduct a first “pass” through the literature that resulted from your searches. In this first screening phase, you will review the immediately available information, such as titles and abstracts, to sift through those studies that obviously do not fulfill your criteria.

Once you begin your search, we recommend creating a form, called a *tracking form*, to track the literature you find and your decisions to keep or discard each piece. This can be a table with your inclusion and exclusion criteria listed in order of importance “so that the first *no* response can be used as the primary reason for exclusion of a study” (Heyvaert et al., 2017, p. 98, emphasis added). Be sure to pilot your tracking form to ensure that it works in the way you intended. This tool will help you begin curating your start set of literature (and later the literature you find through snowballing) that will go through subsequent screenings (i.e., Filter 2 and Critical Appraisal, which will be reviewed in [«Sub-Module 3c»](#)). We will discuss the elements of the tracking form and what you will need to record in the “Tracking the Process” section later in this sub-module.

As you go through your search process using the search engines or other tools, Boolean rules, and search strings you created in previous sub-modules, you will review the titles and abstracts of

publications that come up in your search results. Depending on the search engine or tool, the search results will populate titles *and* abstracts together in your initial searches, but other times you will need to complete separate searches for abstracts. For example, on Google Scholar you may need to click on the PDF hyperlink (if available) to access the abstract and full article. However, this may be too distracting from your initial title searches. If so, just keep track of the URLs for the abstract to review later. As you review and sift through these results, save your decisions, references, and links to abstracts of publications that seem to be relevant in your tracking form. If, during Filter 1, you are not sure whether you should exclude a piece of literature, then you should keep the publication in the “include” pile. A piece can always be removed during the second screening of the literature after reading the full text.

It is important to note that sometimes search engines that use crawlers will populate results that are related to parts of your search strings, but not necessarily the whole search string. In this case, we recommend that you keep all results relevant to your synthesis question. If they are duplicated in later searches, you can simply note that in your tracker. For example, when our team conducted our searches for Native women in undergraduate engineering, Google Scholar also populated results related to African American women in undergraduate engineering. We kept these for further filtering and tracked them in our own tracking forms. The purpose of doing this is to ensure that you have identified all relevant pieces of literature for your meta-synthesis, and it is not guaranteed that search engines that use crawlers will populate the same results with different search strings.

Here is an example. Table 3b.1 shows a tracking form to track Filter 1 decisions for our project that searched for literature that reported on the intersectional experiences of women of color in engineering higher education in the U.S. and that were published between 1999 and 2019. Categories in the tracker included: gender, race, intersectional findings on gender and race, discipline (in this case, engineering), demographic location of the study (U.S. population), career level (higher education), publication date (in this case, 1999–2019), type of publication (e.g., peer-reviewed empirical research study, report, conference proceedings), and Filter 1 decisions. We also tracked the search string used to identify the literature pieces, the full references of the pieces of literature, and a hyperlink to where the piece of literature was published (see Search String Tracker in [«Sub-Module 3a»](#)).

For our team, it was helpful to use numerical values to identify whether literature pieces fulfilled the Filter 1 criteria. If a piece fulfilled a criterion, the team used “1” to note this. If a piece did not fulfill a criterion, the team used “0” to note this. Below is an example of using this number system to track Filter 1 decisions.



Table 3b.1. Filter 1 (F1) tracker with examples

Reference	Pub. Date	Women	Of Color	Engineering	Undergraduate	US Pop.	Intersection	Empirical Study	F1 Decision
Alonso	2012	1	1	1	1	1	1	1	Keep
Fleming	2008	1	1	1	1	1	1	Unclear	Keep

Once you have reviewed all your pieces for Filter 1, the pieces that showed the potential to fulfill your criteria based on their titles and abstracts will then move to the second screening phase, which we call Filter 2. As we mentioned earlier, at the end of Filter 1, you will likely have literature in your results that you are not sure fulfill your criteria but that have the potential to do so. It is the role of Filter 2 to screen out those that do not.

### WHEN TO STOP SEARCHING FOR LITERATURE FOR FILTER 1

As you undergo your search process during Filter 1, you may wonder when you should stop going through the search results within your search engines or other tools. Remember, you should be conducting several searches within your chosen search engines or other tools based on the set search strings you developed (see search strings in «Sub-Module 2d»). Every search string will populate a different number of results, although you may find the same pieces of literature within different search strings. Given that search engines and other tools may populate thousands of results based on the keywords you have chosen to include in your search string, it is highly unlikely that *all* those results are relevant to your synthesis topic or question. Our team has found in our own searches that, after several pages of reviewing search results, the pieces populated by the search engine and other tools become less and less relevant. As such, we have implemented a 3-page rule for our searches. Essentially, we will stop the search with that specific search string and move onto the next search string only when there are three consecutive pages of populated results that are irrelevant to our synthesis topic or question.

### Filter 2: Applying Criteria for Further Inclusion/Exclusion Decisions

The main goal of Filter 2 is to closely examine the literature resulting from Filter 1 to make inclusion and exclusion decisions. In this second screening phase, you will need the studies' full text to sift through those that do not fulfill our criteria (See «Module 3a» for Accessing the Literature). Filter 2 is thus a much more stringent application of the search and selection criteria that we applied in Filter 1. Reading the full text may clarify details about the literature piece that do not readily appear in its title or abstract. In the example of Table 3b.2 below, reading the full text helped us clarify whether the literature pieces were empirical studies or if they were on the undergraduate experience.

Table 3b.2. Filter 2 tracker with examples

Reference	Pub. Date	Women	Of Color	Engineering	Undergraduate	US Pop.	Intersection	Empirical Study	Filter 2 Decision
Alonso	2012	1	1	1	1	1	1	1	Keep
Fleming	2008	1	1	1	1	1	1	0	Discard

Once again, it is vital to be as transparent as possible about the decision-making process and document all decisions and rationales using the tracking form. Being detailed and organized throughout your meta-synthesis project is part of your audit trail and will help enhance the validity of your synthesis and effectively communicate your findings when reporting on them.

### Activity 3b.1.

Take 20–30 minutes and use the tracking form for Filters 1 and 2 we provided in Tables 3b.1 and 3b.2 as a reference to generate your own tracking form for your intended meta-synthesis project employing the search and selection criteria you developed in Module 2.

### Activity 3b.2.

Take 30–40 minutes to apply your search and selection criteria to the search results from Sub-Module 2b using your tracking form for Filters 1 and 2.

## Tracking the Process

Heyvaert et al. (2017) recommend being thorough in tracking your activities when conducting the different steps of the work. Your trackers should record the following elements from your searches and filtering decisions:

- Sampling strategy**  
 In our case, we conduct systematic thematic syntheses; so, we use an exhaustive sampling strategy, which includes forward and backward snowballing. You may use purposeful or selective sampling, where you do not seek to gather all the existing studies on the topic of their synthesis, but only those studies that best answer your synthesis question.
- Which resources were searched**  
 These consist of the search engines or other tools you selected in «Module 2», such as Engineering Village or Google Scholar.

- Number of retrieved publications for each engine**

In each tracking form for Filters 1 and 2, you should record how many results you got when conducting each search and how many you retained from that total. These numbers are useful for reporting purposes to give readers a sense of the scope of your meta-synthesis.
- Number of duplicate publications excluded**

Our team keeps a running list of publications that team members have considered, independently of their inclusion or exclusion. This way, we avoid repeating the evaluation of the same piece over and over, saving time and resources.
- Multiple publication bias**

Research teams may publish more than one manuscript using the same data set. Multiple publication bias may be an issue you run into in your project. If multiple publications report results from the same study, you will need to bundle them into one study and consider them as one unit for the meta-synthesis. You will need to be clear about how these were bundled and treated in the meta-synthesis through your use of references and an explanation of your rationale for it.
- The search, selection, and critical appraisal criteria**

The tracking form is useful to record how each piece of literature fulfills each of your meta-synthesis criteria (search, selection, and critical appraisal).
- Number of pieces of literature that were included and excluded**

It is useful to track these numbers so that later you can break them down in different ways, such as by search engine or other tool and filter, for reporting purposes. It may be useful to create a PRISMA flow diagram (see «[Sub-Module 7c](#)» for a template and to learn how it is used in review and synthesis manuscripts).
- How others were involved in the process**

If you are working in a team, you will want to record how many people were involved and whether they were content experts, methodologists, or both. In our team, we include both content and methodology experts to ensure a thorough consideration of both areas for each piece of literature. We also have at least two team members conduct the critical appraisal of each study.
- How disagreements about inclusion/exclusion decisions were handled**

You will need to record what processes are in place for decision-making when disagreements arise when working with a team. For example, our team uses consensus processes (in which we discuss the different options until we reach an agreement) to check when questions and disagreements about the application of the criteria arise. Other teams may prefer to vote or find other ways to make inclusion/exclusion decisions.

This information will be useful when writing your meta-synthesis findings and methods section for publication.

## Additional Resources

- For guidance on techniques used to identify articles for inclusion in systematic reviews and syntheses: Booth, A. (2006). “Brimful of STARLITE”: Toward standards for reporting literature searches. *Journal of the Medical Library Association (JMLA)*, 94(4), 421–429. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1629442/>
- For an overview of methods to conduct systematic reviews and syntheses: Booth, A. (2016). Searching for qualitative research for inclusion in systematic reviews: A structured methodological review. *Systematic Reviews*, 5(74), 1-23. <https://www.doi.org/10.1186/s13643-016-0249-x>

## References

Heyvaert, M., Hannes, K., & Onghena, P. (2017). *Using mixed methods research synthesis for literature reviews*. Sage.



## Sub-Module 3c: Critical Appraisal

### Objectives

In this sub-module, you will learn:

- The purpose and importance of critical appraisal in the meta-synthesis process
- To develop critical appraisal tools for your meta-synthesis project

### Main Concepts

As we saw in «[Sub-module 3b](#)», not all studies are made available to the public with the same degree of attention to methodology and rigor. For example, an article might not include an explanation of how data was collected and analyzed, or the evidence might not warrant the claims the study authors make in their findings and discussion. Thus, we need to ensure that a synthesis puts forth rigorous **meta-findings** (i.e., overarching findings are synthesized from the results of the individual studies that are included in the meta-synthesis project). For this purpose, it is necessary to conduct a **critical appraisal** of the literature, which is the process of evaluating its rigor to decide about its inclusion in the meta-synthesis. This process should include a set of criteria that addresses the minimum standards of rigor acceptable for studies' inclusion in a synthesis.

#### *The Purpose of Critical Appraisal*

One of the tasks you need to conduct as part of a synthesis is to decide how you will appraise the rigor of the literature, either by selecting a pre-existing critical appraisal tool or by developing your own. Your decision will have a role in how you appraise the literature you find, and which literature is included in the synthesis; so, it is important to carefully weigh the consequences of choosing or developing a critical appraisal tool. Generally, pre-existing tools include elements of research methodology (e.g., having a research question, including a description of data collection and analysis methods) to consider in the appraisal and other elements, such as the ethical dimensions of a study, the use of sufficient evidence to support findings, and the existence of an audit trail. To track these elements, some critical appraisal tools include checklists, questions to guide the process, or lengthy templates; some use a scoring system of the extent to which each criterion is fulfilled in a Likert scale format (e.g., not fulfilled, mostly not fulfilled, partially fulfilled, fulfilled), and others use absolute, true/false statements to indicate whether a criterion is minimally fulfilled.

## *Critical Appraisal Tool: Creating a Checklist*

Walsh and Downe (2006) analyzed eight existing checklists and summary frameworks to assess studies' quality and created a comprehensive list of summary criteria for appraising qualitative research studies. This list includes eight stages with their corresponding essential criteria. Below is a summary of the most relevant criteria:

### **1. Scope and purpose**

- Research questions/aims/purposes/hypotheses
- Literature review
- An established link between study and literature

### **2. Design**

- Rationale for design
- Appropriateness of setting
- Method
- Data collection consistency

### **3. Sampling strategy consistency**

- Justification, description, explanation of disparities with plan

### **4. Appropriate analytic approach**

- Name
- Appropriateness for study
- Data saturation

### **5. Interpretation**

- Description of context
- Audit trail
- Data supports interpretation

### **6. Demonstrated reflexivity**

- Evidence of self-awareness
- Insight
- Positionality

### **7. Demonstrated sensitivity to ethical concerns**

- IRB approval
- Documentation of consent
- Data protection

### **8. Evidence of relevance and transferability**

- Discussion of limitations
- Discussion of significance of the work
- Inclusion of recommendations for future work

We consider this list a useful starting point for the identification of criteria to include in a critical appraisal tool. You will need to decide which criteria to include according to your synthesis question, the availability of literature in your chosen field, the standards for research in your field, and any other

applicable consideration. Two main questions that our team also factors into our appraisals are whether the inclusion of these criteria is common practice in the discipline and whether the absence of one of the criteria would compromise the rigor of the study as a whole.

**Activity 3c.1.**  
 Take 10–15 minutes to write your stance on critical appraisal for your meta-synthesis, including the main criteria for inclusion and how strict their implementation will be. Make sure to include why you have taken that stance.

*Critical Appraisal Tool: Developing a Tracker*

You will also need to make decisions about whether you want to use a points system for the degree each criterion is fulfilled (e.g., Likert scale) or a checklist (i.e., fulfilled vs. not fulfilled) and the flexibility with which the criteria will be applied. Similar to our discussion of filtering in «Sub-Module 3b», once decisions around the critical appraisal tools are in place, you will need to apply each of the criteria to all the literature that has fulfilled the search and selection criteria to make decisions about whether it will be part of the synthesis or not. As with Filters 1 and 2, you will need to track your critical appraisal decisions in a tracker similar to Table 3c.1.

Table 3c.1. Critical appraisal tracker

Reference	Research Question/ Purpose/ Hypothesis	Theoretical Framework / Lit. Review	Description of Methods	Description of Participants & Context	Sufficient Evidence	Critical Appraisal Decision
Alonso	1	1	1	1	1	Keep

How strict or lenient you are in your decision-making may have an impact on the number of pieces of literature that will make it through the critical appraisal. If the elements in your critical appraisal criteria are very narrow and strict and you are studying an emergent area of study, the process may yield an insufficient number of studies for a meaningful meta-synthesis. Or the opposite may be true: If the elements in your appraisal criteria are too wide and loose, the process may yield a really large number of studies, which may make the synthesis process unmanageable.

Based on our experience, we recommend testing your critical appraisal tool before implementing it to all your literature. Such testing guided us to make some changes to our original set of critical appraisal criteria. For example, although we initially included the description of limitations in the studies as one of the criteria, we ultimately decided not to do so. After appraising several pieces in our start set, we

realized that the inclusion of a description of the study's limitations was not very common in the literature for our synthesis. If we had kept that critical appraisal criterion, the number of studies to include in our synthesis would have decreased considerably, diminishing its scope.

### Activity 3c.2.

Take 20–30 minutes to develop critical appraisal tools. Articulate to yourself the reasons for including, or excluding, each criterion you consider. Test the tools in Activity 3c.3.

### Activity 3c.3.

Take 30 minutes to conduct a critical appraisal of two pieces of literature you are considering for your start set (that you found in the activity in Sub-Module 3a).

- What do you notice about the literature you appraise?
- Are there any criteria that are not commonly fulfilled by your literature?

Adjust your tools accordingly and record how and why changes were made.

## References

Walsh, D., & Downe, S. (2006). Appraising the quality of qualitative research. *Midwifery*, 22(2), 108–119. <https://doi.org/10.1016/j.midw.2005.05.004>



## Sub-Module 3d: Forward and Backward Snowballing

### Objectives

In this sub-module, you will learn:

- The sampling strategies called forward and backward snowballing
- How to track your snowballing results
- How to determine when it is appropriate to stop the snowballing process

### Main Concepts

An effective search and selection process that has the goal of casting the most inclusive net possible for a systematic thematic synthesis is **snowballing**; this includes forward and backward snowballing. We generally follow Wohlin's (2014) description of the snowballing process (see Figure 3d.1 in this sub-module).

#### *Forward Snowballing*

**Forward snowballing** is a sampling strategy for literature searches that can help you identify relevant studies by using your start set (see «[Sub-module 3a](#)») to trace recent publications that cite literature in that set. You may conduct forward snowballing using the “Cited by” feature available on Google Scholar and other search engines like Engineering Village. Like your initial search and selection process (described in Modules 2 and 3), you will review the “Cited by” results and identify pieces of literature that fit your synthesis question by conducting Filter 1, Filter 2, and critical appraisal as described in «[Sub-modules 3b and 3c](#)». Forward snowballing adds newer literature to the synthesis. For a brief video demonstrating forward snowballing, see Additional Resources.

#### **Activity 3d.1.**

Spend 10–15 minutes conducting forward snowballing using a literature piece related to your meta-synthesis project.

## Backward Snowballing

**Backward snowballing** is a sampling strategy for literature searches that complements forward snowballing. It is the process of “using the reference list to identify new papers to include” (Wohlin, 2014, p. 3).

For this strategy, we examine each reference list or bibliography of the pieces of literature included in the start set and exclude any publications that do not match the search and selection criteria. Similar to forward snowballing, you are looking at the titles of cited literature pieces and their relevance to your synthesis question. Given that you are looking at the references of pieces in your start set, you will need to pay close attention to their publication dates and whether they are within your publication parameters. Note that duplicate publications need to be removed (i.e., any papers you have already evaluated). This will result in a list of references that will need to be assessed for potential inclusion in the meta-synthesis project.

Next, you will again go through the process of reviewing these new additions and identify among them pieces of literature that fit your synthesis question by conducting Filter 1, Filter 2, and critical appraisal as described in «[Sub-Modules 3b and 3c](#)». The process of backward snowballing adds older literature to the synthesis. If date of publication is one of the criteria for your synthesis (e.g., must be published in the range of 1999–2019), for older pieces in your start sets, most resulting literature from backward snowballing may automatically be excluded from consideration. For a brief video demonstrating backward snowballing, see Additional Resources.

### Activity 3d.2.

Spend 10–15 minutes conducting backward snowballing using a literature piece related to your meta-synthesis project, such as those you used to conduct critical appraisal in Sub-Module 3c.

According to Wohlin (2014), one of the main advantages to forward and backward snowballing is that you begin the processes with your start set, which is relevant to your study, and use its contents to locate publications that are likely to fit your synthesis. A potential disadvantage of this sampling strategy is that relying on literature pieces that cite each other may lead to the collection of a homogenous or insular group of publications due to the influence of the start set (e.g., if the authors in your initial literature only cited certain authors or from certain journals). This could result in a small and biased sample of literature from the larger population of publications related to your topic of interest.

### Activity 3d.3.

Take 5–10 minutes to consider the following question: What do you notice about the results of each snowballing technique?

Heyvaert et al. (2017) state that snowballing can result in an overrepresentation of published research. You can counteract this potential threat by casting the broadest net possible in the pre-search process, using several search engines and other tools and using an inclusive list of search terms, and by emailing your networks for additional resources. Remember to also consider including gray literature and non-academic publications in your start set. This will help you to avoid getting an insular set of literature.

Figure 3d.1 illustrates both forward and backward snowballing.

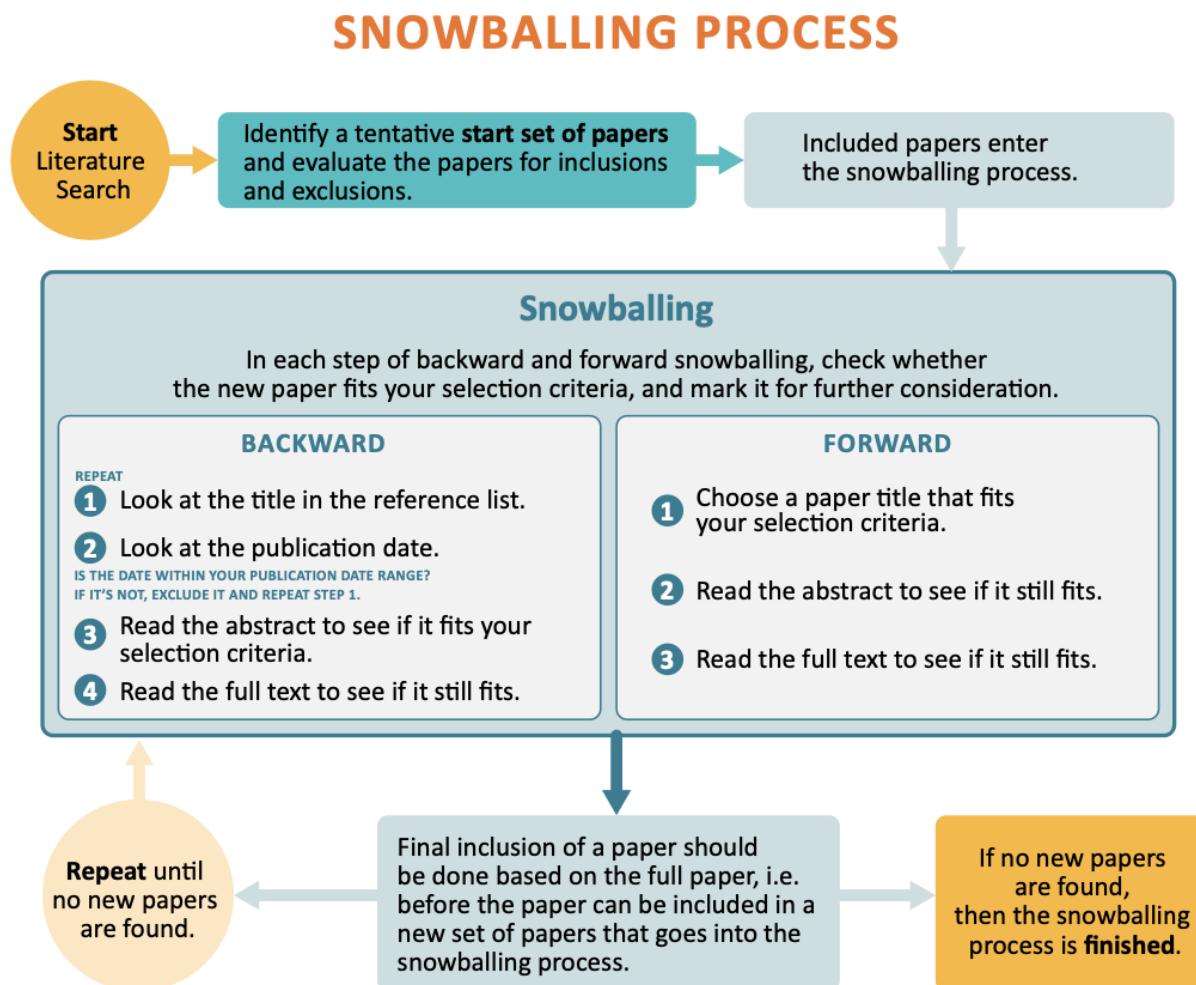


Figure 3d.1. Snowballing procedure based on Wohlin (2014, p. 4)

## How to Track Your Snowballing and When to Stop

When forward and backward snowballing, you will want to track your results in some kind of tracker. Our team typically creates a tracking form using Excel. You can see an example of our tracking form in Table 3d.1. In the tracking form, you would include the citation of a piece in your start set and then its subsequent results from forward and backward snowballing. You would want to include the citations of all the pieces you believe are relevant to your synthesis topic. In identifying these pieces, you are essentially conducting your Filter 1 and can create a Filter 1 tracking form for your snowballing, as you have done prior, to get to your start set.

It will be necessary to stop sampling at some point to continue with the meta-synthesis project, but how do we know when we have collected enough literature? Researchers who employ purposeful sampling often use data saturation or data sufficiency logic to guide them. Heyvaert et al. (2017) define data saturation logic as the logic that “the data collection stops when a saturation point is reached” (p. 82), which means that including more studies during the search process does not necessarily add any new insights. Meanwhile, the data sufficiency logic is the logic that data saturation is never truly achieved and that the researchers should determine when to stop the search process because they know what is considered to be “sufficient evidence” in their field.

In a systematic thematic synthesis, the goal is to include a comprehensive set of literature, which means that the intent is to find all the relevant literature, independently of whether or when there may be data saturation or data sufficiency. Wohlin (2014) recommends continuing to snowball the literature resulting from the snowballing process until it produces no new relevant references for the synthesis.

A caveat to this process is practicality and budget. There is a limit to the time and resources that one can devote to this process until reaching the point recommended by Wohlin (2014). Our team stops snowballing after snowballing the results of the first round (i.e., snowballing of snowballing) because the second round produces diminishing returns given that most of the literature we find is quite recent and had not been cited yet, and has bibliographies that do not include references that are new to us. In essence, we conduct two rounds of snowballing.

Table 3d.1. Forward/backward snowballing tracker

<b>Start Set Literature Piece 1</b>	<b>Citation</b> [CITATION HERE]		<b>Number of Search Results on Google Scholar</b> [# HERE]			
<b>Forward/Backward Snowballing</b>						
<b>Reference/Citation</b>	<b>Filter 1 (F1) Criteria</b>	<b>F1 Criteria</b>	<b>F1 Criteria</b>	<b>F1 Criteria</b>	<b>F1 Criteria</b>	<b>F1 Criteria</b>

## Additional Resources

- To watch a video tutorial on how to conduct forward snowballing, please click this link: [How to Conduct Forward Snowballing](#).
- To watch a video tutorial on how to conduct backward snowballing, please click this link: [How to Conduct Backward Snowballing](#).

## References

Heyvaert, M., Hannes, K., & Onghena, P. (2017). *Using mixed methods research synthesis for literature reviews*. Sage.

Wohlin, C. (2014, May). Guidelines for snowballing in systematic literature studies and a replication in software engineering. In *Proceedings of the 18th international conference on evaluation and assessment in software engineering* (pp. 1–10). Association for Computing Machinery. <https://doi.org/10.1145/2601248.2601268>

# Module 4: Analysis – Introduction and Preparation



## Sub-Module 4a: The Analysis Process

### Objectives

In this sub-module, you will learn:

- The analysis process: coding, thematic analysis, development of findings, and discussion

### Main Concepts

Once you have selected the literature you want to synthesize, you are ready to start your analysis process. As Sandelowski and Barroso (2007) said, “*qualitative metasynthesis* is an interpretive integration of qualitative findings in primary research reports that are in the form of interpretive synthesis of data: either conceptual/thematic descriptions or interpretive explanations. You have available to you a range of methodological and technical approaches for producing a qualitative metasynthesis of findings in a target domain of study” (p. 199). Thus, the analysis process is how you will interpret and integrate the findings in primary research reports to create the meta-findings that will constitute your synthesis. Integration and interpretation involve more than just bringing together literature and generating a summary; they require the development of themes or patterns that transcend any one individual study. Analysis in meta-synthesis involves processes such as comparing and contrasting narratives, relating them to one another, and examining their convergences and divergences, to name a few.

In this sub-module, we discuss the specific analysis process that our team employs. Given that we use systematic thematic synthesis, our methods align with thematic analysis methods, which include coding and developing themes (Thomas & Harden, 2008). Throughout this module and beyond, we use the words *process* and *steps* to refer to the different types of tasks that you will perform throughout your analysis.

### *Preview of the Analysis Process*

In the following modules, we will talk about the different approaches to coding, how to develop themes through thematic analysis, how to develop findings, and how to write up the discussion section. In this sub-module, we describe how all these individual steps are part of the overall analysis process. Keep in mind that the analysis process is iterative and cyclical; each step typically goes through several iterations and the steps build upon each other.

- **First step: Preparation**

In «**Sub-Modules 4b and 4c**», we explain how to prepare for coding and the further analysis of the literature identified for inclusion in the meta-synthesis. This preparation includes reading the literature and the development of analytical memos.

- **Second step: Coding**

In «**Module 5**», we discuss **coding**, which is a “word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldaña, 2016, p. 3). We describe inductive, deductive, and hybrid coding, and the development of codebooks.

- **Third step: Themes**

In «**Sub-Module 6a**», we describe and provide examples of the development of **themes**, which are groupings of similar codes or underlying ideas across codes. We also explain the development of descriptive and analytical themes.

- **Fourth step: Findings**

In «**Sub-Module 6b**», we introduce and include examples of the development of findings. In qualitative meta-synthesis, findings both describe and interpret what has been learned in the study.

- **Fifth step: Discussion**

Also in «**Sub-Module 6b**», we describe and supply examples of the development of the discussion. This is the section in a manuscript where meta-synthesis findings are analyzed considering specific pieces of literature and/or the chosen theoretical framework. Furthermore, new interpretations of the data and implications for future research, policy, and practice might be shared.

A final potential outcome of the meta-synthesis work described these modules is a manuscript for publication (see «**Module 7**» for more information about writing and publishing). The breakdown of the five steps relates to the methods section that you will need to write for your manuscript and to the overall structure of a typical paper in research manuscripts. For example, having a good understanding of how each analysis step builds on the ones before it will help in describing the analysis methods you use. Also, findings and discussion, which are two of the analysis steps we describe, are also sections typically found in research manuscripts.

Figure 4a.1 shows how the analysis process moves from one step to the next by incorporating what we developed in the previous step into the next and progressively moving the analysis process from specific to general.



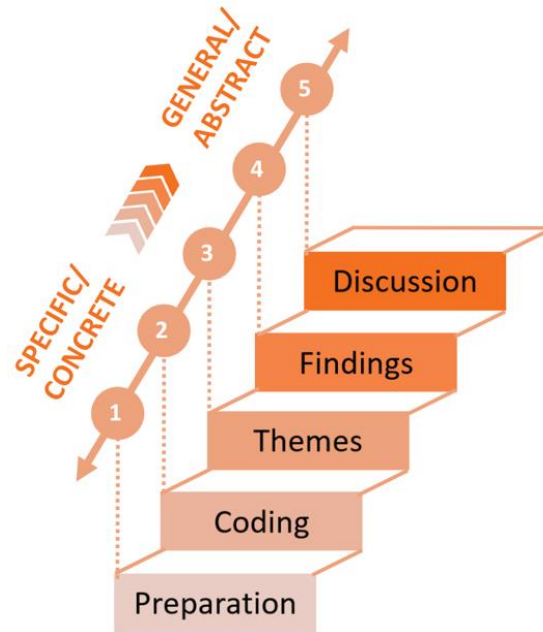


Figure 4a.1. The five steps of the analysis process

Though we show each of the steps in sequence, again, it is important to understand that this is **not** a linear nor summative process where all that is required is to use the pieces from the previous step to build the next. Analysis is a reflective and iterative process of sensemaking that helps to move you from the specificity of your data to progressively more general understandings in each of the steps. As we mentioned above, you will build from one step to the next, but you may occasionally need to go back to previous completed steps due to insights developed in subsequent ones that may influence the overall process.

## Additional Resources

- For extended examples of each element referenced in this sub-module, refer to «[Sub-Modules 5b, 6a, and 6b](#)».
- «[Sub-Module 5b](#)» includes an extended example of how to create a codebook.
- «[Sub-Modules 6a and 6b](#)» include examples of themes, the findings, and the discussion.

## References

Saldaña, J. (2016). *The coding manual for qualitative researchers* (3<sup>rd</sup> edition). Sage.

Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. Springer.

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8(45), 1–10.  
<https://doi.org/10.1186/1471-2288-8-45>



## Sub-Module 4b: Being Strategic when Reading Academic Literature

### Objectives

In this sub-module, you will learn:

- To be efficient, strategic, and focused when reading academic literature
- To read critically towards the goal of identifying information for your meta-synthesis

### Main Concepts

The first step in the analysis process begins with reading through the literature. As part of this first step, we also create analytical memos, which we will cover in «[Sub-Module 4c](#)». Reading and memo development will help you to familiarize yourself with the literature in your dataset and to start thinking through the ideas that may be important for your meta-synthesis project.

#### *Reading Academic Literature Toward a Meta-Synthesis*

A meta-synthesis project involves sifting through and reading hundreds, or maybe thousands, of publication pages. Though seemingly daunting, there is a way to get through it all. First, it is important for you to be familiar with the typical organizational structure of publications in your field. Every discipline has its own variation of what sections are included in a research publication, and this also differs depending on the journal or publication outlet. Generally, in the social sciences and education you can expect the following sections named in this way:

- Abstract
- Introduction/Review of the Literature
- Methods
- Results/Findings
- Discussion/Conclusions
- References

Some articles will also include appendices or supplementary materials.

It is recommended that (1) you keep the full texts of publications that will be included in your analysis organized and separated from other literature related to the project (e.g., literature that has been

excluded during the filtering stages); and that (2) you do not read linearly (i.e., from the beginning of the piece straight to the end).

Before diving into a study, you should read the title, abstract, and conclusions of a study first to get a general understanding of the topics and whether it is worth investing more time (Subramanyam, 2013). Then, depending on your meta-synthesis topic, synthesis question, or theoretical framework, you will pay more attention to certain sections over others. For instance, for our research on women of color in engineering, we mainly focused on the methods, results/findings, and discussion/conclusions. Reading the methods section was key to understanding to what extent each study fulfilled our critical appraisal criteria (see «[Sub-Module 3c](#)»).

Reading the findings and discussion allowed us to see if the study fulfilled our search and selection criteria (e.g., whether or not the studies reported on the intersection of gender and race/ethnicity) (see «[Sub-Module 3b](#)»), and to identify the findings that were relevant to our meta-synthesis. If your project is focused on methodology, then you would pay particular attention to the introduction and methods sections. If your project focuses on the use of a specific theory in research, you will want to concentrate on the literature review and the discussion.

### *Reading Critically*

You now know what sections to read, but what are you reading for? The specifics of what you are looking for will depend on the selection criteria you generated a priori for your meta-synthesis project.

It is important to always be a critical reader. Being a critical reader means that you should approach a text thoughtfully, deeply, and purposefully. Our team has systematized this critical reading process through the creation of analytical memos (see «[Sub-Module 4c](#)»). It is also important to record your decisions and rationales throughout the process as part of your audit trail. An audit trail keeps track of “the procedural and interpretive moves made during the course of your study” (Sandelowski & Barroso, 2007, p. 229).

Reading critically involves reading your key sections slowly, maintaining a curious and questioning frame of mind, and asking yourself questions that examine the assertions of the author(s) and the piece as a whole, including:

- **Key concepts:**  
What are the key concepts put forth by the author(s)? Are they defined? Are they implemented consistently across the manuscript?
- **Claims:**  
Are the claims made by the author(s) clear? How would you summarize them in a few sentences? Is the evidence presented in the piece substantial, sufficiently supported, and consistent with the claims by the author(s)? Is the presence of exceptions explained satisfactorily?
- **Consistency:**  
Are the different elements of the piece consistent with each other? For example, are the

research question and the methods used consistent; do they make sense? Are the methods and the findings consistent?

- **Challenging the field:**

Does the piece challenge what is known in the field? If so, how?

- **Red flags:**

Are there any red flags that make you question the claims made by the author(s)? What are these red flags?

- **Fitting in:**

How does this piece fit with the other literature you are considering for the meta-synthesis? How does the theoretical framework of the meta-synthesis help you glean insights from the piece you are reading?

These questions will help you keep a critical attitude toward what you are reading; question what you are reading to make your own decisions about it; and not merely take the words of the author(s) as the complete truth. These questions will also help you in thinking about how each piece of literature fits into the overall meta-synthesis from the perspective of the theoretical framework and the synthesis question.

One thing we would like to note is that, although it is not necessary to record the answers to the questions above, it may be helpful for you to do so. As previously mentioned, the analytical memos that we will describe in «**Sub-Module 4c**» are a helpful tool to keep track of some of this information and to support your critical reading. These memos can also be part of your audit trail to optimize the validity of your synthesis (Sandelowski & Barroso, 2007) and the basis of your analysis process.

## Additional Resources

- If you are new to reading academic literature, check out “How to read academic papers without freaking out” [blog post] - <https://medium.com/ai-saturdays/how-to-read-academic-papers-without-freaking-out-3f7ef43a070f>
- If you would like more information on the techniques involved in reading scholarly literature, view the video, “How to Read an Academic Paper” by TEDEd - <https://ed.ted.com/on/N1PGnyHL/>

## References

Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. Springer.

Subramanyam, R. V. (2013). Art of reading a journal article: Methodically and effectively. *Journal of Oral and Maxillofacial Pathology*, 17(1), 65–70. <https://doi.org/10.4103/0973-029X.110733>



## Sub-Module 4c: Creating Analytical Memos

### Objectives

In this sub-module, you will learn:

- What an analytical memo is and its purpose
- The components of an analytical memo in the context of a meta-synthesis
- To discern what details are important for inclusion in an analytical memo
- How to avoid losing context of the literature when writing memos

### Main Concepts

As part of the first step in the analysis process, you need to familiarize yourself with the literature in your dataset. In addition to reading through the literature, our team also develops analytical memos. This sub-module explains our approach to developing and using analytical memos. A memo is created for each literature piece that will be included in the meta-synthesis. Memos are brief documents that distill the main themes of each literature piece from two points of view (yours and the authors'), along with supporting evidence for each theme and other essential information, such as contextual details about the study. It is important to create memos that reflect the literature pieces accurately, because in the next stage, we describe how to code the memos instead of the pieces themselves. We developed this system through the years to make the work on meta-synthesis in a team more efficient and less onerous. However, you may choose to not use memos and instead to code directly from the full-text literature in your set.

#### *What is an Analytical Memo?*

Analytical memos serve as summaries for each piece of literature in your set, distilling the elements of interest for the meta-synthesis. Each memo includes a summary of the piece's main themes *in your own words*, claims about the main themes *in the words of the author(s)*, and evidence supporting each theme. Memos consolidate the elements of interest into one concise document per literature piece.

By creating analytical memos and then using them later for coding and as a reference, you limit the necessity of returning to the original source during the analysis and writing processes. Using memos is especially helpful when working in a team and/or when the meta-synthesis includes longer pieces, such as dissertations or books. Analytical memos also contribute to your synthesis project's audit trail.

NOTE: Most data analysis software packages have a memo function, and qualitative researchers often use memos to record thoughts, ideas, methodological notes, or questions about the different elements of their research. You may want to use these types of memos for your work. However, keep in mind that these are different from the analytical memos that we describe in this sub-module.

### *Purpose of Creating Analytical Memos*

The purpose of the analytical memo is to make the coding process (described in «[Module 5](#)») much more manageable and targeted. As noted above, analytical memos help in distilling information that is relevant to your synthesis purpose. For example, when we conducted a literature meta-synthesis on the experiences of women of color in undergraduate engineering education, we mainly focused on our elements of interest—the findings, discussion, and recommendations—and condensed these into an analytical memo. In qualitative studies, authors tend to provide multiple examples to support their findings. Memos should record only the best 1–2 examples for each identified finding or theme. Once you have read through all your literature pieces and have written corresponding memos, you will then move on to the coding process. It is important to note that in the next stages of your meta-synthesis project, you will be coding the memos and **not** the full text of literature (if you decide to follow our process). You will continue to use the literature to check for accuracy as needed, but your main source of data will come from the memos.

### *Components of an Analytical Memo*

Analytical memos and their components may differ from researcher to researcher depending on the focus of the meta-synthesis. The analytical memo described here is the format that we have successfully used in previous literature synthesis projects. First, we included the following as a heading:

- Name of Memo Writer (you)
- Date (the date you write the memo)
- Reference (Full reference in either APA, MLA, Chicago, etc.)

This heading is useful to keep track of the memo development process. For instance, having a record of who on the team wrote the memo and when may be helpful to track the decisions made in the writing of the memo, in case questions arise at other moments of the development of your meta-synthesis.

As we noted above, analytical memos will vary based on the purpose of the synthesis. For example, in one of our projects, we synthesized literature on experiences of women of color in engineering higher education and careers (Ong et al., 2020). We were interested in identifying themes that appeared as findings across the literature. Also, we were interested in the application of what was learned from the literature, so recommendations were an important part of the literature to consider.

Memos include the following components:

- Title of the theme
- Summary of the theme by the memo writer (you) and contextual information
- Summary of the theme by the author(s) of the piece of literature
- Evidence that supports the theme
- Recommendations by the author(s) of the piece of literature

Under each theme in the memo will be the summary by you as the memo writer, summary by the author(s), and evidence. Recommendations, if provided and directly related to the findings, are placed at the end of the memo.

**Title of the theme** refers to the themes you identify as findings of the study. For example, if you read a section of the findings that speaks to the reasons African American undergraduate students chose a historically Black college or university (HBCU) for their STEM degrees, you may create “Reasons to Choose an HBCU” as the title of the theme you would like to include in your memo. You can also decide to use the titles of the themes (usually appearing as subheads) that are identified by the author(s) of the piece. In this case, it is important to acknowledge such use by employing proper citation practices (i.e., quotation marks and page number).

**Summary by the memo writer** refers to the summary of each theme you, as the memo writer, identify in the literature and that you explain in your own words. It is connected to the summary of the findings as explained by the author(s) of the piece of literature (see next section). Your summary should include two main components: (1) a summary of the theme in your own words, and (2) information that will be useful later on to help maintain the context where the theme originated, such as demographic details of participants (e.g., gender, race/ethnicity, student or professional) and context of the research (e.g., geographic location, workplace, undergraduate education, graduate school).

An example of this is the following: *“Researchers in this study found that amongst the 20 women of color (15 African American/Black, 10 Asian, 3 Hispanic, 2 Native) who were undergraduate students in a Midwestern institution of higher education they interviewed, most shared that...”* This description helps to maintain the context of the research, particularly when writing the findings section of the meta-synthesis. It provides immediate access to information useful to the meta-synthesis writer to describe the participants and contexts of the various studies included in the meta-synthesis.

To ensure that our literature summaries stood out and were easily differentiated from what the author(s) of the piece wrote, we formatted our own words in italics. This also helped to avoid misquoting the author(s) or making false claims on their behalf. You may use other strategies to signal that this section is not directly taken from the literature you are working with (e.g., highlighting, underscoring, enclosing it in a box), but you should ensure that it is clearly identifiable.

**Summary by the author(s) of the piece of literature** refers to the paragraphs written by the author(s) of the study to introduce and explain their findings for each theme in the memo. These paragraphs are usually found in the findings and discussion sections. By including this summary, you ensure the presentation of the findings in the way the author(s) intended, adding to the descriptive and



interpretive validity of your meta-synthesis (Sandelowski & Barroso, 2007). Inclusion also provides the reader of the memo (you or a team member) a point of comparison to check its consistency with your own summary as memo writer. Make sure to use proper citation practices when copying from the literature (i.e., quotation marks, page numbers) to ensure accuracy and to make it easier if you want to later return to the original source. Easily identifiable quotes and page numbers also help to distinguish them from the summaries in your own words.

**Evidence** refers to the data used by the author(s) to support their claims for each theme. This may include qualitative data collected from participant interviews (e.g., quotes, images) or quantitative data (e.g., demographic statistics about the study site). As we noted above in the summary by the author(s) of the piece, you want to make sure that the evidence you choose to include in your analytical memo reflects the claims that the author(s) are making in their own analysis. Again, when using direct quotes, make sure to use proper citation practices.

When considering what evidence to include in the memo, it is important to find the best examples and to consider to what extent the evidence included supports the claims made in your summaries and the summaries by the author(s). Typically, we include the best one to two examples in our analytical memos. However, you need to be careful to include a variety of participants' quotes to ensure broad representation.

On occasion, while memo writing, we have found that a literature piece did not actually fulfill our search, selection, and/or critical appraisal criteria, even though earlier it appeared to do so. Careful reading required during the early steps of analysis sometimes lead to the realization that the criteria were not appropriately fulfilled and was grounds for the exclusion of the study from the meta-synthesis.

**Recommendations** refer to advice and suggestions provided by the literature piece's author(s) that may describe implications of the study's findings for others, like the study's participants, for future research, and policy or promising practices for institutions. Including recommendations in the memos can later support writing the last sections of a meta-synthesis, such as the conclusion and recommendations. Recommendations can be helpful in the translation of the findings of the meta-synthesis into actionable points.

When gathering recommendations, it is important to pay particular attention to whether the recommendations put forth by the study's author(s) are supported by the study's findings, are relevant to the topic of the study, and are relevant to your synthesis question. The format of the information gathered for the recommendations can follow the format above (title, summary by memo writer, etc.) or not. In our work, we have not used that format and simply collected the quotes by the author(s) of the piece of literature (with proper citation practices) and indicated what type of recommendation it was (e.g., for future research, for employers, for institutions of higher education, for women of color in STEM).



## Deciding What is Important to Include

Sometimes it is hard to decide what to include in your analytical memo because everything seems important. However, given that the purpose of the memo is to distill the literature piece into its most relevant findings, it should be shorter than the actual publication where it comes from, and it should break down findings into pieces that make sense by themselves and that paint a larger picture of the piece of literature as a whole. Elements to consider when deciding what to include in a memo are:

- Choose the best or most striking examples, quotes, or statistics that best illustrate the piece of literature’s findings and that you can imagine using in your meta-synthesis manuscript.
- Choose examples, quotes, or statistics that provide different perspectives on the same finding to offer a more complete picture of it.
- If you work in a team, work together in pairs to select the best evidence and find consensus with team members when disagreements emerge. This will provide your meta-synthesis with what Sandelowski and Barroso (2007) refer to as “negotiated validity,” which is the

social process and goal, especially relevant to collaborative, methodological, and integration research, whereby research team members articulate, defend, and persuade others of the “cogency” or “incisiveness” of their points of view (Eisner, 1991, pp. 112–113), or show their willingness to abandon views that are no longer tenable. The essence of negotiated validity is consensus. (p. 229)

Sometimes, you may find that a piece of literature that generally fulfills your critical appraisal criteria makes vague claims or does not provide strong evidence for some of their claims. In those cases, we recommend including only those findings that are supported by credible, substantiated evidence and excluding those findings that are not. Including findings that are not well supported will negatively affect the development of strong meta-findings for your meta-synthesis and generally will have a negative impact on your work.

## How to Avoid Losing Context

As described in the section on the *Summary by the Memo Writer*, one of the strategies to avoid losing context or unintentionally distorting the claims of the author(s) is by providing all the necessary details in the summary, such as participants’ demographic information and the institutional context of the study, number of participants, length of study, geographical location, among others. When stripped of its context, a quote from the literature that provides an excellent illustration of a finding, may lose its meaning and its potential impact. As a result, the memo loses most of its function because you would need to go back to the original source to understand why the quote was included in the memo in the first place.

You will need to make decisions related to what to include and what to leave out in your analytical memos, otherwise your memos will not be helpful in distilling the information in your literature for future coding. These decisions will depend on your synthesis question and the other criteria that you

have selected for your project. We provide an analytical memo example that we have included in Appendix 4c. The memo was part of our study on women of color in computing.

If you read through the original article—on which our memo example is based—by Rankin and colleagues (2019), you will notice that it includes two sections about the students’ reflections on the difficulty of course materials and their suggestions to improve it. We have not included these reflections and suggestions in our analytical memo for this article because we did not think that they contributed to our understanding about what influences the retention of women of color in computer science education. However, we did include the section about how food-related activities supported students’ learning of algorithmic design and computational algorithmic thinking. Though this topic does not seem to be related to retention, we felt that it was necessary to include it to understand another topic in the article about how the combination of factors (i.e., the HBCU environment and demographic makeup of the class, the demographic characteristics of the professor, pedagogical style, and course content) contributed to students’ retention in the course.

#### Activity 4c.1.

Take 20 minutes to select one piece of literature from your set, select one topic identified by the author(s) and write a Summary by Memo Writer with all the elements described above. Once you have this summary, identify and quote the Summary by the Author(s) followed by evidence (e.g., quotes, images).

#### Activity 4c.2.

Take 45 minutes to an hour to create a full analytical memo for a piece of literature included in your set.

## Additional Resources

- To see the full example of the analytical memo for Rankin et al. (2019), see Appendix 4c.

## References

Ong, M., Jaumot-Pascual, N., & Ko, L. T. (2020). Research literature on women of color in undergraduate engineering education: A systematic thematic synthesis. *Journal of Engineering Education*, 109(3), 581–615. <https://doi.org/10.1002/jee.20345>

Rankin, Y. A., Thomas, J. O., & Irish, I. (2019, February). Food for thought: Supporting African American women's computational algorithmic thinking in an intro CS course. In *SIGCSE '19: Proceedings of the 50th ACM Technical Symposium on Computer Science Education* (pp. 641–646). Association for Computing Machinery. <https://dl.acm.org/doi/10.1145/3287324.3287484>

Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. Springer.

## Appendix 4c: Analytical Memo Example

**Memo Authors:** The IMS Team

**Date:** 12/23/2022

**Reference:** Rankin, Y. A., Thomas, J. O., & Irish, I. (2019, February). Food for thought: Supporting African American women's computational algorithmic thinking in an intro CS course. In *SIGCSE '19: Proceedings of the 50th ACM Technical Symposium on Computer Science Education* (pp. 641–646). Association for Computing Machinery. <https://dl.acm.org/doi/10.1145/3287324.3287484>

### Main Ideas

**Theme:** *Food-Related Activities Supported Learning of Algorithmic Design and CAT*

**Memo Writer Summary:** *35 African American women (24 in Spring 2015 and 11 in Spring 2016) in an HBCU participated in an introductory computer science course. The course developed their Computational Algorithmic Thinking (CAT) through food and recipes that leveraged their everyday experiences. A pre-course survey showed that over 80% of students did not know how to design or apply algorithms. Following the Dessert Wars Challenge activity – during which students created an original “recipe” out of dessert ingredients, most students self-reported an understanding of the characteristics of algorithms as well as learning creativity. Researchers found that the Dessert Wars activity supported students in the Spring 2016 course (11 participants) to write well-defined algorithms, suggesting that the food activity was a bridge between students’ tacit knowledge and understanding of algorithms/CAT.*

**Author Summary:** “Students successfully articulated algorithms in two different contexts—first, as recipes of desserts which are exemplars of algorithms and second, as a solution to the cashier problem mentioned above. A few students even created real life scenarios (i.e., “Bill wants to buy 6 basketballs for \$10 each.”) to situate their algorithmic solutions. Students’ ability to perform both activities confirmed previous research which explored the potential of food-related activities to serve as a bridge between students’ tacit knowledge of algorithms in the context of recipes and their explicit knowledge of the design and implementation of algorithms as a problem-solving tool in an academic setting [20]. Furthermore, qualitative analysis of students’ online reflective journals suggested that students thought critically about the characteristics of a well-defined algorithm and developed skills to write precise and organized algorithms with little if any ambiguity” (p. 645).

**Evidence:** “One student wrote, ‘I learned that an algorithm must be written out in a manner so the algorithm can be executed exactly. This is where being unambiguous comes into play.’ Such evidence

emphasizes the potential of the *Dessert Wars Challenge* to support students' developing CAT capabilities" (p. 645).

### **Theme:** *Food-Related Activity Helped to Retain African American Women in CS*

**Memo Writer Summary** *The combination of the HBCU environment and demographic makeup of the class, the demographic characteristics of the professor, pedagogical style, and course content contributed to students' retention in the course. The course that included the Dessert Wars Challenge activity helped to retain African American women in CS – 96% from the Spring 2015 and 100% from Spring 2016 – compared to the Spring 2017 course (79%) which did not include food-related activities. Researchers claimed this is because “[i]ntegration of food-related activities creates an equitable learning experience, increasing student retention in the college-level introductory CS course” (p. 646).*

**Author Summary:** “In comparison to predominantly White institutions (PWIs), 100% of students enrolled in all three sections of the introductory CS course were African American women. Furthermore, the all-women’s southern liberal arts institution and the classroom environment embodied inclusion and challenged the status quo of African American women not representing a critical mass of the STEM student population. In addition, the instructor shared the same ethnicity, gender and life experiences as her students, positioning the instructor to be a role model to other African American women in STEM and CS. Thus, the initial starting point in the course represented a level playing field, since the young women were not a minority nor were they subject to a hostile learning environment that conveyed the message that African American women do not belong in CS. This course also elevated and honored the intersectional experiences of these students, being both African American and female in a Computing space, which is also rare in STEM. ... Additionally, the instructor also willingly relinquished some of her power as the instructor to welcome an opportunity for students to criticize her pedagogical strategy, an act of inclusion and an invitation for joint ownership which engaged the African American women as co-designers in creating a more equitable learning experience. These situational factors constituted a more equitable learning environment than most CS departments at PWIs.” (p. 645).

**Evidence:** “Comparing the percentage of students who completed the Spring 2015 course to the percentage of students who completed the Spring 2016 course, we had retention rate of 96% (lost 1 student due to health issues) and a retention rate of 100%, respectively, even when students did not have passing grades at midterm. When comparing the retention rate for both course sections to the same introductory CS course taught in Spring 2017 by the same instructor but without the inclusion of the food-related activities, we saw a decreased retention rate of 79% with poor academically performing students dropping the class at midterms. We posited that 21% (7 students out of the initial enrollment of 33 students dropped the class because more instructional time was spent on learning how to write Python code in the first few weeks of the course with less time allocated for extending students’ funds of knowledge to their understanding of the concept of algorithms, how to design them and the correlation between algorithmic design and programming. Anecdotally, students in the 2017 course complained about the fast pace of the course as they struggled with the programming concepts, especially since most of the students had no programming experience prior to taking the introductory CS course” (p. 645).

**Recommendations:** None stated.

# **Module 5: Analysis – Coding**



## Sub-Module 5a: Codes and Coding

### Objectives

In this sub-module, you will learn:

- What codes and coding are, and how computer-assisted software may support coding
- Why coding is useful in meta-synthesis work
- Different approaches to code data

### Main Concepts

At this point of the meta-synthesis process, you are ready to start the formal analysis of the set of literature that you have identified and with which you have familiarized yourself through the development of analytical memos in «[Sub-Module 4c](#)». Coding is a common next step in the analysis process. Our team uses coding, but others may use different methods, such as summarizing the studies (Petticrew & Roberts, 2008). Coding approaches that we will cover include inductive, deductive, and hybrid. The coding approach you select should align with your synthesis question, theoretical framework, and other elements of your meta-synthesis project.

#### *Codes, Coding, and CAQDAS*

**Coding** is an early step in data analysis that seeks to help make sense of the data. In general, coding is the iterative process of grouping similar pieces of data together. According to Creswell (2009), coding “involves taking text data ... gathered during data collection, segmenting sentences (or paragraphs) ... into categories and labeling those categories with a term” (p. 186). In meta-synthesis, coding helps to extract and categorize evidence towards answering your synthesis question. As we mentioned earlier, our team’s method involves coding memos (instead of the original literature), which we describe below.

**Codes** can summarize, condense, or reduce data (Saldaña, 2016). Saldaña (2016) states that a code “is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based ... data” (p. 3). Groupings of similar codes are referred to as **themes**. We will talk about how to develop themes in «[Sub-Module 6a](#)» – Thematic Analysis.

Table 5a.1 shows an example of a code that our team uses, with an abbreviated definition, and an example from our meta-synthesis work on women of color undergraduates in engineering.

*Table 5a.1. Example of a code with a definition and example from data on women of color undergraduates in engineering*

Code	Definition	Example from the Data
Social Pain	Factors causing the participant to not relate well to people in the social context of the participant’s STEM climate. Includes feelings of “not fitting in,” feelings of difference in the STEM community; difficulty in forming and participating in academic and social support groups; lacking individuals who guide her and share her experience, or individuals and groups that provide safe havens from subtle and blatant hostilities in the greater STEM culture.	<p>“Kiara talked about seeing more opportunities because of her race and gender. Her representative quotation below illuminates the idea of how being a minority had positive and negative consequences.</p> <p><i>I've been getting a lot of opportunities just because of my gender and race. I get the double shot. It's like they're both working against me and for me at the same time, so it kind of breaks even.... I was discussing with the [administrative staff] about reapplying, he's like Kiara, you have three things going for you right now ... you're Black, you're female, and you're transferring from out of state. Use it, use it, use it! That really broke my heart.”</i> (Alonso, 2012, p. 2)</p>

The creation and testing of a collection of codes results in a **codebook**. In a codebook, each entry should have the elements in Table 5a.1: (1) the name of the code; (2) the definition of the code; and (3) examples from literature data illustrating the code’s definition. The codebook will help with data management by serving as a reference for yourself (and your team, if applicable) to consistently identify and organize segments of similar or related text. Having consistently coded data will later greatly assist in interpretation and sensemaking. We will talk more about the relationship between coding and other steps of analysis in «**Sub-Module 6b**», and we will describe how to create a codebook in «**Sub-Module 5b**».

Once your codebook is established and tested with a few sample pieces of literature, you will be ready to begin coding. You can code manually (e.g., using sticky notes, highlighting, chart paper, or using the annotation function in word processing software) or by using computer-assisted qualitative data analysis software (CAQDAS, pronounced “kack-duss”), such as NVivo or Atlas.ti. CAQDAS can be used to store, organize, and manage the data, in addition to coding and analyzing them. CAQDAS are particularly helpful when you need to work in a team and/or with large amounts of data. You can learn more about CAQDAS in «**Sub-Module 5f**».



## Why Code in Meta-Synthesis Work?

You code your data to find patterns. Patterns that can be found include regularities, similarities, frequency, sequence, correspondence, and causation (Saldaña, 2016). These patterns, or themes, make it easier to summarize and interpret your findings by providing a structure to your data. They will also make the writing of the meta-synthesis report or publication simpler. Lastly, the coding process is important in terms of credibility; potential reviewers and readers of your work will have confidence in your findings because you engaged in a rigorous, systematic approach to analyzing your data.

We want to underscore that coding is an iterative process, meaning researchers code and re-code the same piece, developing an increasingly nuanced understanding of their data with each cycle of coding. Furthermore, coding is part of a larger iterative process of analysis. Figure 5a.1 shows how the analysis steps build onto each other, moving from specific to general. Remember that the iterative nature of the process means that what you do in one of the steps may prompt you to go back to a previous step to reassess it.

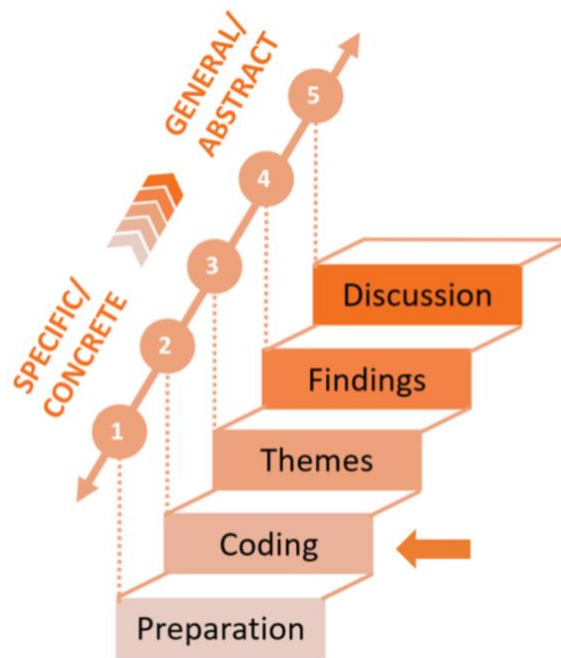


Figure 5a.1. Coding is the second step of the analysis process, illustrated here

## Different Approaches to Coding

There are different approaches to coding your data. You can develop your codes as they emerge from your textual data (**inductive coding**, «Sub-Module 5d»), or you can use predetermined codes based on a particular theoretical framework or what you know about the literature (**deductive coding**, «Sub-Module 5c»). You can also use a combination of terms that come out of the data and preset codes (**hybrid coding**, «Sub-Module 5e»). We will address these three main coding approaches and the process of deciding among them in the next few sub-modules. Our team utilizes hybrid coding.

The specific coding approach that you choose for your own meta-synthesis will depend on your synthesis question, theoretical framework, and the ultimate purpose of your work (e.g., theory development or confirming theory). We recommend that you choose the coding approach you will use before starting to code.

### Activity 5a.1.

Take 15 minutes to examine 3–5 pieces of literature that you have gathered for your meta-synthesis.

Identify the coding approaches the authors have used. Is there a coding approach—deductive, inductive, or hybrid—that appears more frequently than others?

## Additional Resources

- For beginning scholars who want to learn more about coding, check out this website: “Learn to Code Qualitative Data” – <https://getthematic.com/insights/coding-qualitative-data/>
- If you are a beginning scholar who prefers learning via audio and video, view the YouTube video: “Beginner’s Guide to Coding Qualitative Data” by Quirkos – <https://www.youtube.com/watch?v=lyzhgMZii3o>
- For a discussion of coding and how to do it by hand, check out the YouTube video “What Does Coding Look Like? Qualitative Research Methods” by Mod•U: Powerful Concepts in Social Science: <https://www.youtube.com/watch?v=phXssQBCDIs>
- These two books include descriptions of a broad variety of coding approaches, and thus work as guides or manuals. They are two of the most broadly used references for data analysis in qualitative research:
  - Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis: An expanded sourcebook* (2<sup>nd</sup> edition). Sage.
  - Saldaña, J. (2016). *The coding manual for qualitative researchers* (3<sup>rd</sup> edition). Sage.

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## Sub-Module 5b: Creating a Codebook

### Objectives

In this sub-module, you will learn:

- What a codebook is and its purpose
- To create a codebook for the intended meta-synthesis project

### Main Concepts

Once you have decided on a coding approach and a set of codes, one useful way of keeping them organized is by using a codebook. As described in «[Sub-Module 5a](#)», codebook entries typically include the name of the code, its definition, and, if appropriate, illustrative examples. Below, we go into more depth about what a codebook is and potential ways to create and organize codebook entries. We then provide an extended example of a codebook from one of our team’s own projects.

#### *What is a Codebook?*

A **codebook** is not a book, as the name inaccurately suggests. It is “a table or record that contains a list of ... codes that researchers use for coding data” (Creswell, 2009, p. 187) that includes a title for the code, a description, and examples. Even if you begin with a priori codes (or in-hand codes) and their definitions prior to the formal coding process, as you would in deductive coding, the codebook can evolve and change with the data as you code. A common way to format your codebook is to make and assign columns for code names, definitions for codes, and specific examples of the code from the textual data in your meta-synthesis. See Tables 5b.1 and 5b.2 for examples of an abbreviated codebook. Table 5b.1 shows the general structure, while Table 5b.2 shows the codes with their titles, definitions, and examples.

Codebooks are useful in terms of organizing your coding process, documenting your rationale for the use of particular codes, and making sure you are staying aligned with a theoretical framework. They are also helpful in providing a consistent understanding around the meaning of codes when you have multiple researchers working on the same project, thus preventing coding drift. Coding drift occurs when researchers inadvertently and gradually change the meaning of a code as they implement them in their coding process. When coding drift occurs, data with quite different meanings may end up coded under the same code.

## How to Create a Codebook

### GETTING STARTED

This section describes an overview of our team’s process to create a meta-synthesis codebook. You may use this process or a different one, depending on your project and your preferences. As will be discussed in «Sub-Module 5c», **deductive coding** provides a set of codes from the literature and relevant theory, while **inductive coding**, which will be discussed in «Sub-Module 5d», arrives at a set of codes developed from the data. **Hybrid coding**, which will be discussed in «Sub-Module 5e», supports the development of a set of codes that integrate deductive and inductive codes.

From our experience, we recommend that you, either alone or in your synthesis team, start with deductive coding by brainstorming about the repeated terms or commonly described phenomena that you are seeing in the literature as you are filtering through it and as you generate analytical memos. Include these terms or descriptive phrases and, if appropriate, any constructs from the theoretical framework you are using in your meta-synthesis in the first draft of your codebook. Along with the code names, make sure to provide detailed definitions of the codes as well as examples from the data that illustrate those codes. Begin coding. As you come across data relevant to your synthesis question that do not fit the deductive codes, start developing inductive codes. One way to bring together your deductive and inductive codes is by placing your inductive codes into your **Parking Lot** and developing them as you code, bringing inductive codes into your codebook once they have substantial definitions and examples. The *Parking Lot* is where you can temporarily place codes that seem relevant to your meta-synthesis project but require further development and evidence. This will be described in more detail in the next section.

In some cases, you may inductively find data that fits your deductive codes, but they may bring a new nuance to the code. Make sure to record this nuance of your deductive code through the inclusion of definitions and examples. Throughout the process, you will probably make changes to the codebook as you come across data that do not align with your a priori codes or if you feel like your current codes are too broad. Remember that the development of codes, and the development of the codebook that contains them, are iterative processes that involve decision-making about what to include and exclude. You should keep track of these decisions in your codebook as well; it is part of your audit trail and will assist you when it is time for you to write your meta-synthesis methods for publication. In our team, we have addressed this in a few different ways: (1) having a running document listing all the changes made to the codebook and the dates the changes were made; (2) using a notation system within the codebook for codes that have been newly added; and (3) saving the codebook as a different version every time substantive changes are added. As you can see, the codebook is a living document that evolves throughout your coding process.

### STRUCTURING THE CODEBOOK

As you build the codebook, you want to think about how the different codes go together and how they relate to each other. You might consider how your codes fit into different categories. For example, you may have some codes that have to do with *People*, others that have to do with *Places*, and others that have to do with *Curriculum*. You may want to organize the codes into those three categories. You might have codes that are different aspects of the same idea or phenomenon. For instance, you may

have a code that refers to *Stereotypes*, another that refers to *Exclusion*, and a third one that refers to *Harassment*. You may want to bring them together under one larger umbrella term or phrase (also known as a **primary code**) that encompasses different *Forms of Discrimination*. In such a structure, you would have categories of codes (e.g., *People, Places, Curriculum*), primary codes (e.g., *Forms of Discrimination*), and **secondary codes** (also known as sub-codes; e.g., *Stereotypes, Exclusion, and Harassment*). Such a way of structuring your codebook could look as follows:

1. Category
  - 1.1. Primary Code
    - 1.1.1. Secondary Code
    - 1.1.2. Secondary Code
  - 1.2. Primary Code
2. Category
  - 2.1. Primary Code
    - 2.1.1. Secondary Code

Below is an example of how our team developed and structured the codebook for one of our systematic thematic synthesis projects.

### Codebook Example

In this example, we will go through the creation of the codebook for the meta-synthesis on women of color in undergraduate engineering education. A modified example of our overall coding structure for the meta-synthesis is detailed in Table 5b.1 and Table 5b.2. Both tables illustrate the names of codes, definitions, and illustrative examples that were part of the codebook.

We had developed three categories of codes: *Person, Action, and Time Stamp*. We also had other categories, which included a *Parking Lot, Recommendations, and Golden Quotes*. As mentioned earlier, the *Parking Lot* is where we kept codes that seemed to be relevant for the current project but needed more development. Some of the codes that started in the *Parking Lot* stayed there because they did not rise to the relevance we had expected them to reach (e.g., *Work/Life & School/Life Balance*), while other codes were moved to an appropriate category because they did reach sufficient relevance (e.g., *Giving Back/Activism*). When we refer to a code rising to sufficient relevance, it means that there is enough evidence supporting the code that allowed us to develop a robust definition and set of examples for it. It is not simply one short instance, but a phenomenon that appears repeatedly or that appears with depth and nuance in the data. The *Recommendations* code included explicit or implicit recommendations by the authors of the literature. **Golden Quotes** are quotes that provided particularly insightful or illustrative examples of the code we were applying and are thus double coded.

For the project on women of color in undergraduate engineering education, we decided to keep the overall coding structure of the codebook we had used in a previous meta-synthesis. We also kept many of the codes that we had previously used, but made several changes based on what we had learned since those projects, as well as based on inductive coding of our memos. For example, we integrated the construct of *Social Pain* in our 2020 meta-synthesis on women of color in undergraduate

engineering education (Ong et al., 2020) in this codebook by introducing the primary code of *Social Pain* and its opposite term, *Social Comfort*. Also, through inductive coding, we added the secondary code of *Economic Considerations* to our *Identification/Self-Expectations* primary code. We considered this secondary code an intrinsic part of the overall *Identification/Self-Expectations* primary code because it was related to the interest and passion that individuals in the literature had for engineering. See Table 5b.1 for more details on how we organized the categories, primary codes, and secondary codes.

Table 5b.1. Example of the codebook structure for a synthesis project on women of color in engineering

<p><b>1) Person/Support Entity</b></p> <ul style="list-style-type: none"> <li>a) Advisor/Supervisor</li> <li>b) Family</li> <li>c) Peers/Social Group</li> <li>d) Teacher/Professor</li> <li>e) Mentors</li> <li>f) Internship</li> <li>g) Support Programs</li> <li>h) Institution/Department</li> <li>i) Course/Curriculum</li> </ul>	<p><b>2) Action/Type of Support (or Lack Thereof)</b></p> <ul style="list-style-type: none"> <li>a) Identification/Self-Expectations               <ul style="list-style-type: none"> <li>i) Economic Considerations</li> </ul> </li> <li>b) Navigation               <ul style="list-style-type: none"> <li>i) Finding a Mentor</li> </ul> </li> <li>c) Social Comfort</li> <li>d) Social Pain               <ul style="list-style-type: none"> <li>i) Isolation</li> <li>ii) Prove-It-Again</li> <li>iii) Recognition/Reputation</li> <li>iv) Spotlighting</li> <li>v) Microaggressions</li> </ul> </li> <li>e) Giving Back/Activism               <ul style="list-style-type: none"> <li>i) Being a Mentor</li> </ul> </li> <li>f) Learning STEM Content</li> </ul>
<p><b>3) Time Stamp</b></p> <ul style="list-style-type: none"> <li>a) Undergraduate</li> <li>b) Graduate</li> <li>c) Workplace</li> <li>d) Transitional Period(s)</li> <li>e) Other Time Periods</li> </ul>	<p><b>4) Parking Lot</b></p> <ul style="list-style-type: none"> <li>a) Work/Life &amp; School/Life Balance</li> <li>b) Other</li> </ul>
<p><b>5) Golden Quote</b></p>	<p><b>6) Recommendations</b></p> <ul style="list-style-type: none"> <li>a) For Institutions/Departments/Faculty</li> <li>b) For Women of Color</li> <li>c) For Future Researchers</li> <li>d) Other</li> </ul>

Table 5b.2. Example of an abbreviated codebook

Primary Code	Definition
<b>Action/Type of Support</b>	
Identification	<p>Factors causing strong identification or dis-identification with STEM content.</p> <p><b>Example:</b> “I have always been good at engineering and math and I really enjoyed tinkering. I was always taking things apart and putting them back together.”</p>
Navigation	<p>Strategies or mechanisms used to persevere on the STEM school and career path, or cope during hard times in STEM.</p> <p><b>Example:</b> “My mentor helped me identify different internship opportunities that increased my skill set and helped me build my professional network.”</p>
Social Comfort	<p>Factors causing the participant to relate to people (e.g., peers, teachers/professors, advisor, etc.) in the social context of the participant’s STEM climate to be easier.</p> <p><b>Example:</b> “What really helped me persist was my [STEM student group], where I felt welcomed and seen as an engineer.”</p>
Social Pain	<p>Factors causing the participant to not relate well to people (e.g., peers, teachers/professors, advisor, etc.) in the social context of the participant’s STEM climate.</p> <p><b>Example:</b> “Many participants in the study described how they were the only women or people of color in their engineering classrooms. Oftentimes, they had trouble finding peers who would want to work with them on assignments.”</p>
Giving Back/Activism	<p>STEM-related activity to increase recruitment and/or retention of others (e.g., women, minorities, low-income kids) in STEM; "doing good" as far as outreach or community service related to STEM; looking out for others; communal responsibility with regard to STEM-related work.</p> <p><b>Example:</b> “Participants in this study shared how they persisted in engineering so they could serve as a role model for young women of color to see that they could also pursue engineering, too.”</p>
<b>Person/Support Entity</b>	
Advisor/ Supervisor	<p>The degree program or STEM program advisor in an academic setting; the supervisor in a work setting.</p>



Family	Member of her family, including parents, significant other, siblings, and extended family.
Peers/ Social Group	Groups, or non-family individuals, can be in either STEM or non-STEM contexts.
Teacher/ Professor	The participant's teacher or professor; includes other professors at the participant's university that may not be directly teaching the participant. May also include teacher's assistants.
Mentors	Mentor or role model (positive or negative influence) that does not fall under any other codes listed above.
Internship	Short-term jobs, including co-ops and internships, in STEM fields while a student.
Support Programs	Social & content-based group, e.g., STEM diversity conferences, STEM school clubs, affinity groups for women or minorities, programs providing preparation for future studies or careers, community training programs.
Institution/ Department	The academic or workplace administration; program staff; department staff; other person at her institution or organization who is not an advisor, teacher, professor, or peer.

<b>Time Stamp</b>	
Undergraduate	Findings on undergraduate school (or any formal education between high school and graduate school education, e.g., technical or associate's degree, or just courses), or events that occur during that time frame.
Graduate	Findings on graduate school, or events that occur during that time frame.
Transitional period(s)	Findings on school, work, specific roles, or events that occur between high school and undergrad; between undergrad and grad school; and between work-to-school or school-to-work, and work-to-other work transitions. May also mean "over time," e.g., changes measured over time in a longitudinal study across more than one life stage.
Other Time Periods	This includes homemakers and unemployed, unspecified periods of time that do not fit the other time stamps (e.g., during childhood, as I was growing up, I have always done this), during elementary and secondary school, or unknown periods of time. This also includes when the time period is unclear.



Parking Lot	
Work/Life & School/Life Balance	The balance between school and/or work and life (e.g., family and childcare, convenience and benefits of job and location, flex time, part-time, support from leadership); includes institutional policies, concerns for future balance issues, and understanding/description of what a typical schedule in her field is like; encouragement or desire to pursue activities, hobbies, and other interests outside of STEM, and its fit or conflict with STEM culture.
Other	Use this code when the other codes above do not appear to be appropriate for the section you are coding; refer to this code after the coding process to identify how it should be coded.

Recommendations	
Recommendations for Institutions/ Departments	Advice that the literature provides for departments, institutions, and other structured organizations related to student retention of women of color.
Recommendations for Women of Color	Advice that literature provides for women of color.
Recommendations for Future Researchers	Advice that the literature provides for future researchers.

We developed the *Economic Considerations* secondary code because, by reading the literature, we found that authors and their participants talked about the desire to have better lives through accessing well-paying jobs in the engineering industry. This was part of their drive to pursue and persist in engineering. We considered that this secondary code—*Economic Considerations*—was a factor that caused women of color in the literature to identify or dis-identify with engineering content. Thus, it belonged in the *Identification/Self-Expectations* primary code. See Table 5b.3 for an example of a primary code with this secondary code, along with its title, definition, and examples.

Table 5b.3. Example of an extended code with title, definition, and examples

Category: Action / Type of Support > Primary code: Identification/Self-Expectations	
<b>Definition of code</b>	<p>Factors causing strong identification or dis-identification with Engineering/STEM content, including:</p> <ul style="list-style-type: none"> <li>• Feelings or observations of fitting in via content competence or incompetence;</li> <li>• Increasing or losing desire for the field;</li> <li>• Wanting to switch out of the field;</li> <li>• How a participant sees herself or what she expects of herself (abilities, confidence level, fit) in Engineering/STEM;</li> <li>• Self-recognition as a “science person” or expressions of self-efficacy;</li> <li>• Academic/disciplinary/professional identity: how participant’s sense of self is associated with academic activities and perceived success;</li> <li>• Self-motivation: why she is getting into Engineering/STEM, why she does/wants to do Engineering/STEM;</li> <li>• Internal factors (e.g., resilience, grit, stubbornness, personality traits, personal philosophies, intrinsic motivation) that enable persistence in Engineering/STEM.</li> </ul> <p><b>Secondary Code: Economic Considerations.</b> Expectation/intention to find a job, make money, and/or stop having financial difficulties.</p> <p>NOTE: Accepting or rejecting scholarships is part of <i>Navigation</i> code (not this code).</p>
<b>Examples</b>	<p><b>Primary code: Identification/Self-Expectations.</b> E.g., “My father always says that I excelled at problem solving as a kid. Hearing those stories reinforces who I am today. This is what makes me good at engineering—knowing how to ask the right question, how to deeply investigate and find solutions.”</p> <p><b>Secondary Code: Economic considerations.</b> E.g., “Nine of the participants indicated that a factor in their decision to major in engineering was they knew they would be able to find a high-paying job upon graduation. Janette said she changed majors to engineering because ‘being able to find a job after graduation was a huge consideration on my part.’”</p>

Often codes have two sides, such as *Social Comfort* and *Social Pain*. In such cases, meta-synthesis authors need to consider to what extent these need to be separate codes or secondary codes stemming from a primary code. We decided that, in this case, we expected that they needed to be separate primary codes based on our experience in our previous meta-synthesis work. In other cases, such as mentoring, there were concepts that had more than one dimension. We had found that the literature included participants who searched for mentors, or people who could help them navigate

their career path; the literature also included participants in studies who chose to serve as mentors to others, such as girls of color in K-12. In this case, we had to think about whether both of these dimensions of mentoring belonged together. We decided that they did not and separated them into *Finding Mentors* and *Being a Mentor*. We considered *Finding Mentors* was part of the *Navigation* primary code because participants in studies were trying to navigate the engineering environment by looking for guides. We decided that *Being a Mentor* was part of the *Giving Back/Activism* primary code because the main thrust behind being a mentor was to help others navigate the engineering environment.

We hope that these examples help illustrate the types of decisions that go into developing a codebook. It is not a straightforward process, but one where you will need to reconsider your codes and how you structure them in an iterative manner. To demonstrate the extent to which this is an iterative process, we will share that in one of our previous projects, our team had a total of 18 versions of the codebook before arriving at the final one.

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## Sub-Module 5c: Deductive Coding

### Objectives

In this sub-module, you will learn:

- What deductive coding is and its purpose
- To code using deductive coding for your meta-synthesis project

### Main Concepts

In this sub-module, we explain how to build your codebook with deductive codes. We detail how you can create codes from theory and then apply them to the data in your memos or literature.

#### *What is Deductive Coding?*

**Deductive coding** is a top-down method by which you use predetermined codes based on a particular theoretical framework, what you know about the literature, or your synthesis question (Patton, 2002). You let the theory guide the data analysis. In deductive coding, you will develop your **codebook** (see «[Sub-Module 5b](#)») before coding with an initial set of codes from the selected theory. Often, the goal of deductive coding is to confirm an established theory rather than to generate your own theory. The process involves matching the data with the predetermined codes that you develop from the theory.

#### *How to Conduct Deductive Coding*

Before starting to code, you will develop your codebook by taking the main topics in the theoretical framework, synthesis question, and/or other literature that you have chosen and writing them up as codes (i.e., name of the code, definition, and example). Once you have developed the codebook, it is time to assign codes to excerpts of text. In the case of our team, we code the analytic memos that we have created. Others conducting meta-synthesis work who do not use memos may code directly from the full-text literature in their set.

It is likely that existing theory does not account for everything that you find in your data, making it necessary to adjust the codebook as needed when you come across an observation that does not fit the pre-established codes. You may need to expand the definition of a code so that the new data fits, or you may need to create new codes because the original codes cannot explain the new data. When

this happens, you are starting to move into hybrid coding, which we will cover in more detail in «Sub-Module 5e». The goal of deductive coding is to move from broad categories based in theory to specific examples from the data that support those categories. In the end, you should be able to determine whether the theoretical framework can fully explain the data. Any data that is not accounted for by the theoretical framework has the potential to challenge existing theory and/or contribute to new knowledge or theoretical developments to the field.

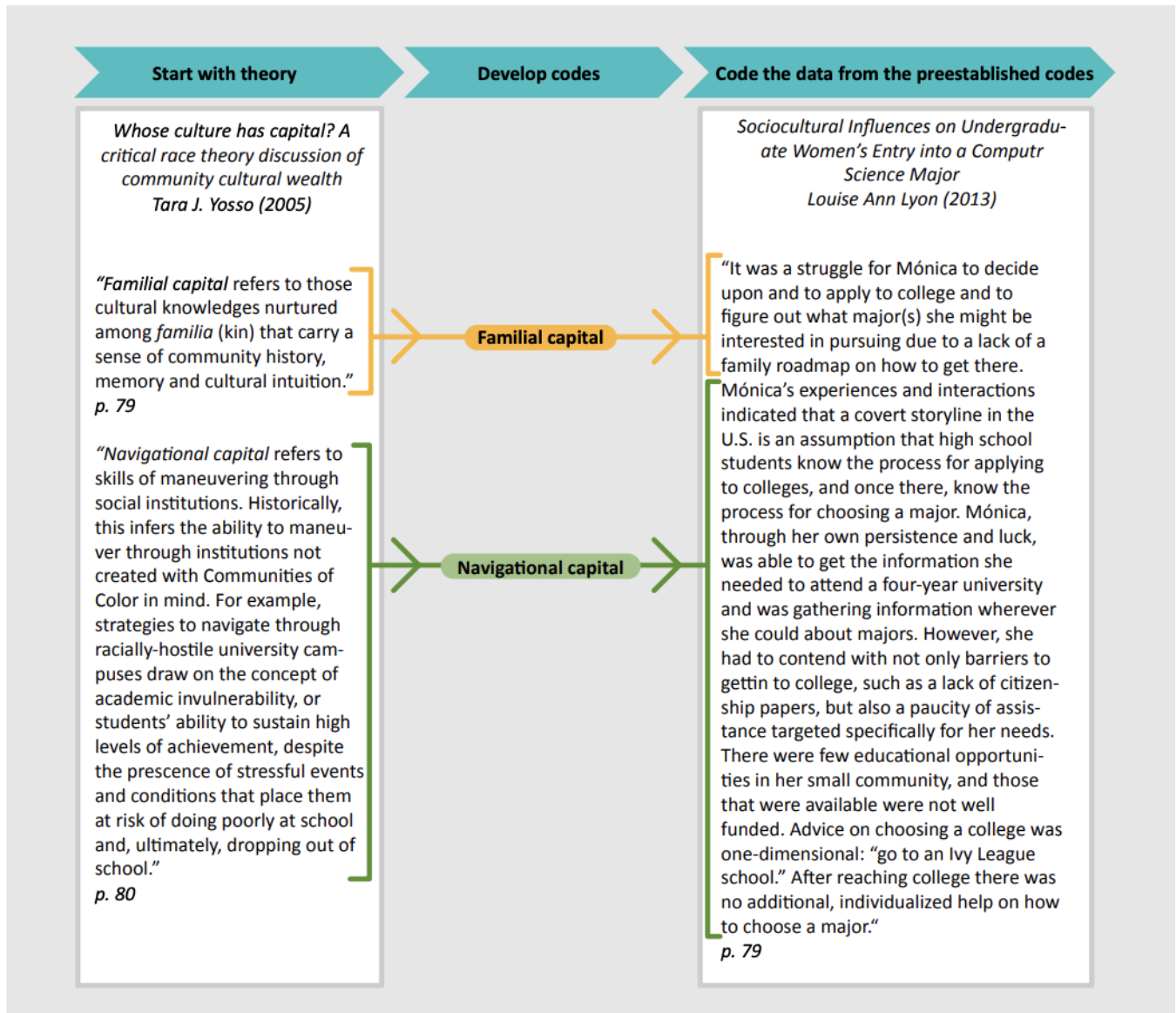


Figure 5c.1. From codes to data in deductive coding

In Figure 5c.1, we share an example of deductive coding from our team’s meta-synthesis on women of color students in engineering. We deduced codes from Tara Yosso’s (2005) theory of community cultural wealth. One concept we used as a code was *Familial Capital*, marked in yellow, which is defined as “the cultural knowledge nurtured among family members that carry a sense of community

history, memory, and cultural intuition” (Yosso, p. 79). In this case, the term *Familial Capital* became the code with which we coded our memos. In this example, it applies to quotes included in one of our team’s meta-synthesis memos, where the author describes how Monica, an undergraduate student, struggled to pick a major due in part to a lack of family guidance. Similarly, we used *Navigational Capital* (see Figure 5c.1. for definition), marked in green, as one of the codes.

As you have seen, you should let your codebook evolve during your analysis so that it can incorporate new conceptualizations. At the same time, it should still reflect the structure and main concepts of your pre-selected theoretical framework at the end of your analysis. When you go to write up your findings later, you will then be able to discuss how you utilized the theoretical framework as well as how your work expands upon the theory.

#### **Activity 5c.1.**

Take 20–30 minutes to choose a theoretical article that you identify as key to the topic you chose for your meta-synthesis. Create a list of deductive codes with definitions and examples based on this article.

#### **Activity 5c.2.**

Once you have developed an initial deductive codebook, take 20–30 minutes to practice coding deductively with your analytical memos (or a piece of literature) from your meta-synthesis study. For an example of a coded memo, see Appendix 5e.

## Additional Resources

- For an example of a coded analytical memo, see the Rankin et al. (2019) memo in Appendix 5e.

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<https://doi.org/10.1080/1361332052000341006>



## Sub-Module 5d: Inductive Coding

### Objectives

In this sub-module, you will learn:

- What inductive coding is and its purpose
- To use inductive coding in the intended meta-synthesis project

### Main Concepts

In this sub-module, we explain how to create, or add to, your codebook using inductive codes. We detail the process of generating new codes from the data in your meta-synthesis memos or literature.

#### *What is Inductive Coding?*

**Inductive coding**, or open coding, is a method by which you develop your codes as you identify them in your textual data (Strauss & Corbin, 1998). With inductive coding, rather than starting with a preset list of codes (as we discussed with deductive coding in «[Sub-Module 5c](#)»), you are generating your own codes. Inductive coding is considered a bottom-up approach, as you are creating codes that are rooted in the data and looking at patterns with the aim of developing theory. Inductive coding is particularly useful in areas where there is little existing theory, there is little data about the topic of research, or if the goal is to contribute to theory development through the expansion of previous theory or through the creation of new theory. Those using inductive coding need to be aware that, even if the goal is to develop theory, that is not always the outcome.

#### *How to Conduct Inductive Coding*

As mentioned in «[Sub-Module 4b](#)», it is recommended that you read through the selected textual data first, jotting down notes in the margins of the articles or the analytical memos you developed for your meta-synthesis. After going through several of the papers or memos, make a list of topics, clustering similar ones together. Use the list and return to the pieces of literature or memos you reviewed to see how the codes align. You can write the codes from your list next to the appropriate segments of text. You can go line-by-line for a more detailed approach to your data or by paragraphs for a more general view.



As we noted in «Sub-Module 5b», when creating codes there is always a risk of going too narrow or too broad. As you code iteratively, you may realize that you need to either lump more specific codes together into a more general one or split an initial, more general code into more specific ones. If you choose to code line-by-line, you may need to reduce the list of codes by lumping them into larger categories that are more descriptive. If you choose to code in larger segments, you may need to break your codes into more specific ones that help you to understand the inner workings of a code. As we often mention, the process of inductive coding is iterative; thus, you should be frequently going from your codes to the raw data (the literature or the memos) and back again, evaluating how your codes “fit” the data and the patterns that you are seeing. The goal is to move from codes to broader categories to generate themes. In the end, those themes are used to form the basis of your findings or to develop a theoretical framework (or expand an existing theoretical framework) to explain your synthesis data. We will cover thematic analysis in «Sub-Module 6a». See Figure 5d.1 for an illustration of how inductive coding moves from data to codes.

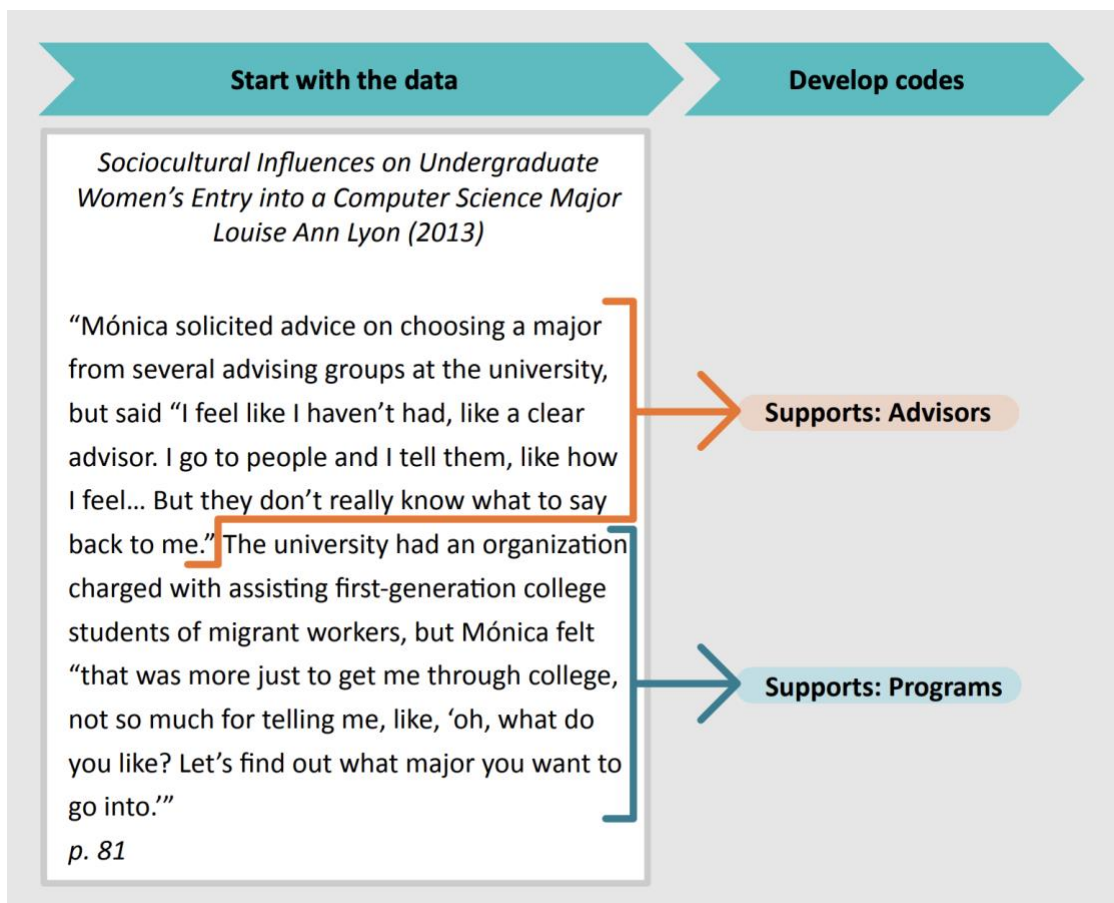


Figure 5d.1. Inductive coding and how codes are developed from the data

Here is a thought experiment to illustrate how you might use inductive coding. Imagine that you have read through the memos you generated from literature on women of color in undergraduate engineering education. You start to notice that the women in the literature talked about how different people in their engineering departments played an influential role in their motivation and persistence in their studies. This could be a first code called *Influential People*.

As you continue coding, you notice that some of these influential people function act as barriers and others as supports. This will mean splitting your original code of *Influential People* into two different codes (*Influential People: Barriers* and *Influential People: Supports*) and going back into previously coded memos to recode them according to the new, more nuanced codes. Alternatively, your process might be the opposite, and you may start with smaller, specific codes, such as *Sibling Support* and *Parent Support* that you may later need to lump together into more general codes, such as *Family Support*. In either case, you will engage in an iterative process where you need to revisit previously coded material in order to recode with your new, more refined codes.

As we noted in «[Sub-Module 5b](#)», you will keep track of your codes, definitions, and examples in your codebook. With inductive coding, you will need to update the codebook as needed. The specific process you use for coding and re-coding may be slightly different depending on whether you are working in a team or on your own. It will also depend on whether you have chosen to utilize computer-assisted qualitative data analysis software (CAQDAS) or to code by hand. We address CAQDAS in «[Sub-Module 5f](#)».

#### Activity 5d.1.

Using your analytical memos from Sub-Module 4c, or a piece of literature from your meta-synthesis study, take 20 minutes to practice inductive coding.

## Additional Resources

- For an example of a coded analytical memo, see “Rankin et al. (2019) Coded Memo” in Appendix 5e.
- For examples on inductive versus deductive coding, check out “Inductive or Deductive? Two Different Approaches” from the website, *The Principles of Sociological Inquiry: Qualitative and Quantitative Methods* here – [https://saylordotorg.github.io/text\\_principles-of-sociological-inquiry-qualitative-and-quantitative-methods/s05-03-inductive-or-deductive-two-dif.html](https://saylordotorg.github.io/text_principles-of-sociological-inquiry-qualitative-and-quantitative-methods/s05-03-inductive-or-deductive-two-dif.html)

## References

- Rankin, Y. A., Thomas, J. O., & Irish, I. (2019, February). Food for thought: Supporting African American women's computational algorithmic thinking in an intro CS course. In *SIGSCE '19: Proceedings of the 50th ACM Technical Symposium on Computer Science Education* (pp. 641–646). Association of Computing Machinery. <https://dl.acm.org/doi/10.1145/3287324.3287484>
- Strauss, A. L., & Corbin, J. M. (1998). *Basics of qualitative research techniques: Techniques and procedures for developing grounded theory* (2<sup>nd</sup> ed.). Sage.



## Sub-Module 5e: Hybrid Coding

### Objectives

In this sub-module, you will learn:

- What hybrid coding is and its purpose
- How to conduct hybrid coding
- To use hybrid coding in the intended meta-synthesis project

### Main Concepts

Now that you are familiar with deductive and inductive coding, in this sub-module we share how the two can be blended, or be integrated, in your meta-synthesis analysis through hybrid coding.

#### *What is Hybrid Coding?*

**Hybrid coding** is a method that uses both inductive and deductive coding practices. It is a melding of emergent codes that are generated from the data with theory-driven codes (Fereday & Muir-Cochrane, 2006). As we have emphasized in «[Sub-Module 5a](#)», this coding approach is one of many and you will need to choose a coding approach according to your methodology, theoretical framework, and synthesis question. The hybrid coding approach has the advantage of allowing you to structure your meta-synthesis project around your synthesis question and theoretical framework while providing the flexibility to let you develop themes directly from the data.

#### *How to Conduct Hybrid Coding*

To conduct hybrid coding, you will need to use a combination of the processes described in «[Sub-Module 5d](#)» (inductive coding) and «[Sub-Module 5c](#)» (deductive coding) to create your codebook, which is the document that lists all the codes for a project with descriptions and examples (see «[Sub-Module 5b](#)»). Our team usually starts with deductive coding by creating a codebook based on theory and our knowledge of the field. Then we apply the deductive codes to our data to see what fits and what does not fit. When we identify data that does not fit our deductive codes, we inductively develop new codes, making sure to develop them in the same format as the rest of the codes, with names of codes, definitions, and examples.

Once you have systematically gone through the data with both your deductive and inductive codes, begin to connect the codes and identify and cluster patterns in the data. The final stage of hybrid coding is a further grouping of the patterns that were previously identified from the coded text into hybrid codes and confirming that they are still representative of the initial data analysis and assigned codes. They should also align with your synthesis question.

For example, imagine that you are conducting a qualitative meta-synthesis on the experiences of women of color undergraduates in engineering education using the theoretical framework of community cultural wealth (Yosso, 2005). For your deductive coding, you may decide to use the theory's six types of capital as the basis for your coding framework. These codes, which reflect an asset-based perspective, would include *Aspirational*, *Linguistic*, *Familial*, *Social*, *Navigational*, and *Resistant* capitals. As you apply the codes to your analytic memos or the literature, you may find that some codes are very useful. For instance, *Aspirational* capital ("the ability to maintain hopes and dreams for the future, even in the face of real and perceived barriers," Yosso, 2005, p. 77) may apply to literature about motivation and persistence. However, you may find that a lot of the memos or literature also includes discussion of barriers and takes a deficit-based perspective. You may realize that if you want to keep that literature in your synthesis, you need to include a set of inductive codes around barriers. You would conduct inductive coding to identify the different types of barriers, such as *Lack of Accommodations*, *Stigma*, and *Stereotyping*. Then you would work iteratively to integrate the two sets of codes (deductive and inductive codes) into your hybrid codebook so that you can apply them to your dataset. See Figure 5e.1 for a graphic representation of how you would conduct hybrid coding by moving from deductive coding to inductive coding.

Keep in mind that Figure 5e.1. only illustrates the additive aspect of hybrid coding, which involves the use of both inductive and deductive codes in the same project. Hybrid coding also involves the use of hybrid codes that have been developed through a combination of deductive and inductive processes. An example of such hybrid code would be a code that started as a deductive code that has a new child code that has been developed inductively.

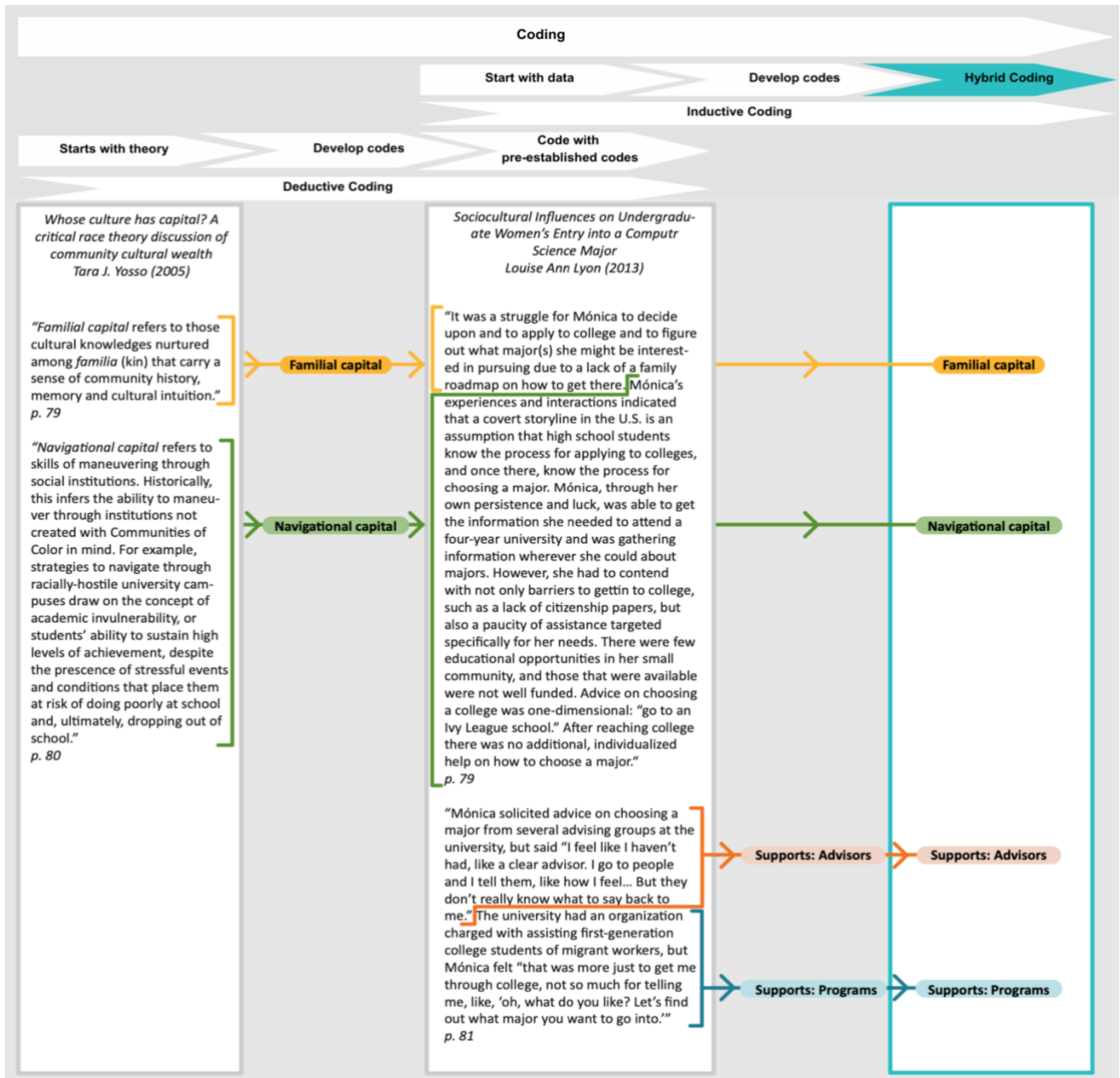


Figure 5e.1. The process of hybrid coding

### Activity 5e.1.

Take 30 minutes to bring together the codes that you developed deductively (Sub-Module 5c) and inductively (Sub-Module 5d) and put them into one codebook.

- Are there codes that you had in both sets of codes? Which ones? Why do you think that is the case?
- Are there codes that you had in one set of codes but not the other? Which ones? Why do you think that is the case?
- Are there codes that complement, provide nuances, or describe different dimensions of the same idea? How do you structure the new hybrid code using primary and secondary codes?

### Activity 5e.2.

Take 30 minutes to practice conducting hybrid coding with your analytical memos (see Sub-Module 4c). If you do not have memos, practice coding directly using 1-2 pieces of literature included in your data set.

- Which codes do you decide to put in the *Parking Lot*?
- Record the rationale behind the decisions in your codebook.

### Activity 5e.3.

Take 10 minutes to think about the following: Now that you have experienced inductive, deductive, and hybrid coding, which of these approaches to coding is appropriate for your meta-synthesis? Why?

## References

- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 5(1), 80–92. <https://doi.org/10.1177/160940690600500107>
- Saldaña, J. (2016). *The coding manual for qualitative researchers* (3<sup>rd</sup> edition). Sage.
- Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race, Ethnicity, and Education*, 8(1), 69–91. <https://doi.org/10.1080/1361332052000341006>

## Appendix 5e: Rankin et al. (2019) Coded Analytical Memo

**NOTE:** The following document, created by us, is a sample coded analytical memo using our hybrid codebook. In this memo, we separated the codes in a table above the memo writer summary. This was done to emphasize and organize our codes from the memo writer summary, author summary, and evidence.

**Memo Authors:** The IMS Team

**Date:** 12/23/2022

**Reference:** Rankin, Y. A., Thomas, J. O., & Irish, I. (2019, February). Food for thought: Supporting African American women's computational algorithmic thinking in an intro CS course. In *SIGSCE '19: Proceedings of the 50th ACM Technical Symposium on Computer Science Education* (pp. 641–646). Association of Computing Machinery. <https://dl.acm.org/doi/10.1145/3287324.3287484>

### Main Ideas

#### *Food-Related Activities Supported Learning of Algorithmic Design and CAT*

**Person/support entity** > Course/Curriculum

**Action / Type of Support** > Learning STEM Content

**Time stamp** > Undergraduate Experiences

**Memo Writer Summary:** 35 African American women (24 in Spring 2015 and 11 in Spring 2016) in an HBCU participated in an introductory CS course. The course developed their Computational Algorithmic Thinking (CAT) through food and recipes that leveraged their everyday experiences. A pre-course survey showed that over 80% of students did not know how to design or apply algorithms. Following the Dessert Wars Challenge activity – during which students created an original “recipe” out of dessert ingredients, most students self-reported an understanding of the characteristics of algorithms as well as learning creativity. Researchers found that the Dessert Wars Challenge activity supported students in the Spring 2016 course (11 participants) to write well-defined algorithms, suggesting that the food activity was a bridge between students’ tacit knowledge and understanding of algorithms/CAT.

**Author Summary:** “Students successfully articulated algorithms in two different contexts---first, as recipes of desserts which are exemplars of algorithms and second, as a solution to the cashier problem mentioned above. A few students even created real life scenarios (i.e., “Bill wants to buy 6 basketballs for \$10 each.”) to situate their algorithmic solutions. Students’ ability to perform both activities confirmed previous research which explored the potential of food-related activities to serve as a bridge



between students' tacit knowledge of algorithms in the context of recipes and their explicit knowledge of the design and implementation of algorithms as a problem-solving tool in an academic setting [20]. Furthermore, qualitative analysis of students' online reflective journals suggested that students thought critically about the characteristics of a well-defined algorithm and developed skills to write precise and organized algorithms with little if any ambiguity" (p. 645).

**Evidence:** "One student wrote, 'I learned that an algorithm must be written out in a manner so the algorithm can be executed exactly. This is where being unambiguous comes into play.' Such evidence emphasizes the potential of the *Dessert Wars Challenge* to support students' developing CAT capabilities" (p. 645).

### *Food-Related Activity Helped to Retain African American Women in CS*

**Person/support entity** > *Course/Curriculum*

**Person/support entity** > *Institution/Department*

**Action / Type of Support** > *Social Comfort*

**Time stamp** > *Undergraduate Experiences*

**Memo Writer Summary** *The combination of the HBCU environment and demographic makeup of the class, the demographic characteristics of the professor, pedagogical style, and course content contributed to students' retention in the course. The course that included the Dessert Wars Challenge activity helped to retain African American women in CS – 96% from the Spring 2015 and 100% from Spring 2016 – compared to the Spring 2017 course (79%) which did not include food-related activities. Researchers claimed this is because "[i]ntegration of food-related activities creates an equitable learning experience, increasing student retention in the college-level introductory CS course" (p. 646).*

**Author Summary:** "In comparison to predominantly White institutions (PWIs), 100% of students enrolled in all three sections of the introductory CS course were African American women. Furthermore, the all-women's southern liberal arts institution and the classroom environment embodied inclusion and challenged the status quo of African American women not representing a critical mass of the STEM student population. In addition, the instructor shared the same ethnicity, gender and life experiences as her students, positioning the instructor to be a role model to other African American women in STEM and CS. Thus, the initial starting point in the course represented a level playing field, since the young women were not a minority nor were they subject to a hostile learning environment that conveyed the message that African American women do not belong in CS. This course also elevated and honored the intersectional experiences of these students, being both African American and female in a Computing space, which is also rare in STEM [5,6,24]. Additionally, the instructor also willingly relinquished some of her power as the instructor to welcome an opportunity for students to criticize her pedagogical strategy, an act of inclusion and an invitation for joint ownership which engaged the African American women as co-designers in creating a more equitable learning experience. These situational factors constituted a more equitable learning environment than most CS departments at PWIs. However, without the inclusion of It's All in the Mix



even in this nurturing learning environment, retention of African American women in introductory CS courses still presented quite a challenge” (p. 645).

**Evidence:** “Comparing the percentage of students who completed the Spring 2015 course to the percentage of students who completed the Spring 2016 course, we had retention rate of 96% (lost 1 student due to health issues) and a retention rate of 100%, respectively, even when students did not have passing grades at midterm. When comparing the retention rate for both course sections to the same introductory CS course taught in Spring 2017 by the same instructor but without the inclusion of the food-related activities, we saw a decreased retention rate of 79% with poor academically performing students dropping the class at midterms. We posited that 21% (7 students out of the initial enrollment of 33 students dropped the class because more instructional time was spent on learning how to write Python code in the first few weeks of the course with less time allocated for extending students’ funds of knowledge to their understanding of the concept of algorithms, how to design them and the correlation between algorithmic design and programming. Anecdotally, students in the 2017 course complained about the fast pace of the course as they struggled with the programming concepts, especially since most of the students had no programming experience prior to taking the introductory CS course” (p. 645).

**Recommendations:** None stated.



## Sub-Module 5f: Computer-Assisted Qualitative Data Analysis Software (CAQDAS)

### Objectives

In this sub-module, you will learn:

- What are CAQDAS
- The misconceptions and realities of using CAQDAS
- The pros and cons of using CAQDAS in meta-synthesis

### Main Concepts

So far, we have talked about coding as the first step in the analysis process, and we have mentioned that it can be done manually using sticky notes, highlighting, chart paper, using the annotation function of word processing software, or using software specifically designed for the purpose of data analysis. This sub-module provides an overview of the pros and cons of using **computer-assisted qualitative data analysis software (CAQDAS)** in qualitative meta-synthesis.

#### *What are CAQDAS?*

CAQDAS are software packages designed to store, organize, manage, and support the analysis of the data in qualitative research projects. CAQDAS can be used throughout the meta-synthesis project, from the search and selection of the literature to the analysis of your data. You will need to decide early in the project how you will use CAQDAS, if at all, so that you can explore its tools and decide which will be the most useful to you. Many qualitative researchers do not use CAQDAS in their qualitative work for a variety of reasons. Some argue that CAQDAS get in the way of getting close to the data, while others argue that they are too expensive or that they are difficult to use. You will need to decide what makes the most sense for you based on your comfort with software and the needs of your project. Our team's use of CAQDAS does not span all steps of qualitative meta-syntheses as we utilize them mainly during analysis.

There are several CAQDAS on the market, including Atlas.ti, MAXQDA, Dedoose, NVivo, and QDA Miner, among others. The American Institutes for Research has recently released MetaReviewer, a program for conducting systematic reviews and meta-analyses. It is available here:

<https://www.metareviewer.org/>

## Misconceptions vs Reality

Though CAQDAS can be quite powerful, they are simply one potential tool in the researcher's hands. Below is a comparison of two misconceptions and two realities regarding CAQDAs.

Misconception	Reality
When data is entered into a CAQDAS, it automatically analyzes it without the need for any other input from the researcher.	The cognitive work of analyzing the data falls on the researcher. CAQDAS provide the tools for researchers to do the analysis, such as query functions and code hierarchies that may speed up the analysis process.
Using CAQDAS is a methodology. When writing up a paper's methods, mentioning the use of CAQDAS is sufficient to explain how analysis was done.	CAQDAS provide the tools for researchers to implement their chosen methodology. Depending on the methodology, researchers may use a specific set of tools or another within the same CAQDAS.

In summary, CAQDAS may make your analysis more agile by providing tools that help in quickly bundling or chunking data in different ways that are much more time consuming when done by hand. It is the researchers' job to decide which bundle or chunk is relevant and meaningful and to develop coherent findings.

For example, our team uses the query function in NVivo. This allows us to see which codes appear the most and the least in our data and decide which codes to look at closer. It also allows us to look at all the data that is under the same code to identify patterns.

## Pros & Cons of Using CAQDAS

Below is a comparison of the pros and cons of using CAQDAS in analysis.

Pros	Cons
CAQDAS can make analysis more efficient; they keep the data and analysis in one place and provide tools that allow for different ways of looking at the data, such as bundling or chunking the data and organizing the coded data in categories and hierarchies.	It is not enough to simply use the CAQDAS to code; you need to deeply understand the methodology to translate it into the software package. So, in a manuscript for publication, it is necessary to talk about the data analysis approach, such as type of coding, not simply that you used CAQDAS.

If the specific CAQDAS you choose has the option of a cloud version, it can facilitate collaboration with other researchers.	Many CAQDAS software packages are not completely intuitive and can be hard to navigate; so, if you choose to use one, be sure to build in time for learning how to use it.
They provide an audit trail that can be referenced in manuscripts.	They can be expensive, but cheap and even free options are becoming available.
Many CAQDAS have video tutorials that show how to use their functionalities, making it easier to learn them.	If CAQDAS are not used on a regular basis, it is easy to forget how the different functionalities work, making it necessary to relearn the software.
If intercoder reliability is of interest to the team or to the journal, CAQDAS can provide that information.	Intercoder reliability is a quantified measure that may not be coherent with most qualitative approaches to research and synthesis.

We want to underscore the fact that CAQDAS will **not** code the data for you. You will also need to set aside time to learn how to use it so that it is as useful as possible and so that it does not overwhelm the process. At the same time, you should be aware that you might need to change your coding plans to ensure the best fit between your coding approach and your project. If you do need to change your plans, you will need to go back to your chosen CAQDAS to ensure that it can accommodate the changes and that you have the best tools at your disposal for the work you are doing. CAQDAS are particularly helpful when you need to work in a team and/or with large amounts of data.

Please remember that CAQDAS options are constantly evolving, with many of them currently starting to implement AI tools to aid analysis. Although CAQDAS currently does not conduct analysis independently, this may be a reality in the near future. Before you choose CAQDAS for your project, you will need to assess the tools they offer and how they may support your work.

## Additional Resources

- To learn more about CAQDAS, see this page of resources compiled by the Qual Page – <https://qualpage.com/qda/>
- The University of Oregon has a page that compares and looks at the pros and cons of five CAQDAS, three of which have a cost (Atlas.ti, Dedoose, NVivo) and two of which are free/open source (MaxQDA, Taguette) – <https://researchguides.uoregon.edu/c.php?g=567658&p=3940638>
- MetaReviewer is a program for conducting systematic reviews and meta-analyses developed by the American Institutes for Research – <https://www.metareviewer.org/>

# Module 6: Analysis – Themes, Findings, and Discussion



## Sub-Module 6a: Thematic Analysis

### Objectives

In this sub-module, you will learn:

- What thematic analysis is
- How to conduct thematic analysis

### Main Concepts

At this point in the meta-synthesis process, you have coded your data and are ready to develop themes that group your codes. Because our team conducts systematic thematic synthesis, developing themes is at the core of our methodological choices. By the end of this sub-module, you will have completed the last stages of analysis, and by the end of this module, you will have started developing sections that you can use as part of a meta-synthesis manuscript. In [«Module 7»](#), we will cover writing and publishing a meta-synthesis manuscript, so, you will have the opportunity to review some of the concepts in this module.

#### *Thematic Analysis*

Careful coding and the next step in the analysis process, thematic analysis, allow you to undertake what Thomas and Harden (2008) call a prime task of qualitative meta-synthesis: “the *translation* of concepts from one study to another” (p. 5). This sub-module is dedicated to showing you how to do just that using thematic analysis.

Thematic analysis is a data analysis method that consists of the identification of **themes**, or the process of unifying ideas across codes. Given that you are working within the context of a thematic synthesis (which is a type of meta-synthesis, as you saw in [«Sub-Module 1c»](#)), thematic analysis is the third step in the analysis process (see Figure 6a.1), and you will implement it across the multiple studies included in your literature set. Thus, within a literature meta-synthesis, such analysis “involves the identification of prominent or recurrent themes and the summarization of the findings” of multiple studies included in the meta-synthesis (Heyvaert et al., 2017, pp. 184, 186). The advantages of using a thematic approach are that it provides a structure to identify important themes, to attend to themes that arise frequently, and to explore whether and how themes align with the synthesis question.

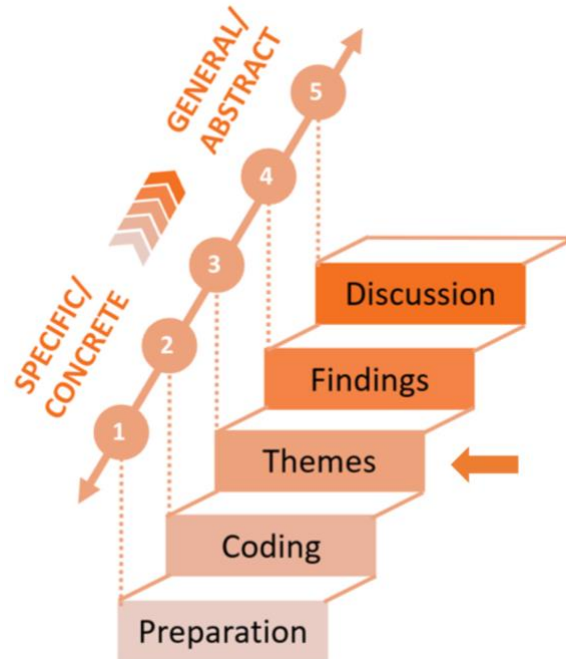


Figure 6a.1. Thematic analysis is the third step in the analysis process, illustrated here

### How to Conduct Thematic Analysis

Thomas and Harden (2008) suggest using a three-staged approach to doing thematic analysis:

- Code literature studies using the strategies described in «Module 5».
- Develop **descriptive themes** (see Figure 6a.2, arrow A), which are themes that stay close to the primary studies (i.e., the literature in your data set). This means that they should closely represent what was found in those studies. You should organize the codes by looking at similarities and differences between them. Based on what you see, you generate descriptive themes and then group together codes that relate to the same topic, concept, metaphor, or idea. Make sure to keep track of which codes were grouped into which theme and your rationale for putting them in a particular theme.
- Generate **analytical themes** (see Figure 6a.2, arrow B) to cluster your descriptive themes. Analytical themes “represent a stage of interpretation whereby the reviewers ‘go beyond’ the primary studies and generate new interpretive constructs” (Thomas & Harden, 2008, p. 1). They can be more abstract than your descriptive themes, but they ultimately need to be able to describe or explain all your descriptive themes as well as address your synthesis question. See Figure 6a.1 for an illustration of the theme development process as developed by our team. Remember that, as we stated in «Sub-Module 5d», inductive coding does not always result in theory development, even when it is the original purpose of the study.

### Activity 6a.1.

Take 30 minutes to practice conducting thematic analysis by developing descriptive and analytical themes based on the coding of your analytic memos or the literature included in your data set. Create one theme.

In the following example, we continue using the meta-synthesis on women of color in engineering that were examined in earlier sub-modules to look at the steps our team used to conduct thematic analysis. We refer to codes that you saw in «**Sub-Module 5d**» that are labeled *Person: Support Entity*, *Action: Type of Support*, and *Time Stamp*.

As we mentioned earlier, our team uses NVivo to code our data. There are many alternative types of software packages for data management and analysis. See the QualPage for a list of software packages (<https://qualpage.com/qda/>). You can also code by hand using sticky notes, highlighters, chart paper, or other systems that work for you, or using the annotation functions of word processing software. Our team, at this point in the project, used NVivo to conduct queries by code. Queries can be done to generate lists of excerpts from our data (i.e., our literature) that include sections with single codes or from the intersection of two codes.

In our meta-synthesis on women of color in engineering, we conducted queries where we got lists of excerpts resulting from the intersection of two codes from the *Action: Type of Support* and the *Time Stamp* categories (see Table 6a.1 to see the codebook structure we used). We found that *Time Stamp* codes such as *Transitional Period(s)* and *Other* did not contain much information. Thus, we decided to only focus on queries from the remaining three *Time Stamp* codes (*Undergraduate*, *Graduate*, and *Workplace*) and their intersection with the *Action: Type of Support* codes (e.g., *Navigation*, *Giving Back/Activism*).



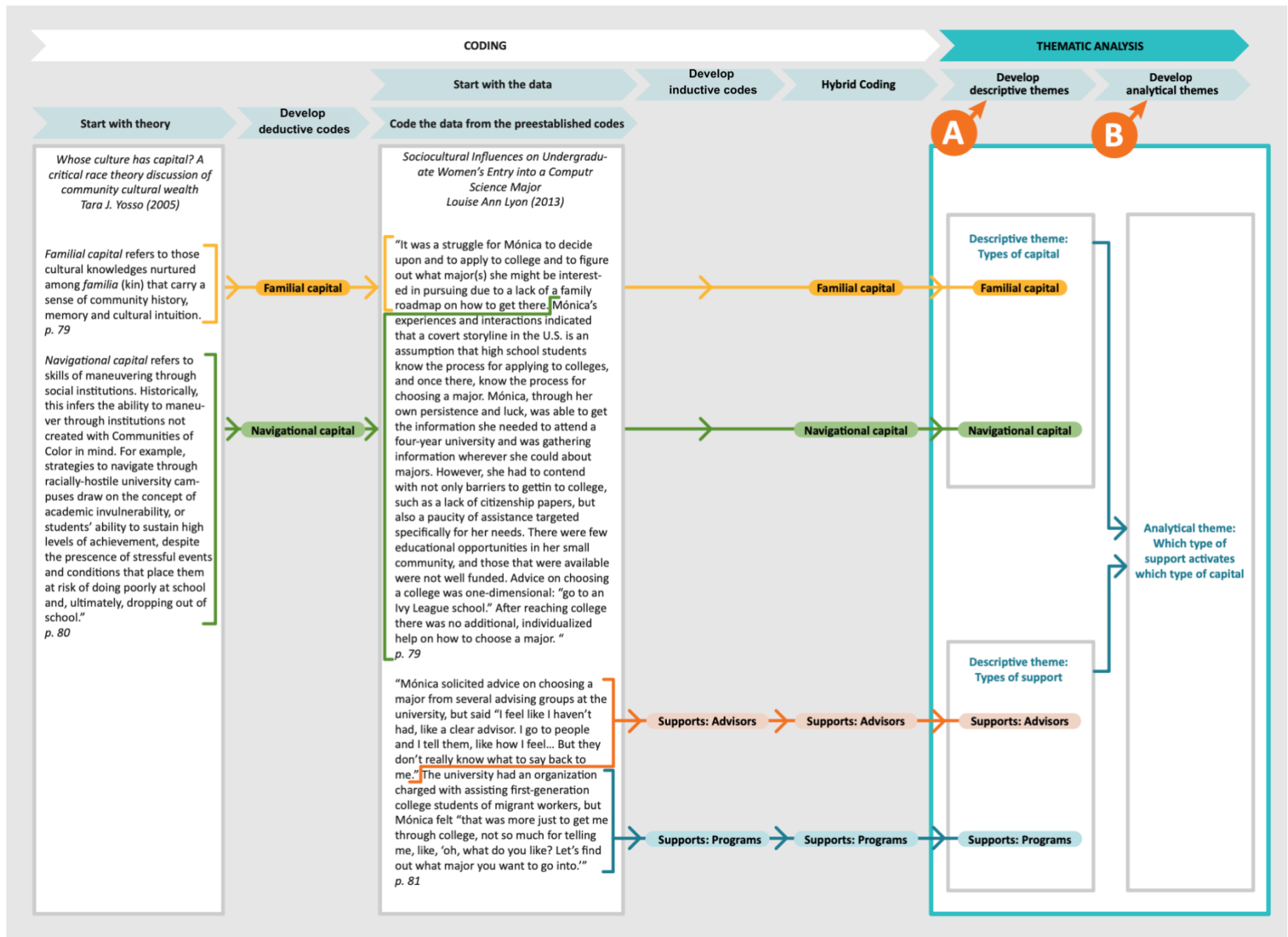


Figure 6a.2. Thematic analysis example

Table 6a.1. An example of a codebook structure for our synthesis on women of color in engineering project. Note the removal of “Transitional Period(s)” and “Other,” with explanation in-text

<p><b>1) Person / Support Entity</b></p> <ul style="list-style-type: none"> <li>a) Advisor/Supervisor</li> <li>b) Family</li> <li>c) Peers/Social Group</li> <li>d) Teacher/Professor</li> <li>e) Mentors</li> <li>f) Internship</li> <li>g) Support Programs</li> <li>h) Institution/Department</li> </ul>	<p><b>2) Action / Type of Support (or Lack Thereof)</b></p> <ul style="list-style-type: none"> <li>a) Identification/Self-Expectations <ul style="list-style-type: none"> <li>i) Economic Considerations</li> </ul> </li> <li>b) Navigation <ul style="list-style-type: none"> <li>i) Finding a Mentor</li> </ul> </li> <li>c) Social Comfort</li> <li>d) Social Pain <ul style="list-style-type: none"> <li>i) Isolation</li> <li>ii) Prove-It-Again</li> <li>iii) Recognition/Reputation</li> <li>iv) Spotlighting</li> <li>v) Microaggressions</li> </ul> </li> <li>e) Giving Back/Activism <ul style="list-style-type: none"> <li>i) Mentoring Others</li> </ul> </li> <li>f) Learning STEM content</li> </ul>
<p><b>3) Time Stamp</b></p> <ul style="list-style-type: none"> <li>a) Undergraduate</li> <li>b) Graduate</li> <li>c) Workplace</li> <li><del>d) Transitional Period(s)</del></li> <li><del>e) Other Time Periods</del></li> </ul>	<p><b>4) Parking Lot</b></p> <ul style="list-style-type: none"> <li>a) Work/Life &amp; School/Life Balance</li> <li>b) Other</li> </ul>
<p><b>5) Golden Quote</b></p>	<p><b>6) Recommendations</b></p> <ul style="list-style-type: none"> <li>a) For institutions/Departments/ Faculty</li> <li>b) For Women of Color</li> <li>c) For Future Researchers</li> <li>d) Other</li> </ul>

Team members then read through the query results to find patterns and create outlines of what we found to be the main themes in each of the codes’ intersections. Here are examples of the intersections of codes for which we created outlines:

- *Undergraduate AND Navigation*
- *Undergraduate AND Social Pain*

Once we had a set of outlines that our team agreed upon, we developed a title that was descriptive of each theme and included evidence from the literature that we thought supported the theme as developed. Often, we also created sub-themes that fit under an umbrella theme but contained characteristics that were distinct from characteristics in other sub-themes. In our engineering education meta-synthesis, we looked at the literature that had to do specifically with women of color in undergraduate education. We found that within the *Social Pain* code, there were structural hurdles

that had to do with the culture of the institution of higher education as well as needing to deal with generally held stereotypes about women of color. See Table 6a.2 for an outline sample of the *Social Pain* code for undergraduate students.

Table 6a.2. An example outline of a theme from the code “Social Pain” for undergraduate students

Codes: Time Stamp – Undergraduate School AND Action/Social Support – Social Pain		
Theme	Sub-Theme	Evidence
Departmental culture	Culture of exclusion and hostility	<ul style="list-style-type: none"> <li>- Being the subject of subtle or overt racism or sexism (Bush, 2013; Camacho &amp; Lord, 2011; Reyes, 2011; Shehab et al., 2007)</li> <li>- Experiences of sexual harassment (Gorman, 2014)</li> <li>- Being ignored or made invisible by white male professors and peers (Alonso, 2012; Bush, 2013; Camacho &amp; Lord, 2011; Lord &amp; Camacho, 2013; Reyes, 2011)</li> </ul>
	Stereotypes	<ul style="list-style-type: none"> <li>- Having to disprove negative stereotypes about intellectual abilities in engineering (Oden, 2003)</li> <li>- Experiences of being spotlighted (Carter, 2007; Carter Andrews, 2012; McLoughlin, 2005)</li> <li>- Racial stereotyping and being singled out (Litzler et al., 2011)</li> </ul>

You can develop similar outlines for all the themes across your coded data that help to address your meta-synthesis question. Your theme outlines may show that you have enough data to support the development of more than one manuscript according to time stamps, career levels, or other specific themes. By the end of your project, you may have several meta-synthesis manuscripts.

### Activity 6a.2.

Take 30 minutes to create a one-page outline of one of your themes, including examples from your meta-synthesis data.

## References

Heyvaert, M., Hannes, K., & Onghena, P. (2017). *Using mixed methods research synthesis for literature reviews*. Sage.

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8, 1–10.  
<https://doi.org/10.1186/1471-2288-8-45>



# Institute for Meta-Synthesis

## Sub-Module 6b: Findings and Discussion

### Objectives

In this sub-module, you will learn:

- What meta-findings are and how to develop them
- How to develop a discussion section and connect it to your theoretical framework

### Main Concepts

At this point in the meta-synthesis process, you have conducted thematic analysis and are ready to begin developing synthesis findings and discussion sections for your manuscript (or manuscripts). Though findings and discussion are two different steps in the analysis process, we have brought them together in this sub-module because of how they inform one another.

#### *What are (Meta-)Findings?*

The findings in a qualitative research study are a narrative that describes and interprets what has been learned in the study and is supported by evidence from the study (Patton, 2002). **Meta-findings** are developed from analyzing the findings of other studies. They are the outcomes of a meta-synthesis process that links common findings across studies and the answers to your synthesis question. It may make sense to organize the reporting of your results by some of your analytical themes and/or major codes (see «[Module 5](#)» and «[Sub-Module 6a](#)»). We consider the development of findings to be the fourth step in the analysis process (see Figure 6b.1).

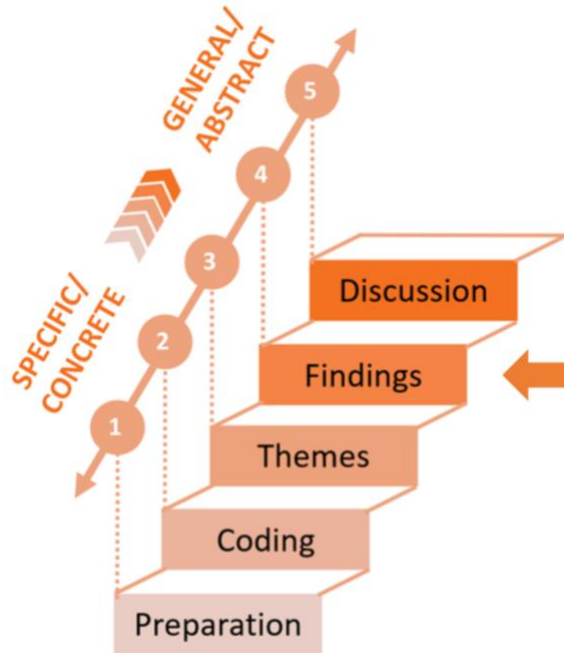


Figure 6b.1. Development of findings is the fourth step in the analysis process, illustrated here

One way to approach writing this section is what Gopaldas (2016) refers to as the “Claim, Data, Elaboration” sequence (p. 119). This entails:

- Stating your overarching claim
- Providing evidence from your data
- Expanding upon how your data justifies your claim

Like findings from qualitative research studies, meta-findings (which we also call “findings” for simplicity’s sake) combine sufficient description and interpretation. We refer to Patton (2002) to understand what **sufficient description** is: “Sufficient description and direct quotations should be included to allow the reader to enter into the situation and thought of the people represented in the report” (p. 503). Thus, you should use **evidence**, such as examples and quotes from the data, and explanations in the words of the author(s) that support the main argument so that the reader can understand it.

**Interpretation** involves your understanding of the significance of the findings described beyond your specific meta-synthesis project, such as understanding the relationships that exist among different elements of the findings. It involves making inferences of how and why those findings occurred based on the description provided (Patton, 2002).

### *How to Develop Meta-Findings*

In a meta-synthesis, readers are relying on you to gather, synthesize, and report meta-findings on the literature on a particular topic. Therefore, your meta-findings should reflect only those literature pieces that were in your final synthesis set. When writing the findings, you are explaining what you

have learned so that others can understand it. This involves making decisions about what to include and what to omit from the story you are telling and how to organize what was learned in the study. This means showing instances in the evidence where your definition of the findings applies and creating coherence in what may be a set of interconnected and flowing details. If you use a quote from a literature piece, be sure that it is representative of the finding you are presenting and that you properly cite the source. Creating coherence and organization often requires leaving out favorite pieces of analysis that do not fit the overall organizing structure (Patton, 2002). As Finfgeld-Connett (2018) assert, “[T]he findings should be fully explanatory by themselves, and references from the literature [beyond your data set] should not be used to support or enhance the results” (p. 67). Thus, as tempting as it may be, you should not include in your meta-findings additional references from literature that are not part of the meta-synthesis data set to support or enhance the results. This use of additional references outside of your data set should be reserved for the discussion section, which we will address in the next section.

To start writing the findings, we suggest writing a description of a theme. The description needs to be “substantively significant and provide enough detail and evidence to illuminate and make that case” (Patton, 2002, p. 503). The description should not include every detail or become trivial and mundane. The difficulty in writing manageable descriptions lays in finding the balance of sufficient description and evidence while avoiding excessive detail.

Once you have the theme descriptions, you need to interpret them by connecting findings to larger societal issues. The description and the interpretation need to support each other, with the description providing the basis for the interpretation and the interpretation providing the larger context to understand the social significance of what is being described. Throughout the development of the findings, you will need to weave in evidence that supports the descriptions and interpretations so that they do not become detached from the reality of the studies where they were developed.

Once you have developed the findings through theme descriptions, interpretations, and supporting evidence, you will need to develop a structure that connects the different findings in an overall understanding of what they mean as a whole. This structure needs to reflect the synthesis question that you developed in [«Sub-Module 2a»](#).

The coding in Figure 6b.2 illustrates how we built a section of the findings in our meta-synthesis on women of color in engineering.

“Several studies suggested that WOCE [women of color in engineering] experienced social pain as a result of discrimination and harassment by professors and peers. In interactions with undergraduate peers and faculty in engineering, WOCE reported being sexually harassed (Gorman, 2014); being the subject of subtle or overt racism or sexism (Bush, 2013; Camacho & Lord, 2011; Reyes, 2011; Shehab et al., 2007), and having their abilities and academic qualifications questioned (Brown, 2000; Camacho & Lord, 2011).

DESCRIPTIONS

For example, Camacho and Lord (2011) described male undergraduate peers undercutting Latinas' achievements by ascribing them to affirmative action, irrespective of the fact that the Latinas' grades and standardized test scores were consistently higher than their peers'. Sexual harassment and discrimination were also evident in a few studies. For example, Gorman (2014) described one WOC engineering student, Terri, who knew she was going to fail a class because her male instructor gave her “straight 69 s” on all her homework and tests. Gorman stated, “A score of 69, with sexual undertones and all, is not considered a passing grade in engineering. A consistent score of 69 ‘on everything’ that Terri received somehow felt wrong” (p. 222). This same student recounted male peers in her program joking with female students about the females getting A's only because they “have boobs” (p. 200).

SUPPORTING EVIDENCE

The literature shows that social pain is widely experienced in many forms by WOC in the engineering environment; that this pain can negatively impact their performance, persistence and retention, regardless of their levels of interest, motivation and self-efficacy; and that the social pain experienced in engineering schools replicates culturally pervasive race and gender inequities. Social pain diverts WOCE's cognitive resources away from their engineering education and toward navigational strategies, as described below” (Ong et al., 2020, p. 17).

INTERPRETATIONS

Figure 6b.2. Example of findings describing discrimination and harassment (Ong et al., 2020, p. 17)

This example includes a description of a finding from the team’s undergraduate engineering meta-synthesis (women of color are stereotyped), taking it from the specific to its larger social concerns (women of color often need to assume the burden of disproving stereotypes to be able to stay in engineering), and providing a different instance from the evidence where the finding applies. In Figure 6b.2, the finding in the first paragraph about discrimination and harassment is illustrated with examples such as Latinas’ achievements being discounted and the sexual harassment of a student by a professor through his grading of her work. Meanwhile, the second paragraph in the figure provides an interpretation of these findings by connecting them to the societal concerns, which in this case is that women of color need to use cognitive resources, not only for their academic responsibilities but also to cope with discrimination and harassment.

### Activity 6b.1.

Take 30 minutes to create a one-page outline of your initial findings, including examples from your meta-synthesis.



## Developing the Discussion Section

### WHAT IS THE DISCUSSION SECTION?

The discussion is the section in a manuscript where you would discuss the meta-findings alongside the chosen theoretical framework and the implications for future research, policy, and practice (Heyvaert et al., 2017). The discussion presents the theoretical and practical significance of your study findings. You should provide the reader with a brief overview of your primary findings and then begin an exploration of the meaning and significance of those findings in light of the literature and your theoretical framework. You should discuss any trends and comparisons you have found as well as strengths and limitations of those claims. Make sure to integrate the literature mentioned in the theoretical framework, revisiting its existing claims, and then confirming, challenging, or extending those claims with the information you presented in your findings.

If you challenge or extend existing theory, you may be creating or pushing theory in a new direction, which can be a key mark of a strong meta-synthesis. However, a meta-synthesis does not always create theory, so be cautious with your claims. Your discussion section should end with a consideration of the implications of your meta-synthesis and how your work can be applied in the field and elsewhere. As you will remember, you are conducting a systematic meta-synthesis, meaning that you searched for a comprehensive set of literature within your specific topic. This positions you to map out the literature and identify its gaps and, thus, present future research areas that can be pursued based on your findings. This means thinking of the implications of the findings beyond your meta-synthesis. In summary, the discussion section is where the circle of the story you want to tell closes by bringing together and integrating the different sections in a manuscript. We consider the development of the discussion to be the fifth step of analysis (see Figure 6b.2).

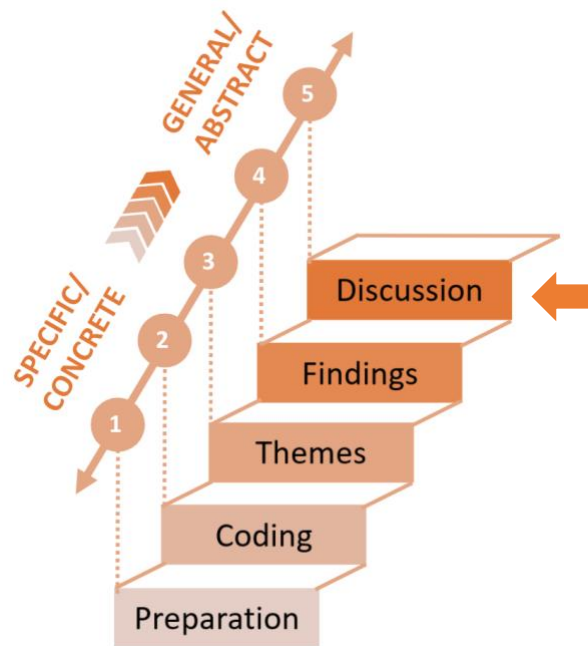


Figure 6b.2. Development of discussion is the fifth and final step in the analysis process, illustrated here



## HOW TO DEVELOP THE DISCUSSION SECTION

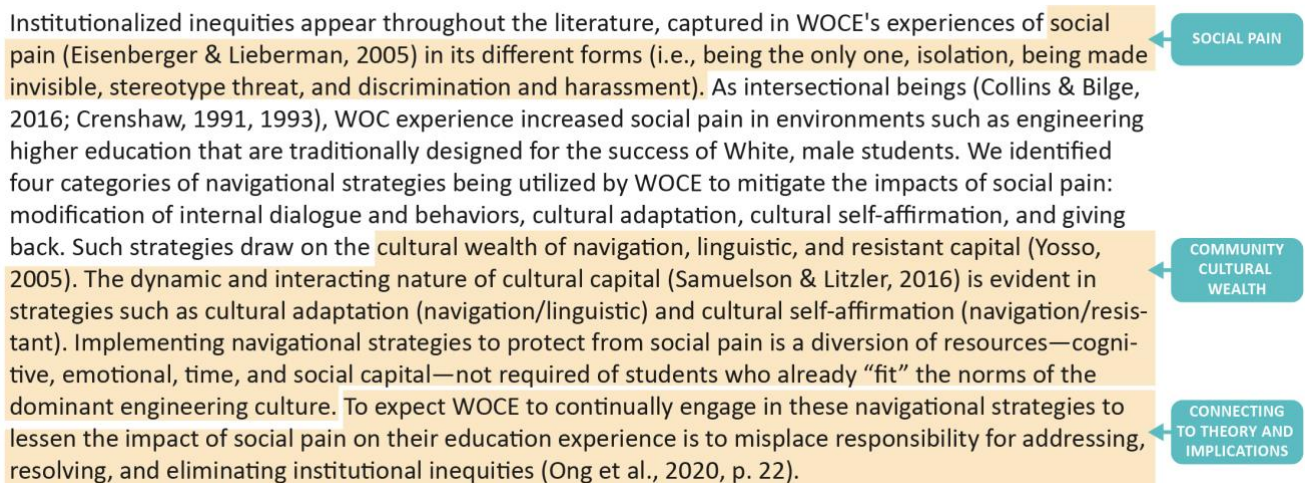
According to Heyvaert et al. (2017), discussing the meta-findings involves:

- Answering the synthesis question posed at the beginning of the meta-synthesis
- Using the theoretical framework as a lens to make sense of the meta-findings
- Reflecting on how methodological decisions affected the meta-synthesis, such as how your decisions around your search, selection, and critical appraisal criteria influenced the literature you included in the meta-synthesis
- Advancing the implications of the meta-findings and stating suggestions for future research, policy, and practice (though this last point could, alternatively, be discussed in the conclusions or recommendations section of your manuscript; check the author guidelines for your selected publication outlet)

A key element of a discussion section is our second point above—using theory to make sense of the synthesis findings. This is an opportunity for you to point out how your meta-findings are applied examples of the theory and may contribute to and/or extend existing theory. You will have different options on how to do this. You may want to apply your chosen theoretical framework’s constructs as the lens to look at your findings. You may also want to compare the findings of other studies or meta-syntheses to your own to see how they converge, diverge, or build on each other.

Figure 6b.3 shows an example of how our team developed a section of the discussion in our meta-synthesis on women of color in engineering undergraduate education. We use highlighting to illustrate where the different constructs appear in the discussion and to show how we build on them to develop implications. Specifically, this example corresponds to the development of the "discrimination and harassment" finding we saw in Figure 6b.2 using our chosen theoretical frameworks for our meta-synthesis. Figure 6b.3 shows how our team used the constructs of social pain (Eisenberger & Lieberman, 2005) and community cultural wealth (Samuelson & Litzler, 2016; Yosso, 2005) to connect our findings to theory and to advance the implications put forth in the meta-synthesis.

Institutionalized inequities appear throughout the literature, captured in WOCE's experiences of social pain (Eisenberger & Lieberman, 2005) in its different forms (i.e., being the only one, isolation, being made invisible, stereotype threat, and discrimination and harassment). As intersectional beings (Collins & Bilge, 2016; Crenshaw, 1991, 1993), WOC experience increased social pain in environments such as engineering higher education that are traditionally designed for the success of White, male students. We identified four categories of navigational strategies being utilized by WOCE to mitigate the impacts of social pain: modification of internal dialogue and behaviors, cultural adaptation, cultural self-affirmation, and giving back. Such strategies draw on the cultural wealth of navigation, linguistic, and resistant capital (Yosso, 2005). The dynamic and interacting nature of cultural capital (Samuelson & Litzler, 2016) is evident in strategies such as cultural adaptation (navigation/linguistic) and cultural self-affirmation (navigation/resistant). Implementing navigational strategies to protect from social pain is a diversion of resources—cognitive, emotional, time, and social capital—not required of students who already “fit” the norms of the dominant engineering culture. To expect WOCE to continually engage in these navigational strategies to lessen the impact of social pain on their education experience is to misplace responsibility for addressing, resolving, and eliminating institutional inequities (Ong et al., 2020, p. 22).



The diagram shows a paragraph of text with three callout boxes on the right side. The first callout box, labeled 'SOCIAL PAIN', points to the highlighted text: 'social pain (Eisenberger & Lieberman, 2005) in its different forms (i.e., being the only one, isolation, being made invisible, stereotype threat, and discrimination and harassment)'. The second callout box, labeled 'COMMUNITY CULTURAL WEALTH', points to the highlighted text: 'cultural wealth of navigation, linguistic, and resistant capital (Yosso, 2005)'. The third callout box, labeled 'CONNECTING TO THEORY AND IMPLICATIONS', points to the highlighted text: 'To expect WOCE to continually engage in these navigational strategies to lessen the impact of social pain on their education experience is to misplace responsibility for addressing, resolving, and eliminating institutional inequities (Ong et al., 2020, p. 22)'.

Figure 6b.3. A sample of an abbreviated discussion section (Ong et al., 2020, p. 22)

### Activity 6b.2.

Take 30 minutes to draft a discussion section for your meta-synthesis by:

- Reviewing your synthesis question and writing about how the findings address it.
- Using your theoretical framework to talk about the findings.
- Reflecting on how your methodological choices impacted your findings.

## References

- Gopaldas, A. (2016). A front-to-back guide to writing a qualitative research article. *Qualitative Market Research: An International Journal*, 19(1), 115–121. <https://doi.org/10.1108/QMR-08-2015-0074>
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## Sub-module 6c: Conclusion and Recommendations

### Objectives

In this sub-module, you will learn:

- What conclusion and recommendations sections of a meta-synthesis manuscript are
- How to develop the conclusion and recommendations
- What other sections may be included in your meta-synthesis manuscript

### Main Concepts

At this point in the meta-synthesis process, you have developed the findings and discussion sections and are at the last stages of developing your meta-synthesis manuscript. You are now ready to write your conclusions and recommendations. Remember that the specific sections of your manuscript will depend on the publication outlet you choose; so, it is possible that the conclusion and/or recommendations may need to be integrated with the discussion.

#### *What Are the Conclusion and Recommendations Sections?*

The conclusion is the final section of a paper where the most important findings of the meta-synthesis are summarized and where the importance and implications of the study are briefly discussed, bringing the meta-synthesis full circle (Heyvaert et al., 2017). The conclusion of your manuscript should not be just a summary of your findings; you should be looking to briefly explain to the reader the significance and implications of your findings. What do they mean to the field and to society? What do they tell us in terms of what policies, practices, or future research should be carried out? Conclusions are the place where any of your final thoughts related to the findings and discussion sections of your meta-synthesis should be expressed. You should leave the reader with an overall understanding of the purpose of your synthesis.

To further support this, you may also include recommendations in this section. The recommendations help in translating the findings of the meta-synthesis into applicable actions for those interested in applying what they learned from reading the manuscript in their schools, workplaces, and lives. If you do include recommendations, make sure that they address the findings and that they are connected to the literature included in the meta-synthesis. Note that the recommendations may also be a separate section in your meta-synthesis manuscript.

## How Do You Develop the Conclusion and Recommendations?

The conclusion should be brief and highlight each of the meta-synthesis' key findings. The recommendations that are often included in this section can be developed in a couple of ways. You may want to collect the recommendations from the literature in the meta-synthesis project and summarize them. For example, our team uses a set of codes to identify recommendations (see Table 6c.1 for an example of the structure of a codebook with the recommendations set of codes). Alternatively, you may want to advance your own recommendations based on your knowledge of the literature. These two approaches to developing recommendations can be used together. Independent of the approach you choose, you need to be careful to stay close to the findings when making recommendations. For example, it would not make sense to provide recommendations on pedagogical practices when the findings focus on persistence in STEM and never address pedagogy.

Table 6c.1. Recommendations section (see #6, highlighted) in a sample codebook structure for the meta-synthesis on women of color in engineering project

<p><b>1) Person / Support Entity</b></p> <ul style="list-style-type: none"> <li>a) Advisor/Supervisor</li> <li>b) Family</li> <li>c) Peers/Social Group</li> <li>d) Teacher/Professor</li> <li>e) Mentors</li> <li>f) Internship</li> <li>g) Support Programs</li> <li>h) Institution/Department</li> </ul>	<p><b>2) Action / Type of Support (or Lack Thereof)</b></p> <ul style="list-style-type: none"> <li>a) Identification/Self-Expectations               <ul style="list-style-type: none"> <li>i) Economic Considerations</li> </ul> </li> <li>b) Navigation               <ul style="list-style-type: none"> <li>i) Finding a Mentor</li> </ul> </li> <li>c) Social Comfort</li> <li>d) Social Pain               <ul style="list-style-type: none"> <li>i) Isolation</li> <li>ii) Prove-It-Again</li> <li>iii) Recognition/Reputation</li> <li>iv) Spotighting</li> <li>v) Microaggressions</li> </ul> </li> <li>e) Giving Back/Activism               <ul style="list-style-type: none"> <li>i) Mentoring Others</li> </ul> </li> <li>f) Learning STEM content</li> </ul>
<p><b>3) Time Stamp</b></p> <ul style="list-style-type: none"> <li>a) Undergraduate</li> <li>b) Graduate</li> <li>c) Workplace</li> </ul>	<p><b>4) Parking Lot</b></p> <ul style="list-style-type: none"> <li>a) Work/Life &amp; School/Life Balance</li> <li>b) Other</li> </ul> <p><b>6) Recommendations</b></p> <ul style="list-style-type: none"> <li>a) For Institutions/Departments/Faculty</li> <li>b) For Women of Color</li> <li>c) For Future Researchers</li> <li>d) Other</li> </ul>
<p><b>5) Golden Quote</b></p>	

Figure 6c.1 below is an example of how our team developed the beginning of the conclusion and recommendations section for our meta-synthesis on women of color in engineering (WOCE) education. This example includes a brief summary of the findings and explains the types of recommendations that the reader will find in the following paragraphs. Note how the recommendation puts the emphasis of responsibility on changes that need to be implemented by leaders in institutions of higher education. We use highlighting in Figure 6c.1 to illustrate this.

“In developing this synthesis, we observed two interrelated trends in the literature. On the one hand, the literature described how, without institutional support in the form of organized programs, the social settings in undergraduate education in engineering reproduced patterns of discrimination that perpetuate race and gender inequity through social interactions. Our analysis made evident these patterns of discrimination as the theme of social pain was prevalent in descriptions of feelings of isolation, incidents of stereotype threat, and experiences of harassment, to name a few. That these forms of social pain can be observed in literature produced within the last two decades indicates that larger historical inequities of power and privilege in U.S. culture—between White people and people of color, between men and women, and between those who fit “ideal norms” and those who live at the intersections of multiple identities—are still active in education environments, including in engineering higher education.

BRIEF SUMMARY OF THE FINDINGS

On the other hand, we found descriptions in the literature of organized environments, such as professional and student organizations, summer programs, and centers for women and/or students of color, providing surrogate familial systems to WOCE that included social and academic networks. Through participation in these programs, WOCE were more likely to succeed, and through these concerted efforts to support WOCE's success, institutions were able to circumvent and possibly start changing their cultural patterns of discrimination. From these contrasting but interrelated trends in the literature, we conclude that the path forward for institutions to retain more WOCE in undergraduate programs is to provide sustained institutional programs that explicitly buffer WOCE against ingrained patterns of social interaction that perpetuate discrimination and that seek to change institutional culture” (Ong et al., 2020, pp. 26-27).

TYPES OF RECOMMENDATIONS FOR THE READER

Figure 6c.1. A sample of the beginning of a conclusions and recommendations section (Ong et al., 2020, pp. 26-27)

In the previous sub-module («Sub-Module 6b»), we discussed the development of findings and discussion sections. The findings, discussion, conclusion, and recommendations sections that you will be developing are sections that typically appear in a qualitative meta-synthesis manuscript. Depending on the journal and your own preferences, they can be combined or separated into several smaller sections. When a manuscript does not include recommendations, the discussion and conclusions can appear together as one section. These sections, in whatever combination they appear in your manuscript, need to be consistent and need to answer your synthesis question. For example, if your findings talk about discrimination and harassment, your discussion needs to address the same topics, without inserting new ideas that have not been addressed before. No matter what, make sure you thoroughly understand and are aware of the guidelines provided by your intended journal.

### Activity 6c.1.

Take 15–20 minutes to list all the topics you would like to include in your conclusion section.



### Activity 6c.2.

Take 15–20 minutes to list recommendations you may include in your manuscript grounded by the findings of your meta-synthesis project and for future research, policy implications, and practitioners in the field. Consider looking at the recommendations included in your literature to develop your own.

### Activity 6c.3.

Take 10 minutes to review the guidelines of 1–2 journals to determine if your conclusions and recommendations will be within the same section or in two separate sections.

## References

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# Module 7: Writing and Publishing



## Sub-Module 7a: The Nature of Writing

### Objectives

In this sub-module, you will learn:

- The cyclical nature of the manuscript writing process
- How to establish a daily writing practice

### Main Concepts

Scholars have varied understandings of what it means to write and how to go about publishing their work. In this sub-module, we describe the writing process in general and provide recommendations on how to develop a daily writing practice that will set you up for success when it comes time to writing your meta-synthesis manuscript.

#### *A Note About the Cyclical Nature of Writing*

The writing process is not a linear process that begins with the opening sentence and ends with a polished product. As Figure 7a.1 illustrates, it is a cyclical activity that is continually shaped by the addition of new information, experiences, and perspectives. In addition, the three phases of writing – pre-writing, writing, and re-writing/revision – can occur simultaneously and repeatedly throughout the creation of a text. It is important to understand that these phases do not occur in isolation from one another. For example, at the same time you are reading literature (part of the pre-writing phase), you might be paraphrasing or summarizing information, selecting illustrative quotes, and organizing your codes and themes (part of the writing or re-writing/revision phases). The phases are described below.



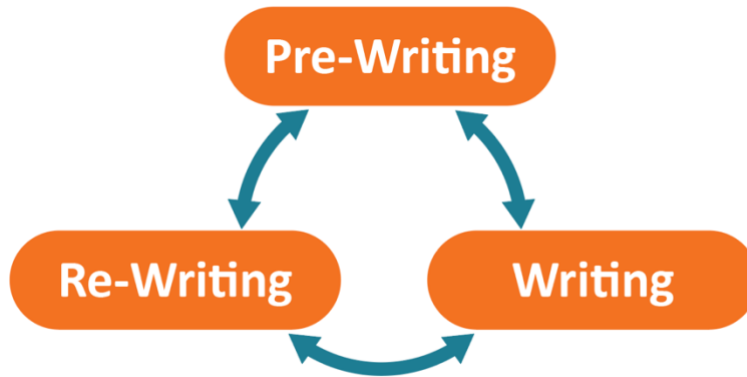


Figure 7a.1. The cyclical nature of writing

The **pre-writing phase**, often considered the “first” stage of writing, is the phase in which you gather evidence and observations. The pre-writing process involves thinking about the purpose, intended audience, and context of your manuscript, and refining these pieces as needed. It also includes brainstorming, free writing, concept mapping, and contemplating next steps. The pre-writing phase also includes analyzing (and re-analyzing) the literature pieces or analytical memos—the steps that we have already addressed in [«Modules 4, 5, and 6»](#).

The “middle” **writing phase** is typically thought of as when you put pen to paper, so to speak. In this phase, you organize your ideas based on what you read, your synthesis question, and argument. You insert yourself into the scholarly conversation by presenting evidence for your claims via:

- Selective use of quotes
- Paraphrases
- Clear and vivid descriptions
- Themes
- Citation practice

In relation to your meta-synthesis project, this is where your analytical memos, codebook and coded materials, and identified themes will come in handy as you begin to pull everything together into one cohesive manuscript. [«Sub-Module 7c»](#) offers some guidance on the writing phase of producing a meta-synthesis.

The “final” phase of the writing process is the **re-writing or revision phase**. The term “revision” means to literally *see again*. Thus, the revision phase is about taking a second (or third, fourth, fifth, etc.) look at your text to examine the clarity and logic of your argument. Some questions to consider when thinking about the clarity and logic of your argument include:

- Does your evidence support your claim(s)?
- Does your chosen theoretical framework make sense in terms of how the findings are presented and analyzed?
- Do the findings push the field by generating new theory or expanding existing theory?
- What are the strengths and weaknesses of your argument or within the sections of your manuscript?

- Are you speaking to your intended audience?
- Does the manuscript contain all the sections required by your chosen publication outlet?
- Do your topic sentences have transitional phrases to assist with the flow of the writing? Can a reader see and follow the structure of your manuscript?
- Does your voice as an author come through (i.e., did you make sure to synthesize the perspectives of other scholars while speaking to and emphasizing your view)?

When you have a full draft of your meta-synthesis, we recommend that you come back to answer this list of questions. It is also highly recommended that you read your paper out loud to listen to its flow and clarity and to catch any spelling or grammar mistakes. Ask a peer scholar to read it, if possible. We also suggest walking away from your manuscript and coming back to it a few days later with a fresh mind and perspective.

As mentioned above, the process of writing is cyclical, and you might at times find yourself doing all three phases at once. Keep in mind that, like any piece of academic writing, the development of a high-quality meta-synthesis manuscript can be slow but very rewarding.

### *Developing a Writing Practice*

A common piece of advice given to new scholars in academia is to write often, when you can, whenever you can. You should consider developing a daily writing practice. This is great advice in theory, but not something that is easy to do in practice. Here are some tips to try to get you writing more efficiently and productively, but ultimately, do what works for you:

- **Set aside a block of time** for writing on a regular basis. It does not have to be a huge block of time; it can be as little as 15 minutes per day. You do not have to write every day; however, it does have to be frequent enough so that it becomes a habit. Schedule it into your workday in your calendar and treat it like a meeting you would have with a colleague.
- Set up a physical space for writing that is ideally distraction-free and cozy. Make it your own with all of your creature comforts and things you need to write productively.
- Get yourself in the writing mindset. A dedicated space and time for writing should help you to transition from thinking about the things you need to do to a quieter mind focused on writing. You may want to consider having a moment of silence or a 5-to-10-minute meditation prior to writing to help clear your mind and prepare yourself for writing.
- To keep yourself motivated and moving forward on your writing projects, set a realistic writing goal depending on your schedule. Start small and try not to go beyond 5 pages per day in order to avoid the “boom and bust” writing trap. Document how much time and writing you have accomplished. You can use a notebook or an Excel spreadsheet to track your page or word count. You can also jot down next steps to jump start your next writing session.
- Find ways to make yourself accountable, such as by joining a writing group or finding yourself a writing partner. A writing group or partner can help you talk through ideas, review manuscripts in progress, provide advice and feedback, and keep you motivated. Remember that every strategy has its pros and cons; so, keep in mind your style and preferences before committing.

- When you meet your writing goal for the day, give yourself a little treat (e.g., walk with a friend, eat a piece of chocolate, watch 20 minutes of your favorite show).

### Activity 7a.1.

Take 10 minutes to reflect on and write about your current writing practice.

- What do you notice about your practice?
- How do you prepare to write?
- Do you work alone or in a group?
- How do you get started writing? (e.g., outlines)
- How do you revise your work?
- What do you think you need to work on or get help with?

### Activity 7a.2.

Look at your calendar for the next month. Identify regular blocks of time to write given your schedule and block them out. Then, take 15–20 minutes to set realistic weekly goals that you can meet.



## Sub-Module 7b: Identifying an Appropriate Publication Outlet

### Objectives

In this sub-module, you will learn:

- To consider what journal can be the right fit for your meta-synthesis manuscript in terms of content and audience
- How to use acceptance rate, quartiles, impact factors, and other related information to make decisions about where to submit a meta-synthesis manuscript
- How the peer review process works in a journal's publication process

### Main Concepts

When you are ready to write your meta-synthesis manuscript, we recommend that you start thinking about where you will submit it for publication because this will influence some of the decisions you need to make in your writing, such as the sections to include in your manuscript. In this sub-module, we describe other considerations—fit and audience, acceptance rates, and impact factors—that will influence what journal you decide on. By thinking about these factors, you can then find multiple model meta-synthesis papers from recent years to get a sense of what journals are looking for in a publishable meta-synthesis work. You can then use those model papers to guide the organization of your writing.

#### *Fit and Audience*

The publication outlet where you decide to submit your meta-synthesis findings will depend on your field, the aim and scope of the publication, and whether there is an interest by the target audience. Ideally, you should find a publication outlet early in the writing process to tailor your manuscript to the audience. You can start searching for an appropriate outlet by noticing where articles in your field typically get submitted as well as investigating where authors of meta-synthesis projects generally submit their work. Then, you should look at the journal's website and learn about its focus by reading webpages called, "about the journal," "aims & scope," or similar sections on its site. Make sure your meta-synthesis content aligns with the scope of the journal. It is also helpful to do a search within the journal to see if the journal has published syntheses, systematic reviews, or meta-analyses in the past; this is an indication of their potential openness to publishing your meta-synthesis manuscript.

If you are not sure whether a particular journal in your area would be willing to publish a meta-synthesis, you can email the editor of the journal and ask for their advice; that is called a **pre-submission inquiry**. Know that submitting to a journal that does not accept your article type is a guaranteed way of getting your paper rejected. It is a good idea to have a short list of journals, ordered in terms of how you prioritize them. If you are rejected from your first choice, then you can quickly regroup and revise your manuscript towards the requirements of the second choice, and so on. Our team creates a list of potential journals for each manuscript using a table we call a journal tracker, where we keep track of information that is relevant for our decision-making, such as the journal’s impact factor, the fit of our manuscript with the journal’s purpose/mission, and whether it publishes syntheses, among other considerations. The last column in the table, overall rank, is where we prioritize journals according to our intention to submit. See Table 7b.1 for an example of a journal tracker that we have used.

*Table 7b.1. Example of a journal tracker*

Title of Journal and Website	Aim, Scope, or Mission	Quartile Ranking	Impact Factor	Publishes Syntheses? (yes/no)	Fit with Our Synthesis (strong/medium/weak)	Overall Rank (Our Priority: 1, 2, 3, etc.)

We also recommend that you look at the **author guidelines** (also called “instructions for authors” or “submission guidelines”; see («**Sub-Module 7d**»)). Each journal will give you specific instructions on elements like the journal’s preferred layout, word limit (including and excluding references), referencing style, and more. If you intend to submit your meta-synthesis work to a specific journal, make sure to format the manuscript accordingly so that it will have a higher probability of being reviewed. Additionally, academic journals are typically **peer-reviewed journals**, meaning that submissions are read by experienced colleagues in the field, who then advise the editor on whether the submission should be published. For academic journals, look at their **peer review** process to see by what criteria reviewers will be asked to evaluate your work. Then, you can make sure that your submission addresses those criteria. Knowing the peer review process will also give you a sense of how long it will take for the editorial board of the journal to get back to you with its decision. Pay attention to the length of time of their turnaround notifications, if time to publication is a consideration for you.

For the sake of equity within the area of knowledge production and access, we encourage you to consider publishing your meta-synthesis work as an open access publication. Open access journals reduce the permission requirements on article use and eliminate the fees for readers, and many (though not all) maintain high standards in terms of quality of content and having peer review processes. Increasingly, academic journals are hybrid, with some articles being open access and others behind a paywall. With an open access journal or article, virtually anyone would be able to get and read your article for free without a subscription or payment. Open access articles receive more

citations than subscription publications, which means that your work would potentially be cited more frequently and have broader impact. However, there are different types of open access journals (see Figure 7b.1). In some cases, the journal has publication fees and is open access. These provide equitable access to content but are not equitable in terms of who has access to publish due to the cost. The main drawback of this type of journal is that the publication cost falls on the author; you or your institution would have to pay a publishing fee to the journal. Before submitting your manuscript, make sure you know what the fees are, how they differ based on manuscript type, and whether you or your institution would be able to cover the fees. In other cases, the journal is open access and has no publication fees. These journals are harder to find, but they are slowly increasing in number.

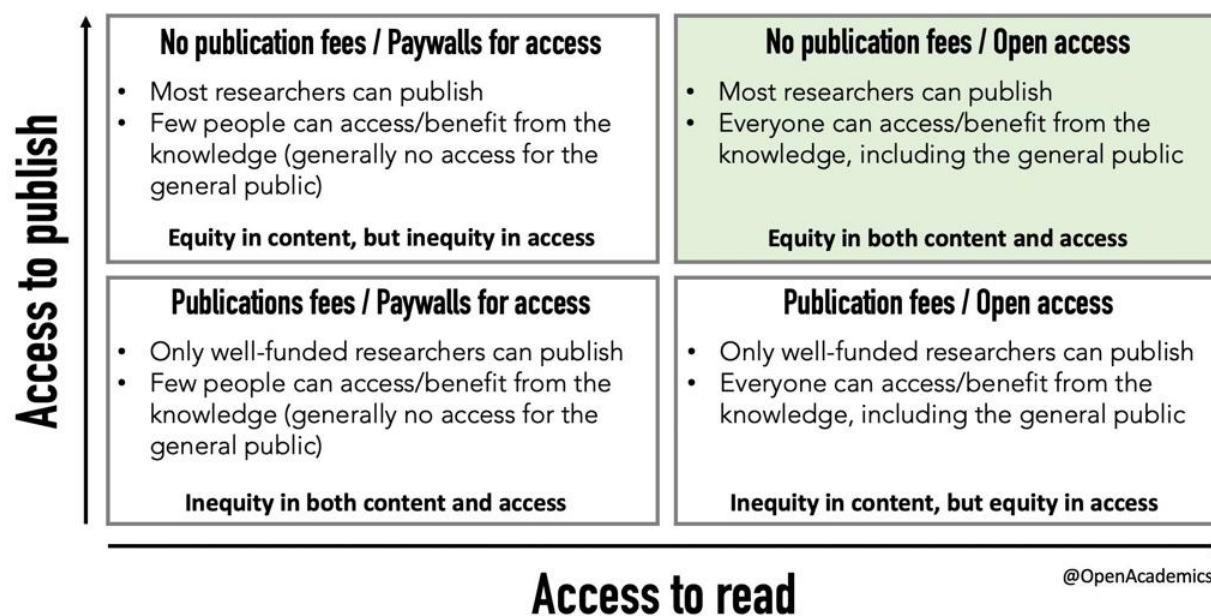


Figure 7b.1. A matrix of equity in access to publish and access to read (Borrowed with permission from @OpenAcademics)

One quick word of warning: beware of predatory journals. Publishers know the value and importance of publishing, and some are profiting from it. William Byrnes (2016) from the Law Professor Blog Network has the following three recommendations for authors:

- Check with an academic librarian to see what they know about the journal where you are planning on submitting. They can also tell you if it is included in indexing services.
- Make sure that the existence of any publishing fees is made public by the journal.
- Make sure that the journal or publisher makes its publishing process public.

In summary, transparency in the processes and costs of publication are a good indicator of the trustworthiness of a journal. If you are not sure of your preferred journal's practices, contact the journal's editor for clarification and check with your academic librarian. If the journal editor's response

is not satisfactory and your academic librarian is not familiar with the journal, it may be better to look for an alternative venue for the publication of your work.

### *Acceptance Rates and Impact Factors*

In academia, the prestige and visibility of a journal is often associated with a journal's acceptance rate, quartile, and impact factor. These are research metrics that are assumed to be objective and supposedly determine the quality of the journal. The thought is that the more difficult it is to get your paper accepted by a journal (or the greater the rejection rate), the higher the quality of the journal. Similarly, a journal's **impact factor** is a metric used to evaluate its relative importance within its field by measuring the frequency with which the "average article" in a journal has been cited in a particular time period. The higher the impact factor, the higher the quality of the journal due to the demand of its articles by individuals in the field. Similarly, a journal's **quartile** ranking (first, second, third, and fourth) is an indication of the frequency with which it is cited and the quality of the journal relative to others in the same field.

It is important to know that acceptance rates, quartiles, and impact factors can be manipulated by the journal to give the illusion of prestige and are not necessarily correlated with journal quality. Impact factors and other research metrics can also differ due to data sources, calculation method, and how they are being used. Therefore, if you decide to use these metrics to determine a publication outlet to submit your meta-synthesis work, then you should use both qualitative and quantitative information. Look at multiple metrics, since each metric alone has its strengths and weaknesses. You should also consult with individuals who have published with the journal. In addition, look at who is listed as editorial board members and as reviewers. If you see a mix of respected, established scholars as well as early career contributors, then the journal is most likely a good option. A useful tool to check for metrics, such as impact factor and quartile, is Scimago Journal and Country Rank (<https://www.scimagojr.com/>). In addition to metrics, it includes links to the journal pages and a description of the journal's scope.

#### **Activity 7b.1.**

Spend 10–15 minutes searching, comparing, and selecting 2-3 journals that you would consider sending a manuscript of your meta-synthesis project. Make sure to check the journal's Scimago page (<https://www.scimagojr.com/>) and the journal's website.

### Activity 7b.2.

Take 30–45 minutes to create a table that tracks the journals you think are the best fit for your publication. Make sure to include the key information that you are interested in tracking, such as impact factor, whether they have published syntheses in the past, and potential fit for your manuscript.

## Additional Resources

- Check out the website QualPage, which is currently maintained by Dr. Kathy Roulston, a professor in the Qualitative Research program at the University of Georgia. The website has over 20 years of resources related to qualitative inquiry and publishing, CAQDAS, and teaching qualitative methodologies, including a list of journals that publish qualitative research – <https://qualpage.com/journals-publishers/>
- Look for peer-reviewed, open access journals using the Directory of Open Access Journals – <https://doaj.org/>
- Learn more about how to spot a predatory journal by reading this 2018 *Typeset* blog post by Deb Mukherjee titled “Choosing the Right Journal — A Comprehensive Guide for Early-Career Researchers” – <https://blog.typeset.io/choose-right-journal-early-stage-researchers-guide-ea2cf236dde4>

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## Sub-module 7c: Structuring Your Meta-Synthesis Manuscript

### Objectives

In this sub-module, you will learn:

- To find a mentor text
- The structure of a meta-synthesis manuscript for publication
- The structure and content of the introduction, theoretical framework, and methods
- To consider adding statements that describe your limitations and positionality

### Main Concepts

As you are figuring out what publication outlet to submit to ([«Sub-Module 7b»](#)), you can begin to craft a draft of your meta-synthesis article. Throughout the modules, you learned about the steps involved in the development of a qualitative meta-synthesis project with the goal of publishing a manuscript that reports your process and findings. You will now bring together all that you have learned to build the different pieces of your meta-synthesis manuscript. Your notes and documentation about your decisions and process, as well as the products of the activities in previous modules, will be key to supporting the development of the manuscript. In this sub-module, we identify key ideas in each of the modules and how they shape the key pieces of your meta-synthesis manuscript and highlight where those components should be located within your paper. We also review the typical sections of a meta-synthesis manuscript, providing suggestions related to certain writing elements and referencing previous modules when appropriate.

#### *Find a Mentor Text*

Before beginning to work on your manuscript, identify a **mentor text** that will guide the organization of your writing (Borrego, 2022). A mentor text is typically an article (or two) that has been published in the journal you have chosen that can serve as a model for your own manuscript. This article can be a meta-synthesis and/or it can discuss similar topics related to your meta-synthesis project. From your mentor text, you might learn about the appropriate sections for the manuscript, the order of the sections, and how references should be cited. You may also observe more nuanced ideas, like how an author establishes a strong rationale for their topic. While you should also carefully read the journal's

author guidelines, having a mentor text is helpful because it demonstrates how those guidelines are enacted.

### *The Structure of a Meta-Synthesis Manuscript*

The structure of your manuscript will vary according to your discipline, the journal you selected for submission, the nature of the specific synthesis topic, and your individual preferences. However, it is recommended that theory-generating meta-synthesis articles use the same formatting as peer-reviewed research articles (Finfgeld-Connett, 2018). Generally, a meta-synthesis paper should include the following sections. The number of double-spaced pages for each section is provided as a rough guideline for an initial submission with a 10,000-word limit.

- Abstract and Keywords (1/2 page or approx. 125–200 words)
- Introduction (with a Synthesis Question) (2-3 pages or approx. 500–750 words)
- Theoretical Framework (3-4 pages or approx. 750–1,000 words)
- Methods (plus Positionality Statement) (8–10 pages or approx. 2,000–2,500 words)
- Findings or Results (10–12 pages or approx. 2,500–3,000 words)
- Discussion (4–6 pages or approx. 1,000–1,500 words)
- Conclusions and Recommendations (4-5 pages or approx. 1,000–1,250 words)

NOTE: Literature reviews are typically omitted from meta-syntheses papers.

#### **Activity 7c.1.**

Take 30 minutes to select and skim one of the following meta-synthesis articles. Identify and study the sections of the article we have discussed in this sub-module.

Winterer, E. R., Froyd, J. E., Borrego, M., Martin, J. P., & Foster, M. (2020). Factors influencing the academic success of Latinx students matriculating at 2-year and transferring to 4-year US institutions—implications for STEM majors: a systematic review of the literature. *International Journal of STEM Education*, 7(1), 1–23.

<https://stemeducationjournal.springeropen.com/articles/10.1186/s40594-020-00215-6>

Denton, M., Borrego, M., & Boklage, A. (2020). Community cultural wealth in science, technology, engineering, and mathematics education: A systematic review. *Journal of Engineering Education*, 109(3), 556–580.

<https://onlinelibrary.wiley.com/doi/full/10.1002/jee.20322>

## *Structure and Content of the Introduction, Theoretical Framework, and Methods*

This sub-module describes the first three sections of a meta-synthesis manuscript. For information about how to develop the other sections of the manuscript (Findings, Discussion, Conclusion, and Recommendations), see «[Module 6](#)».

### **ABSTRACT AND KEYWORDS**

The abstract is a summary of the paper. Every journal has different criteria for the contents of an abstract, but typically, it is around 125–200 words and discusses the problem to be solved, the approach to the problem, some main findings, and some implications or conclusions. Though they appear first in the article, abstracts are typically written last because they must be complete mini encapsulations of the full paper. Some journals have what is called a structured abstract. These abstracts have pre-defined sections, such as Introduction, Methods, Results, and Discussion. This type of abstract can be slightly longer than typical abstracts, but they usually do not exceed 250 words.

Keywords are 4–5 words or phrases that are descriptors of the study or the paper topic. Depending on the journal, these can either be freeform or picked from a menu provided by the journal. Keywords help readers locate your article.

### **INTRODUCTION**

The introduction of your meta-synthesis manuscript should describe the nature or motivation and context of your study. Typically moving from general to specific (see Figure 1 in Busse & August, 2020, p. 2), you should identify the subject, provide a background/landscape, and define the problem or synthesis question you are attempting to address using supportive literature (Lester & Lester, 2015; Heyvaert et al., 2017). As suggested by meta-synthesis expert Dr. Maura Borrego (2023), Director of the Center for Engineering Education and Professor of Mechanical Engineering and STEM Education at the University of Texas at Austin, you should also think about *why* readers would care about your meta-synthesis and make sure to be up-to-date on the particular research area covered by your meta-synthesis in order to see if there are any ideas for new research directions.

Your goal for your introduction should be to clearly explain the objectives and rationale of your study—What is the goal of your study? Why is your meta-synthesis topic so timely, urgent, and necessary to study? What is the current state of the field in relation to the topic? What is the gap in the literature that your work addresses, and what is your claim based on the information you have gathered? How does it contribute to moving the field forward? How is it helpful to your intended audience(s)? How might it help society? According to Lester and Lester (2015), you should “let the introduction and body work toward a demonstrative conclusion” (p. 218), which means that you should be walking the reader through the logic that you used to reach your synthesis question and conclusions. Typically, the introduction ends with your synthesis question.

### **SYNTHESIS QUESTION**

The synthesis question (and sub-questions) is typically included at the end of the introduction. They might also be paraphrased again in the methods or discussion section. As we have seen earlier, a thoughtful and well-designed synthesis question will guide your decision-making and your attention to

the literature that ends up being included in your synthesis (Borrego et al., 2014). Similarly, a thoughtful and well-designed synthesis question will influence the development of the manuscript by framing the focus of your study and guiding the reader to attend to the synthesis literature through the lens of these questions. To review the important functions of the synthesis question, see «[Sub-Module 2a](#)».

## THEORETICAL FRAMEWORK

As we described earlier in «[Sub-Module 2a](#)», the theoretical framework is one of the most critical aspects for framing your manuscript. By stating the theoretical framework, you will inform the reader about the lens you used to design your study and analyze your findings. Make sure to illustrate why you selected the specific theoretical framework and how it fits with your overall synthesis question (Gopaldas, 2016). Some equity-minded theoretical frameworks our team uses include critical race theory (Delgado & Stefancic, 2017), community cultural wealth (Yosso, 2005), and intersectionality (Collins, 2019).

The theoretical framework typically appears as its own section after the introduction. The theoretical framework will influence a significant part of the manuscript by directing your attention to how the meta-synthesis' findings are relevant in the context of the literature and the significance of your findings beyond your meta-synthesis. To review the important functions of the theoretical framework, see «[Sub-Module 2a](#)».

## METHODS

The methods section of your manuscript should clearly describe what you did in the meta-synthesis in enough detail for the reader to replicate it. It should also provide them with enough information for them to interpret and evaluate your meta-findings. Gopaldas (2016) identifies research context, data collection, and data analysis to be the three most important elements in qualitative studies. The synthesis context may be set by re-stating the synthesis question (and sub-questions) or the theoretical framework that informs your study. The data collection and analysis components will be determined by your meta-synthesis process, as we saw in «[Modules 2, 3, 4, 5, and 6](#)», including pre-search decisions such as search terms and inclusion/exclusion criteria for searches; search strategies, databases, and filtering criteria; literature collection and filtering steps you followed; coding development and decisions; and other data analysis methods (Heyvaert et al., 2017; Ong et al., 2020).

In the methods section, you may want to include a table of all works included in the meta-synthesis and provide some key details, such as:

- Author and year published
- Literature format (e.g., journal article, conference proceeding)
- Methodological stance (e.g., qualitative, mixed methods)
- Type of study (e.g., interview, ethnographic)

In our publication on women of color in engineering, we additionally included details in a table on each work's STEM field focus, the career moment of participants (e.g., undergraduate, professional), and race/ethnicity of participants as they were identified by the authors. In addition, you can use a visualization, such as a **PRISMA** flow diagram, to describe your methodological process. PRISMA flow diagrams are very popular amongst synthesis methodologists, particularly those who conduct

systematic reviews. PRISMA stands for *Preferred Reporting Items for Systematic Reviews and Meta-Analyses*. Due to its prevalence, reviewers often expect to see a PRISMA flow diagram in the methods section of a synthesis manuscript. See Appendix 7c for a PRISMA flow diagram template. For an example of how the flowchart is used, see page 58 of the article by Borrego, Foster, and Froyd (2014), which is listed in our References section.

It is vital that you are transparent in your description of your meta-synthesis data collection and analysis methods and that you explain how you go beyond coding descriptions in your data analysis (Finfgeld-Connett, 2018). You should discuss as thoroughly, yet as concisely, as possible the methodological decisions you have made during your meta-synthesis as well as your rationales behind those decisions (Heyvaert et al., 2017). We recommend reviewing «[Module 3](#)» for a review of search, selection, and critical appraisal procedures and «[Module 4, 5, and 6](#)» for a review of analysis procedures.

### **SEARCH, SELECTION, & CRITICAL APPRAISAL (MODULE 3)**

The decisions you have made during the planning and implementation of search, selection, and critical appraisal procedures should appear in the methods section of the manuscript. The selection of search engines, the search, selection, and critical appraisal procedures, and the literature search strategies (e.g., snowballing procedures) determine the literature that will be included in the meta-synthesis. In addition, the decisions made in determining how these procedures will take place, such as which search engines to use and the specific criteria applied, are part of the methodological choices for the meta-synthesis.

### **ANALYSIS PROCEDURES (MODULES 4, 5, AND 6)**

You should also include the decisions you have made in the different cycles of data analysis in the methods section of the manuscript. The coding approach (e.g., inductive, deductive, hybrid) and other analysis decisions (e.g., thematic analysis) determine how to approach the data and how to present the findings. In addition, the decisions made in determining the coding and analysis approaches are part of the methodological choices for the meta-synthesis.

Your notes and documentation about your decisions and processes throughout the development of the meta-synthesis phases will be very helpful at this point to support the development of the methods section of the manuscript that pertains to data analysis procedures.

#### **Activity 7c.2.**

Based on the decisions you made in Modules 2 through 6, take 30–60 minutes to outline the methods section of your meta-synthesis manuscript. Do not forget to address both data collection (e.g., selected search engines, criteria for search, selection, and critical appraisal of the literature, snowballing) and data analysis (e.g., types of coding and overall analysis strategy).

## *Structure and Content of Positionality and Limitations*

Two other important—though sometimes optional—sections of a meta-synthesis manuscript are the positionality statement and the limitations of the study. Our team strongly urges you to consider the inclusion of both if your chosen journal allows them. The positionality statement will typically be part of the methods section or a separate section following the methods. The limitations section typically appears after the methods, in the discussion section, or at the end of the manuscript. Both are described in more detail below.

### **POSITIONALITY STATEMENT**

Our team encourages you to consider adding a **positionality statement** in your publication following your methods (or limitations) section. A positionality statement is typically a paragraph or two that describes the author’s background and identities that may influence or bias the interpretations and claims presented in the manuscript. The author is expected to reflect on the ways in which they foresee their positionality having an influence in their interpretations and claims. The purpose of having a positionality statement is to show transparency and, thus, build trustworthiness with your readers (Secules et al., 2021). Seen through an equity lens, stating your positionality further demonstrates an understanding that you are not claiming to see the data from a neutral, objective, or “higher” standpoint (Harding, 1992; Secules et al., 2021). A positionality statement may include your motivations for engaging in this work, gender, race/ethnicity, disability status, class or socioeconomic status, profession, discipline, and/or other details that are relevant to the topic of your meta-synthesis. Our team’s positionality statement always includes mention of the fact that our work is motivated by social justice and how it shapes the focus of our synthesis work. Here is a sample statement from our meta-synthesis on women of color in computing graduate education (Jaumot-Pascual, Ong et al., 2021, p. 6):

#### **Example 7c.1. Positionality statement**

The authors of this synthesis identify as women who are minoritized due to their intersecting identities and/or their national origins/cultural backgrounds. As such, the team is interested in highlighting the experiences of WOC in engineering and diversifying engineering as social justice issues that will help in providing WOC with access to careers with growth and high pay potentials.

In **«Sub-module 8c»**, we cover the role of positionality statements in proposals for funding.

### Activity 7c.3.

Take 15–20 minutes to draft a one-paragraph positionality statement that situates yourself within the context of your meta-synthesis project.

### LIMITATIONS OF THE STUDY

When conducting a meta-synthesis, the study is, by nature, limited by the literature that is in existence. It may also be limited by methodological decisions that influenced the resulting literature data or the interpretations of the data (Price & Murnan, 2004). The purpose of a limitations section is to be transparent about what these limitations are and to acknowledge how, and to what extent, they may influence your findings, and how you are addressing them within your manuscript to minimize any negative effects on your meta-synthesis. The types of limitations you could encounter and document may include, among others: having small or uneven sub-groups of literature; a lack of available or existing literature; and a lack of reliable studies upon which the literature was based. In this section or elsewhere in your paper, you can describe how you addressed the limitations you identified. Below is a sample limitations section adapted from our paper on women of color in engineering (Ong et al., 2020):

#### Example 7c.2. Limitations

The limitations of this synthesis are mainly connected to our methodological choices. First, we decided to include empirical research on WOCE [women of color in engineering] published only between 1999 and 2015. This decision was based on the belief that older research may no longer be relevant to the contemporary experiences of WOCE, as well as the need to stop literature searches in order to advance to the next stage of the project. For the benefit of the reader, we conducted a cursory, non-exhaustive search of works on WOCE released between April 2015 and October 2019 and list the resulting 31 works in the Appendix of the article.

Another limitation is the possibility that our definition of empirical research eliminated qualified studies, even though we were relatively lenient in defining what constitutes the different components of a research study. ... Another limitation is that the team did not disaggregate beyond race/ethnicity and gender by various social identities (e.g., class, sexuality, ability status). However, given that most of the literature did not include disaggregation by these categories, analysis beyond race/ethnicity and gender would have been of limited relevance. Finally, in the set of studies we synthesized there was an imbalance in the representation of different racial/ethnic groups due to the fact that the literature itself had focused more on some groups, such as African American women, than on others, such as Asian American and Native American women.

It may be tempting to not acknowledge the limitations of your meta-synthesis, but it is better that you acknowledge them up front, rather than have readers identify them later and negatively influence the



article's trustworthiness. Furthermore, acknowledgment of a meta-synthesis' limitations demonstrates thoughtful and critical analysis of the synthesis problem and of the literature while, at the same time, being an opportunity to make suggestions for future research. Do not apologize for any of the limitations; just state them matter-of-factly and explain how you addressed them.

#### Activity 7c.4.

Take 15–20 minutes to consider and list the limitations you have encountered in conducting your meta-synthesis project.

### *Other Sections of a Meta-Synthesis Manuscript*

In addition to the sections we have covered above, meta-synthesis manuscripts may include acknowledgments, abbreviations/glossary, disclosure of conflicts of interest, and appendices. You may find that some of these additional sections may be mandatory for certain journals, such as the acknowledgments section, which usually requires a statement as to whether the author has received funding for their work. However, most of these additional sections are optional and dependent on the needs of the manuscript.

## Additional Resources

- If you are interested in completing a PRISMA flow diagram for your meta-synthesis, see Appendix 7c or visit this website here for a template: <https://www.prisma-statement.org/prisma-2020-flow-diagram>

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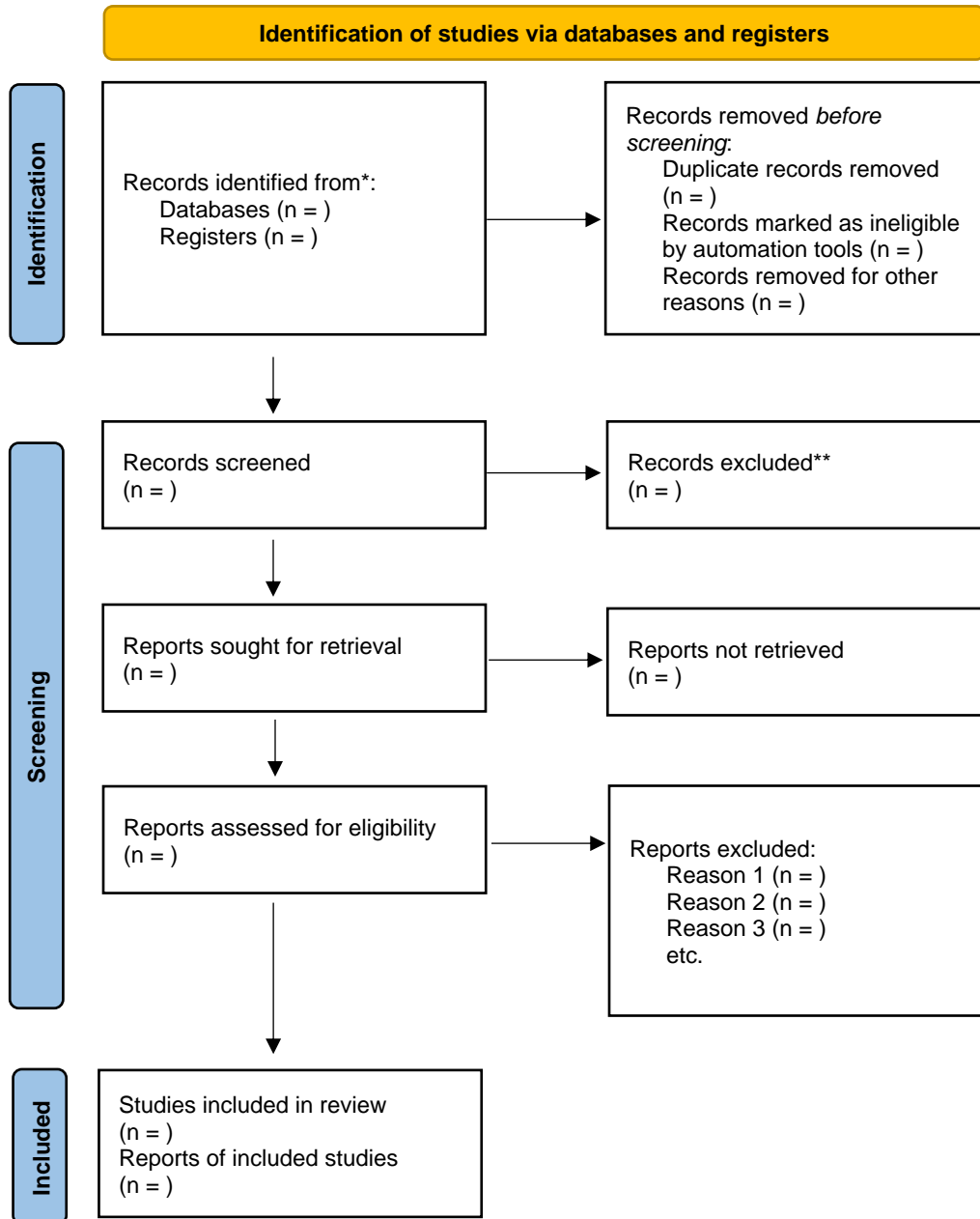


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## Appendix 7c: PRISMA Flow Diagram Template



\*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

\*\*If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

From: Page M. J., McKenzie J. E., Bossuyt P. M., Boutron I, Hoffmann T. C., Mulrow C. D., et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71 For more information, visit: <http://www.prisma-statement.org/>

## Sub-Module 7d: The Publication Process

### Objectives

In this sub-module, you will learn:

- The steps and considerations for the manuscript submission process
- To identify the four types of peer review processes used by journals
- To determine what is expected from reviewers and authors during the review process
- Strategies for responding to a manuscript review

### Main Concepts

After you have written your meta-synthesis manuscript, you should congratulate yourself on all you have accomplished, but what is next? In this sub-module, we describe the manuscript submission process, the review process, and what to do once you have received reviewer feedback.

#### *Manuscript Submission Process*

Here is a quick summary of the submission process. More details about each step are described throughout the module.

1. Read the author guidelines of your chosen journal and prepare your manuscript and accompanying documents accordingly.
2. Submit the manuscript. Understand the types of submission and peer review process your chosen journal follows.
3. Wait the appropriate length of time for the review to take place. The journal's webpage should list the average length of time for you to receive reviews and editor's decision.
4. There is a broad array of editor's decisions you could receive, but the decision is most often either a "revise and resubmit" (R&R) or rejection. If you receive an R&R, plan to address all the reviewers' major concerns and some minor concerns. If you are rejected, learn what you can from reviewers' comments and quickly move on to your next journal of choice.

## AUTHOR GUIDELINES

The **author guidelines** (sometimes called “instructions to authors”) provide key information about the journal’s citation style requirements, including:

- Maximum length of the manuscript, usually given by word count
- What is part of the word count (check whether the abstract, references, table, or captions for graphics count toward the word limit)
- Formatting requirements (e.g., font, margins, citation style, section numbering, placement of tables and figures)
- What type of abstract the journal requires (unstructured or structured; see «[Sub-Module 7c](#)»)
- Whether to anonymize a manuscript, meaning to mask your name (and the names of co-authors, if any) and all your own citations and references

Be sure your manuscript follows all requirements to avoid being outright rejected, otherwise known as a **desk rejection**.

## SUBMISSION TYPES

There are different types of manuscript submissions in terms of where or how they are submitted, and whether and to what extent the manuscript contains information identifying you as the author. The most common way to submit is through an online portal hosted by the journal’s publisher. Before entering the online portal, be sure to have information and documents ready, including:

- Your affiliation and contact information (and those of your co-authors, if any)
- The ORCID number for yourself and any co-authors. An **ORCID number** is a digital identifier that uniquely identifies you as a researcher. Register for an ORCID number at [orcid.org](http://orcid.org).
- Keywords that describe your paper. Depending on the journal’s specifications, these may be provided from a menu by the journal or created by you.
- Long title and abbreviated title of your manuscript
- Title page
- Body of the paper with references, tables, figures, etc.
- Cover letter
- Supplemental documents
- List of names and contact information of potential reviewers (optional)
- List of names and contact information of people who are not suitable to review (optional)

Another type of manuscript submission, though rarer, is through email. For an email submission, you simply send all required materials to an email address provided by the journal. However, this type of submission is becoming less common.

Submissions can be redacted or unredacted. In a **redacted submission**, also known as a masked or blinded submission,\* the author masks their identity in the submission documentation, including the manuscript’s title page, author’s in-text citations, and acknowledgements, before an editor evaluates it. In an **unredacted submission** (also known as an unmasked or unblinded submission\*)—which is more

common—the editor knows the identity of the author. Note that redacted and unredacted submissions are different (though related) from redacted and unredacted peer reviews, discussed below.

\*NOTE: The terms “blinded/unblinded submission” and “single-blind/double-blind/triple-blind review” are ableist terms unfortunately perpetuated within the academic publishing industry. This use of disability as metaphor is not something that our team promotes. We mention it here because this is the terminology the industry frequently uses that readers should be aware of, but we encourage readers to push their colleagues and academic publishers in their fields to reconsider their language and use alternatives, such as redacted/unredacted, masked/unmasked. We use this alternative language for the rest of the module.

### Activity 7d.1.

Visit the websites of 2-3 journals that you are considering for a manuscript submission. Spend 15 minutes reviewing their author guidelines and peer review process.

## Four Types of Peer Review Processes

The credibility of a researcher hinges on the quality of their work. **Peer review** is one process in academia by which research is evaluated and validated by fellow scholars in the field (see Figure 7d.1 for a diagram of the review process). It is how the research community continues to improve upon findings and builds upon disciplinary knowledge. When you submit your manuscript to an academic journal, it goes to an editor who determines if the submission fits the journal’s mission. If so, then this editor will pass the manuscript off to reviewers, who are selected based on their area of expertise. The reviewers may or may not be given your name, depending on the type of review.

There are four types of peer review processes that are based on decreasing the amount of potential bias associated with the review—**single-redacted**, **double-redacted**, **triple-redacted** (also known as single-blind, double-blind, triple-blind; see note above), and **open peer review**.

A *single-redacted review* allows the reviewers to know the name of the manuscript’s author, but the author is prevented from knowing the names of the reviewers. There are a few major concerns with this type of review, including: (1) it may allow reviewers to intentionally delay a publication so that they can write up and publish a similar article first; and (2) reviewers may be biased based on the identity of the author.

In a *double-redacted review*, the most common type of review in academic journals, the reviewer and the author are anonymized, which limits reviewer bias and any advantages well-known authors may have based on name recognition. There is still the possibility of reviewers identifying the author due to the topic, citational practice, or writing style, especially if the field is small.

A *triple-redacted review* prevents the reviewers and editor from knowing the name of the author (this is related to redacted submission). The author also does not know the identities of the editor or

reviewers. During the submission process, before the editor receives the manuscript, the name of the author is removed and replaced with an alphanumeric designation. This process minimizes bias against the author, though it can be more complicated for the editorial board in terms of keeping track of submissions.

For both double- and triple-redacted reviews, you, as the author, will likely have the responsibility to “redact” or “mask” your identity in the manuscript, such as citing yourself as “Author, 2019,” instead of stating your true name. We suggest that, to avoid confusion, you create an unredacted version of your manuscript, then just before you submit, create a redacted version. Keep both versions handy so you can compare versions and easily unmask yourself later in the process.

Lastly, there is the *open peer review*, which is the opposite of the triple-redacted review. It is a process based on transparency by which everyone involved—the editor, reviewers, and author—know each other’s names. Some people believe that this encourages transparency and prevents people from using the review process for their own personal agenda or from making hurtful comments, whereas others believe that this review process keeps people from providing truthful, critical constructive feedback for fear of retribution. We recommend that you are familiar with the review process for whichever publication outlet you ultimately decide to submit your meta-synthesis project.

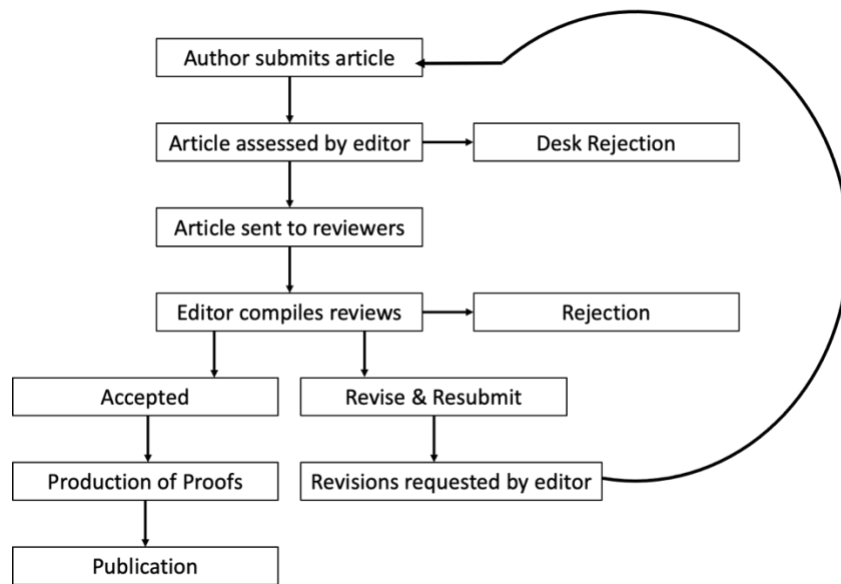


Figure 7d.1. A general diagram of the peer review process

### Identifying Potential Reviewers and Non-Reviewers

Authors often have the option of listing potential reviewers for their manuscript. Be sure to have on hand the names and contact information of two to three experts. Borrego (2023) recommends that potential reviewers should always be recommended for meta-syntheses because these names communicate additional information about the intended audience. She states that the suggested reviewers should be only those who have conducted meta-syntheses and can be broad in their subject area knowledge. Also, she advises, choose experts who are “not too famous” so they might have time

to serve as reviewers; in other words, consider all authors of a paper, as second or third authors might have the same level of methodological expertise (Borrego, 2023). Experts who agree to serve as reviewers might serve as advocates for the publication of your piece. These experts might also give you insightful feedback that would improve your manuscript. Note that the editors may or may not take up your suggestions for reviewers, but they are always pleased to have their pool of suitable potential reviewers enlarged. Likewise, you might also have the possibility of listing people who would *not* be suitable to review your work. People who would be on this list would include people with whom you have a conflict of interest (e.g., your advisor) or with whom you have ideological or other professional conflicts.

### *What to Expect During and After the Review*

As mentioned earlier in this sub-module, the editor reviews the manuscript to determine whether it fits the journal's mission. If they determine that it does not, the manuscript receives what is called a desk rejection. When this happens, the manuscript is not sent out for review and the author receives little feedback.

If the manuscript aligns with the journal's mission, two to four reviewers are typically assigned to every article submission, and each reviewer is given a specific amount of time to review and evaluate it based on the general rubric of the journal. Reviews can take from a few weeks to several months depending on the availability of reviewers and reviewers' and editors' schedules. The role of the reviewer is to identify the strengths and weaknesses of the manuscript and to provide constructive feedback. They should offer suggestions on how to improve the work in a professional, respectful manner as well as provide their honest opinion as to whether the manuscript should be accepted in the journal based on the quality of the work and its potential to advance the field.

The reviewers submit their feedback to the editor, who compiles and summarizes the comments to share with the author. The editor then informs the author of the decision along with the reviewers' suggestions. Common decisions include the following:

- Accept with no revisions—this is very rare, but it does happen.
- Accept with minor revisions—the manuscript will be published by the journal if all or most of the requested revisions are addressed adequately by the author. Again, this is rare.
- Revise and resubmit (R&R)—this decision is usually given when there are conflicting reviews or if the editor or reviewers want to see substantial changes made to the manuscript. The editor sends the revised manuscript out for a second round of reviews (usually with the same reviewers) before making an official final decision. There is no guaranteed acceptance, even if the author addresses all the reviewers' concerns.
- Rejection—this decision occurs frequently, but it is not necessarily related to the quality of the manuscript, as it may be due to a lack of fit with the journal or other reasons out of the hands of the author. If you have planned for a backup journal, start to prepare your manuscript for it.

## Responding to Feedback

Although the feedback provided by reviewers is supposed to be respectful and constructive, sometimes it is not. When this happens, it often has more to do with the reviewer than with the manuscript itself. The manuscript may address a topic that the reviewer has a personal issue with, or it may use a methodology that they do not know or understand, or something else entirely. If this happens to you, try one or more of the following steps:

- Take a break from it to distance yourself from it so that you can come back to it without an emotional response.
- Read the feedback critically without taking it personally, trying to find the useful nuggets of information that you can use for the improvement of your manuscript. You may even want to create a table to track what should be revised (and later, how you addressed it in your revised version).
- Share your reviews with a peer or mentor to try to get some perspective on what was written.
- Re-write the negative feedback in your own words in a way that keeps the useful information but softens the critique.
- If there is feedback that you disagree with, it is perfectly acceptable to let the editor know that, providing a rationale for why the suggestions will not be incorporated in the manuscript revision.

For a revise and resubmit, you and your co-authors would typically be given one to two months to make the requested changes to the manuscript. In your response to the editor, you must provide a copy of the revised paper, prefaced with a description of how each of the reviewers' major concerns was addressed. The review process, from manuscript submission to publication, can take anywhere from six months to two years, depending on the number of rounds of review the manuscript goes through.

Once the manuscript is accepted for publication, you and any co-authors will need to review proofs, sign an author agreement, and process payment of open access fees, if they apply. **Proofs** are the typeset manuscripts as they will be published. They are the last chance you to make any changes, and usually changes are minor, such as typos and misplaced captions for images. An **author agreement** is a contract between you and the publisher about the copyright and the use of the work. Once the manuscript is published, you can disseminate it while keeping in mind the parameters agreed upon in the author agreement.

## Reference

Borrego, M. (2023). *Meta-synthesis manuscript writing: One person's (strong) opinions*. [PowerPoint slides]. Cambridge, MA, TERC.  
<https://docs.google.com/presentation/d/148J7zo5qUT2XaQFDS543gcd-GhM6JVfV99KA-5Ftdf0/edit#slide=id.p>



# Module 8: Proposals for Funding



# Institute for Meta-Synthesis

## Sub-Module 8a: Request for Proposals (RFPs)

### Objectives

In this sub-module you will learn:

- What a request for proposals is, and what are its components
- To search for and identify RFPs related to your intended meta-synthesis project
- How to identify solicitations for synthesis projects embedded in larger RFPs
- To read RFPs for important elements to include in your proposals
- Selecting the right RFP for you

### Main Concepts

Up to this point, we have described how to conduct and write a manuscript for a meta-synthesis, but you may be wondering how you would be able to fund such a project. Manuscripts and proposals overlap in several elements (e.g., description of methods, theoretical framework) but have different goals and objectives. Manuscripts include a description of what you have already done, while proposals include step-by-step descriptions of what you plan to do during a future meta-synthesis project, if funded. Throughout this module, we describe how to create main sections of a strong proposal. We point back to earlier lessons and activities in this user guide as appropriate. In this sub-module, we explain how to locate and identify requests for proposals for synthesis work, which may help you with potentially funding your project.

#### *Request for Proposals*

**Requests for proposals**, or RFPs, are documents generated by funding agencies, including foundations, non-profit organizations, businesses, and government agencies, that announce new funding opportunities and solicit project ideas. A more informal term is **solicitation**. An RFP or a solicitation typically outlines:

- **Eligibility requirements** (e.g., proposers must belong to a nonprofit or be affiliated with a minority-serving institution)
- What **types of projects** they are looking for (e.g., testing an intervention, basic research)—a synthesis would be a type of project, and qualitative meta-synthesis would fall into this category
- Anticipated **funding totals** and **maximum project amounts**

- **Expected length of projects**
- **Preparation and submission requirements**, which may include the requirement to submit a letter of intent that is due a few weeks or months before the proposal deadline
- **Deadlines**

They can also include:

- The **goal that the funding agency** wants to achieve
- The **expected scope** of the project
- The **evaluation criteria** that will be used to assess submitted project ideas

According to Cronan (n.d.), the funding agency views the RFP as “a non-negotiable listing of performance expectations reflecting the agency’s goals, objectives, and investment priorities that the team must meet to be funded” (p. 55). In a 2022 IMS webinar, Dr. Earnestine Psalmonds Easter, a National Science Foundation (NSF) program officer (now retired), strongly recommended that proposal writers ensure that they read and respond to the program solicitation; she stated that proposers often make errors due to not reading specific RFPs and relying instead on their assumptions or their previous proposal writing experiences. Clearly aligning your proposal with the RFP and complying with its requirements will increase your probability of submitting a successful proposal.

### *Where to Find RFPs*

If you don’t know which agencies fund the type of work you want to do, you may want to begin your search by typing “request for proposals” and your research interest (e.g., “STEM education”) in a search engine. You can further limit your results by setting a timeframe (e.g., RFPs over the last month). However, as you do this search, beware of illegitimate websites and organizations. One way to verify an organization is to search for it using a website such as [guidestar.org](https://www.guidestar.org) that collects verified information about nonprofit organizations through direct reporting and the Internal Revenue Service (IRS) 990 forms, which are filed annually and provide an overview of an organization's activities, governance, and detailed financial information.

A recommended way of finding RFPs is by talking to other researchers to learn about organizations that typically fund the area of work you are interested in. This may help you identify local organizations that announce funding opportunities. In the section of this sub-module labeled “Additional Resources,” you will find a list of organizations and websites where you can find RFPs from federal organizations, such as [grants.gov](https://www.grants.gov), or private foundations, like the Foundation Center.

Yet another way to find RFPs is to join a mailing list or register for newsletters from organizations that share information about funding in your area of research. Again, in the “Additional Resources” section, there are some examples of organizations, such as the Spencer Foundation, that announce funding opportunities in STEM education (among other fields) and express special interest in equity and inclusion.

### Activity 8a.1.

Take 25–30 minutes to search for current RFPs in your field. If there are any that invite synthesis proposals, identify the topics funded, expectations for proposal content (i.e., details that must be in the proposal), and deadlines. Identify an RFP to potentially apply to for your meta-synthesis project.

Below are five examples of solicitations that expressly ask for synthesis proposals. These solicitations are expired, but these organizations have similar RFPs on a regular basis:

- NSF EDU/EES (formerly EHR) Core Research:  
<https://www.nsf.gov/pubs/2021/nsf21588/nsf21588.pdf>
- Long Term Ecological Research Network: <https://lternet.edu/synthesis-2021/rfp-2022/>
- NSF Advancing Informal STEM Learning (AISL):  
<https://www.nsf.gov/pubs/2022/nsf22626/nsf22626.pdf>
- NSF Discovery Research PreK-12 (DRK-12):  
<https://www.nsf.gov/pubs/2020/nsf20572/nsf20572.pdf>
- NSF Innovative Technology Experiences for Students and Teachers (ITEST):  
[https://www.nsf.gov/pubs/2022/nsf22585/nsf22585.htm#pgm\\_desc\\_txt](https://www.nsf.gov/pubs/2022/nsf22585/nsf22585.htm#pgm_desc_txt)

Be aware that sometimes RFPs for syntheses are embedded in larger RFPs that fund a collection of project types. Also note that RFPs for synthesis proposals may be rare in many disciplines.

### *Examples of Embedded Solicitations and How to Read RFPs for Important Elements*

Here, in Example 8a.1, is an embedded synthesis solicitation from the RFP for the National Science Foundation’s EDU Core Research program (2021, p. 5; formerly known as EHR Core). The request for synthesis proposals is just one “strand” of the EDU Core Research program.

#### **Example 8a.1. Synthesis solicitation #1**

Synthesis Proposals combine fundamental knowledge and findings on a topic of critical importance to STEM learning, education, broadening participation, or workforce development. They should strive both to present the state of the knowledge on an area, across disciplines where appropriate, as well as highlight issues for future research. Synthesis proposals should explain and justify the **methodological approach** (e.g., meta-analysis or meta-synthesis) to be adopted, and should outline the steps for **literature identification**, **decision points** (e.g., identifying inclusion and exclusion criteria and outcome measures of interest), and **systematic techniques** to ensure all relevant research is included and that information is gathered accurately across studies. Proposals should place particular emphasis on the **goals and outcomes** of the synthesis and the **dissemination plan**.

(<https://www.nsf.gov/pubs/2021/nsf21588/nsf21588.pdf>; emphasis added)

In Example 8a.1, the RFP is telling us that the following elements are important:

- Methodological Approach
- Literature Identification
- Decision Points
- Systematic Techniques
- Goals and Outcomes and
- Dissemination Plan

Given the emphasis the RFP put on these elements, you may want to consider having sections in your proposal with these phrases as the headers.

Example 8a.2 is another illustration of a (now expired) synthesis solicitation, also from the National Science Foundation (NSF). This call for synthesis proposals was part of a larger call for proposals. It came in the form of a Dear Colleague Letter requesting proposals on the specific topic of testing new methodologies for STEM learning. Dear Colleague Letters bring focus to a specific area of an *existing* program; the letters signal a special and/or urgent interest of the funder without the funder creating a new program around it. Government funders such as NSF or the Department of Education use Dear Colleague Letters.

#### **Example 8a.2. Synthesis solicitation #2**

Synthesis proposals seek support for the synthesis and/or meta-analysis of existing knowledge on a topic of critical importance to STEM learning and/or education, or for the diffusion of research-based knowledge. Investigators are permitted to propose conferences and other meetings as one of the means of completing the syntheses and diffusing the research-based knowledge that is developed. Additional emphasis will be placed on the proposed dissemination plan.

(<https://www.nsf.gov/pubs/2019/nsf19036/nsf19036.jsp>)

### *Selecting an RFP*

To select the RFP that works for you, you need to consider if the topics funded, expectations for proposal content, deliverables, and timeline for submission are practical and manageable for you. If the timeline is not manageable, you can plan on submitting in the next round of the RFP. You should also check the award amount and decide if it is reasonable for what the funding agency is asking for. As Cronan (n.d., p. 54) stated,

A flawed understanding of the requirements of the program funding solicitation and the role it plays in planning, developing, and writing a successful research narrative is one of the common reasons proposals are poorly reviewed and declined by funding agencies.

Thus, you must make sure that your work, in turn, is a research interest of the funding agency. If you have any questions or concerns related to your understanding of the solicitation, you should do a close

reading of the RFP, talk to colleagues who have been funded by the organization, or contact the program officer at the funding agency (Cronan, n.d.). A **program officer** is a professional that works for the funding agency to coordinate funding around a specific topic or area. A program officer is familiar with what the funding agency is interested in funding and the mechanics of the funding process with their agency. Part of their job is to guide those interested in applying to their agency.

When contacting a program officer, it is useful to create and share, in advance, a short concept paper (one or two pages) that summarizes your synthesis idea and includes its main points, such as a rationale for the proposed work, main objectives, overall methods, expected outcomes, contributions to the existing knowledge base, and the ways your synthesis may help society. This concept paper will provide program officers with an overview of your ideas and will allow them to better guide you. For example, they may suggest changes to make your idea better suited for their program or they may guide you toward another program that is better suited for your idea. We recommend that you take these suggestions as guidance intended to support your success, not as criticism of your ideas or your work.

The takeaway should be that there is not just one way to find potential sources of funding. Depending on your area of research, you may need to be patient, persistent, and willing to search broadly and speak to many people to identify opportunities for your synthesis.

#### Activity 8a.2.

Take 25–30 minutes and click on the URL of one of the synthesis solicitations mentioned above (<https://www.nsf.gov/pubs/2021/nsf21588/nsf21588.pdf> or <https://www.nsf.gov/pubs/2019/nsf19036/nsf19036.jsp>), skim the RFP, and do a thought experiment with a synthesis proposal in mind: What expectations do the funders set for topics and proposal content? What are the expected activities or outputs? Does the RFP mention the amount of the award?

## Additional Resources

### *Federal RFPs*

The link below provides access to information about federal grant-making agencies. Each agency may have grant programs that individuals can research for funding opportunities for their meta-synthesis project.

- <https://www.grants.gov/>

### *Organizations/Websites for Researching Foundation RFPs*

The links below are from organizations that aggregate research funding opportunities. Individuals interested in seeking funding for their meta-synthesis projects can start with the links provided below.

- <https://www.guidestar.org/>
- <https://doresearch.stanford.edu/stanford-research-development-office/finding-funding/funding-search-resources/funding-search>
- <https://med.stanford.edu/rmg/funding.html>
- <https://pivot.proquest.com/> (You must be affiliated with an institution that subscribes to Pivot-RP in order to create an account.)
- <https://fconline.foundationcenter.org/> (This requires a paid subscription.)
- <https://grantstation.com/> (This requires a paid subscription.)

### *Organizations that Support Education Meta-Syntheses*

Individuals interested in seeking funding for an equity and education-focused meta-synthesis can start with the links provided below. The third link for the National Science Foundation is specifically for STEM and STEM education-focused synthesis grants.

- W.T. Grant Foundation: <http://wtgrantfoundation.org/>
- Spencer Foundation: <https://www.spencer.org/>
- National Science Foundation: <https://www.nsf.gov/> (This government agency has several directorates with different funding programs. For example, the Directorate for STEM Education [EDU] offers funding for meta-synthesis proposals through funding programs such as EDU Core Research [ECR:Core] and Advancing Informal STEM Learning [AISL].)

## References

Cronan, M. (n.d.). *Strategies for planning, developing, and writing large team grants*. Academic Research Funding Strategies, LLC. <https://www.research.fsu.edu/media/2281/strategies-for-planning-developing-and-writing-large-team-grants.pdf>



## Sub-Module 8b: Writing the Front Matter of a Proposal

### Objectives

In this sub-module, you will learn:

- How to state the research vision of your meta-synthesis project
- How to write a rationale that stresses the urgency and novelty for your meta-synthesis
- How to succinctly state the goals and objectives of your meta-synthesis project
- How to declare the anticipated outcomes and impacts of the project so that reviewers and funders can envision the benefits arising from funding your project

### Main Concepts

Each of the elements described below is essential to creating a strong proposal: *research vision, rationale, goals and objectives, outcomes and impact*. Our team thinks of these elements as comprising the “front matter” of a proposal. However, the order of how each of the elements is presented in a proposal is dependent upon the requirements of your specific RFP (which may require other, or additional, information) and the flow of the proposal itself. Following the description of each element is an example drawn from our successful synthesis proposal on literature on women of color in engineering.

#### *The Research Vision*

The grant proposal structure proposed by Cronan (n.d.) starts with the development of a research vision, which is a statement that “provides the global, unifying, thematic overview of the research to be accomplished over the proposed funding period and its significance and value-added benefits to the funding agency mission, or to the research field itself” (p. 80). Essentially, this statement is where you show reviewers how your meta-synthesis work fits within the context of the proposal solicitation. The research vision summarizes your project narrative so that reviewers and funders immediately see how your project potentially adds value to the funder’s mission. In your research vision statement, you need to:

- Demonstrate that you understand the trends in research in your field.
- Provide a succinct description of the context of your proposed meta-synthesis study.
- “Present a vision that advances the field in some important way” (Cronan, n.d., p. 154).



Below is an example of a research vision from our team’s engineering proposal:

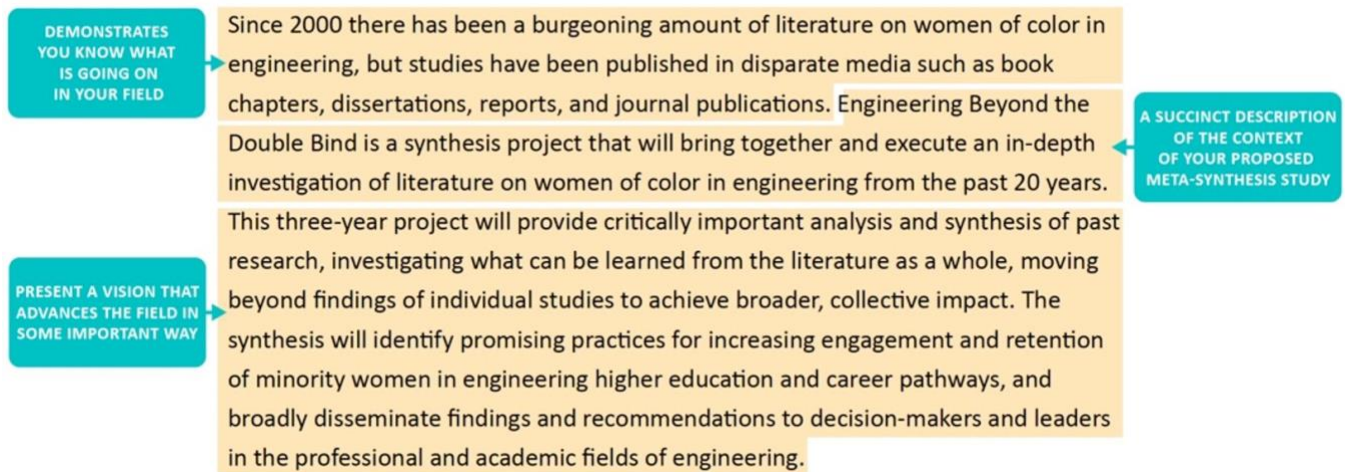


Figure 8b.1. Example research vision statement

### Activity 8b.1.

Take about 20 minutes to write a research vision statement (3-5 sentences).

### *Rationale for the Meta-Synthesis*

To create a strong proposal, you will need to have a compelling meta-synthesis rationale, or a statement of the importance of the problem you want to solve. The purpose of your rationale should be to illustrate what the anticipated contribution will be to the discipline as a result of your meta-synthesis project. Some examples of contributions you can make with a meta-synthesis include:

- Bringing together literature that is scattered across many disciplines and/or literature types.
- Informing scholars and practitioners—in a succinct way—about literature on your topic, which has dramatically increased, changed directions, or changed in some other significant way in recent years.
- Identifying important gaps or disagreements in current knowledge that warrant further study.
- Using meta-synthesis to potentially resolve a research disagreement.
- Studying the implementation of a specific intervention across settings and/or populations.
- Potentially identifying a scholarly intervention or advancement to the field.
- Addressing a critical societal issue.

For an extended explanation of the reasons to conduct a meta-synthesis and for literature supporting these reasons, refer to **«Sub-Module 1b»**.

Your meta-synthesis rationale must be situated within your field’s literature. Therefore, it is appropriate for your rationale to contain a demonstration of your knowledge of your field’s literature via a literature review. The **literature review** should meet the following criteria:

- Present a succinct discussion of relevant research studies that are most closely related to the topic.
- Describe, cite, and comment on the current state of research knowledge around the study topic or issue.
  - Provide an overview of what is known and unknown in the field related to your topic (Ahram & Erickson, 2020).
- Point out the gaps that your proposed study will address without belittling the work of others (Sandelowski & Barroso, 2003). For example:
  - Never use the word “fail” in describing what other researchers did not do.
  - Make sure to describe the work of other researchers accurately.

Note that your literature review should be brief and contain an indication that you have knowledge of the field; it should not be so long and exhaustive that reviewers conclude that a meta-synthesis on your topic is not needed, after all.

Below is an abbreviated example of the rationale from our team’s engineering meta-synthesis proposal:

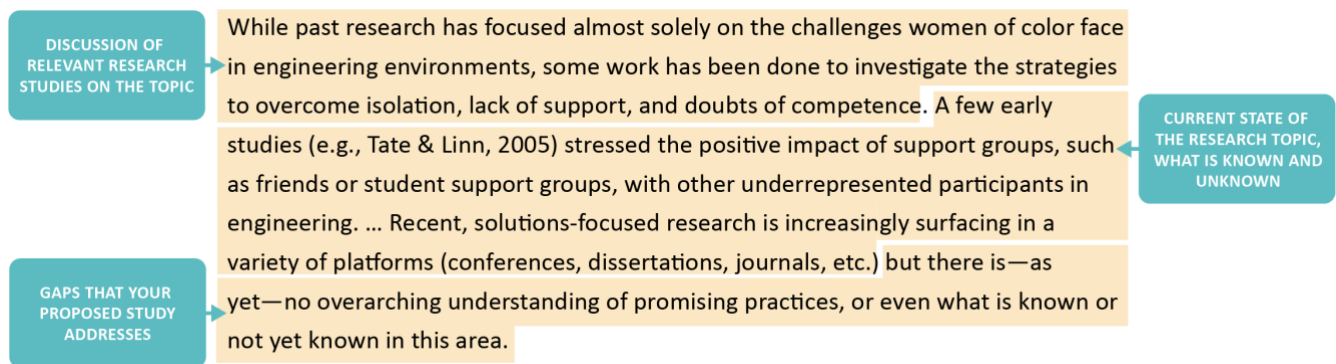


Figure 8b.2. Example rationale

In this example, our team emphasized our unique approach, which was to focus on positive, solutions-based research literature (as opposed to studies focused on more common deficit approaches), and that the literature related to this topic was recent but scattered in different types of media.

### STRENGTHENING YOUR RATIONALE

To ensure you have a strong rationale, make sure to:

- Be concise.
- Ensure your citations are from reputable and/or peer-reviewed sources. This includes:
  - Including classic citations (widely regarded as original or foundational knowledge of the field, e.g., Crenshaw [1989] for intersectionality theory).

- Include “recently published” citations according to the standards of your discipline. For example, in STEM education, research published during the last decade would be considered recent literature.
- Advance equity and inclusion. Our team recommends practicing **citational justice** by citing women and non-white authors in your literature review (Mott & Cockayne, 2016) and other sections of your proposal, as appropriate. Recognizing that citation is used as a form of power in our society (and especially in academia), citational justice is the act of citing authors who are underrepresented to intentionally uplift their voices (Kwon, 2022). Additionally, many funding agencies are increasingly interested in broadening participation and creating equitable systems. Thus, practicing citational justice (in addition to consciously including equity and inclusion as a focus) in your proposals may make it more fundable.

### Activity 8b.2.

Take 30–60 minutes to draft an outline of your rationale (1-2 pages) for your meta-synthesis project. Include some citations of the major theories upon which you will be drawing.

### *Goals and Objectives*

The goals of the synthesis study are the overarching, long-term, major accomplishments that you will reach over the course of the grant period. The most salient goal in a synthesis proposal should be to answer your synthesis question, which should be carefully developed (see «[Sub-Module 2a](#)»). Objectives are the actual steps you will take to achieve each goal. You should state the goals and objectives of your study early in the proposal.

It is important that the goals and objectives of the synthesis study are aligned with each other – and that they address the synthesis question. Table 8b.1 and Example 8b.3 showcase two ways—chart or text—of sharing the same goals and objectives. They also illustrate how objectives are aligned with each goal. In your proposal, you can decide which representation (e.g., chart vs. text) is more effective, given the amount of detail you want to share as well as the amount of space available in the proposal.

Table 8b.1. Chart representation of goals and objectives, from a proposal on women of color in engineering

Goals	Objectives
1. Build new knowledge and understanding of the positive and negative factors affecting the retention of women of color within academic programs and in professional settings for engineering.	1.a. Analyze ways in which personal characteristics and interpersonal interactions promote, or hinder, women of color in engineering.  1.b. Construct new knowledge and understanding by analyzing and synthesizing information from diverse sources.
2. Make methodological contributions through the testing and refinement of meta-synthesis tools and processes.	2.a. Develop, test, and refine tools and processes involved in conducting meta-syntheses (e.g., develop a template for analytical memos).

**Example 8b.3. Text representation of goals and objectives, from a proposal on women of color in engineering**

**Goal 1:** Build new knowledge and understanding of the positive and negative factors affecting the retention of women of color within academic programs and in professional settings for engineering.

*Objectives for goal 1:*

- 1.a. Analyze ways in which personal characteristics and interpersonal interactions promote, or hinder, women of color in engineering.
- 1.b. Construct new knowledge and understanding by analyzing and synthesizing information from diverse sources.

**Goal 2:** Make methodological contributions through the testing and refinement of meta-synthesis tools and processes.

*Objective for goal 2:*

- 2.a. Develop, test, and refine tools and processes involved in conducting meta-syntheses (e.g., develop a template for analytical memos).

### Activity 8b.3.

Take 45–60 minutes to write out your goals and objectives. Be sure to check that your goals directly relate to your synthesis question, and that your objectives describe practical steps towards achieving each goal.

## Outcomes and Impacts

Your outcomes include the answers to your synthesis question and sub-questions (if applicable); they are also the products of the project. Impacts are the influences or effects that your project outcomes will have.

- Some funders will require specific statements about the expected contributions to the existing knowledge base and/or the ways in which the project will contribute to supporting equity and inclusion.
- You should be clear about the impact your work will have on stakeholders, including the research community. Who will benefit from your meta-synthesis work, and in what ways? What policies and practices will be informed, changed, or created as a result? You can address this at the individual, institutional, local community, regional, national, and/or societal levels.

Below is an example statement from our team’s engineering meta-synthesis proposal that speaks to how the project *outcomes* will contribute to, and *impacts*, the existing knowledge base and various stakeholders (see Figure 8b.3).

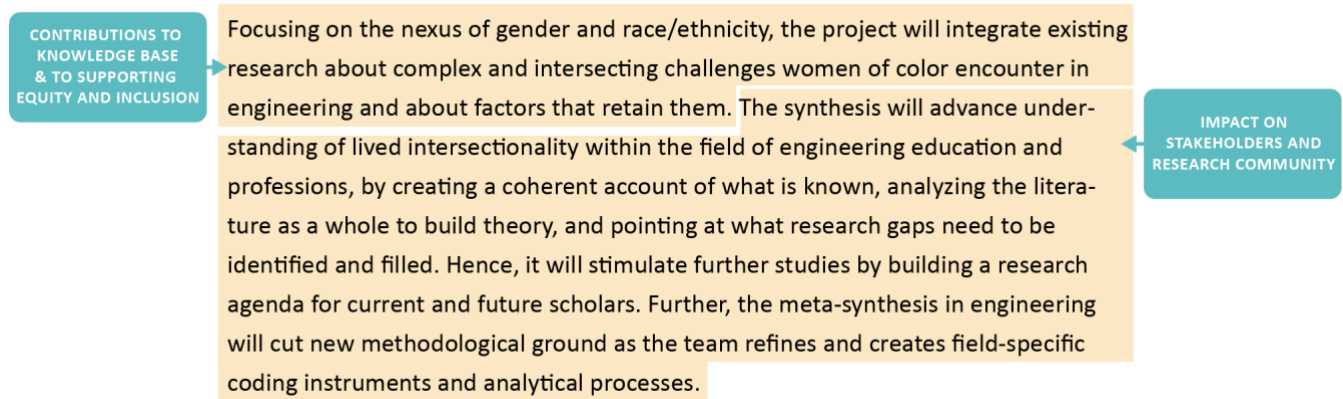


Figure 8b.3. Example outcomes and impacts statement #1

Below is another example statement, also from the engineering meta-synthesis proposal, where our team details how outcomes from the project would positively impact the STEM enterprise and society by diversifying the U.S. workforce (see Figure 8b.4).

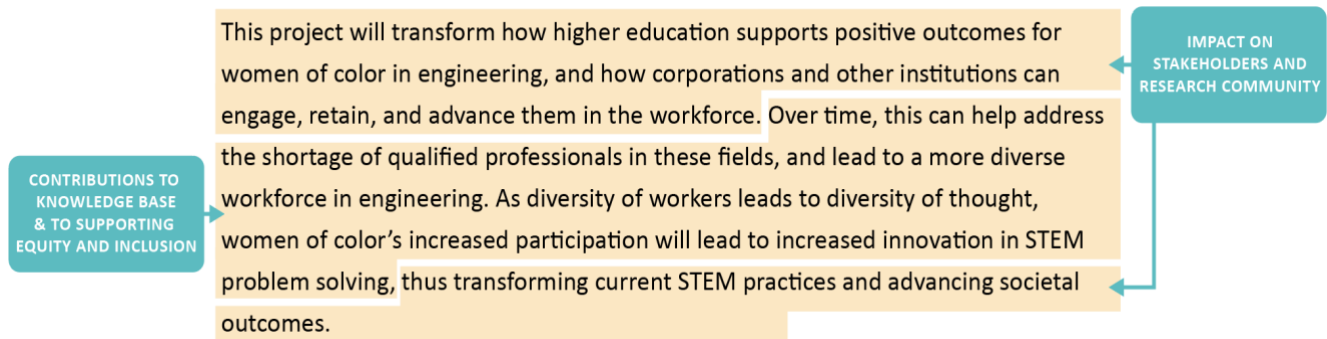


Figure 8b.4. Example outcomes and impacts statement #2

#### Activity 8b.4.

Take 30–40 minutes to write your outcomes and impacts statement. Be sure to check that they are related to your goals and objectives.

## Additional Resources

- This book offers step-by-step guidance on academic research and writing, including electronic research.
  - Lester, J. D., & Jr., Lester, J. D. (2015). *Writing research papers: A complete guide* (16<sup>th</sup> edition). Pearson Education. <https://www.pearson.com/en-us/subject-catalog/p/writing-research-papers-a-complete-guide/P200000002248/9780137540853>
- This article by Mott and Cockayne (2017) argues for awareness of the “politics of citation” and resistance to the ways in which citation, as a measure of knowledge production, typically favors one group over others. Some additional resources to learn more about citational justice are included below.
  - Mott, C., & Cockayne, D. (2017). Citation matters: Mobilizing the politics of citation toward a practice of ‘conscientious engagement’. *Gender, Place & Culture*, 24(7), 954–973. <https://doi.org/10.1080/0966369X.2017.1339022>
  - <http://www.citeblackwomenscollective.org/>
  - <https://www.colorado.edu/education/2020/07/21/help-us-engage-and-advance-citation-justice-alumni-and-graduates-color>

## References

- Ahram, R., & Erickson, F. (2020). *A guide to writing successful field-initiated research grant proposals*. Spencer Foundation. <https://www.spencer.org/resources/a-guide-to-writing-successful-field-initiated-research-grant-proposals>
- Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum*, 1989(1), 139–167.
- Cronan, M. (n.d.). *Strategies for planning, developing, and writing large team grants*. Academic Research Funding Strategies, LLC. <https://www.research.fsu.edu/media/2281/strategies-for-planning-developing-and-writing-large-team-grants.pdf>
- Kwon, D. (2022). The rise of citational justice. *Nature*, 603, 568–572. <https://doi.org/10.1038/d41586-022-00793-1>
- Sandelowski, M., & Barroso, J. (2003). Writing the proposal for a qualitative research methodology project. *Qualitative Health Research*, 13(6), 781–820. <https://doi.org/10.1177/1049732303013006003>





# Institute for Meta-Synthesis

## Sub-Module 8c: Writing the Body of a Proposal

### Objectives

In this sub-module you will learn:

- The importance of selecting a theoretical framework that aligns with your synthesis question
- To describe your methods to a set of reviewers who may or may not have meta-synthesis expertise
- About positionality statements

### Main Concepts

Typically, the middle of the proposal, or the “body,” consists of two main sections, *theoretical framework* and *methods*. Increasingly, funding agencies and reviewers also favorably review *positionality statements*, which often follow the methods section. Each of these elements, described in this sub-module, will give reviewers a strong sense of your approach to the project and how you will conduct your meta-synthesis activities. As stated in the previous sub-module («Sub-Module 8b»), the order of how each of the elements is presented in a proposal is dependent upon the requirements of RFPs and the flow of the proposal.

#### *Theoretical Framework*

«Sub-Module 2a» described how you should frame your meta-synthesis activities through theory. Theory can inform how the study is conducted (i.e., the methodology) and the lens by which data are examined. For these reasons, it is important to state the theoretical framework in your meta-synthesis proposal, providing clear descriptions and citations. If you have done the exercises in «Sub-Module 2a», you may be able to transfer and refine what you have already written.

One example of how a theoretical framework can be used comes from our synthesis work on women of color in engineering education in which our team stated that we would draw upon the theory of community cultural wealth (CCW, Yosso, 2005), an approach based in critical race theory that focuses on *assets* that members of minoritized groups bring to their educational experiences. This framework, we argued, would enable us to stay attuned to literature that focused on *self- or community-based solutions* for persistence in engineering education.



In your proposal, the theoretical framework section should make the case for how the current knowledge base and its theoretical underpinnings justify new investment in the proposed line of inquiry, and how the project and its findings are likely to build upon and refine existing relevant theory. Continuing our example from above, we stated that our application of CCW would take an assets-based approach to illuminating strategies for success and barriers to persistence for women of color in engineering higher education, as well as the ways that institutions could further support them.

### Activity 8c.1.

Take 1.5–2 hours to identify a theoretical framework for your proposal. If you did the theoretical framework activity in Sub-Module 2a, it may take you less time; simply transfer and refine it.

## Methods

The methods section should be a clear, detailed, and coherent description of your meta-synthesis activities. The methods should be evidently geared towards answering your synthesis question (and sub-questions, if applicable), which you should consider re-stating at the beginning of this section. In a strong methods section, reviewers should be able to imagine you doing each task and understand how a given task is closely connected to the one before it and after it. For a proposal for a meta-synthesis project, the methods can be broken into two parts: pre-search and data collection (or literature collection), and data analysis (or literature analysis).

### PRE-SEARCH AND DATA COLLECTION

Our earlier modules («[Modules 2 and 3](#)») described the pre-search and data collection tasks outlined below, which you may adapt and flesh out for your own methods section.

- **Step 1: Pre-Search: Setting Up the Data Collection**
  - Establishing search and selection criteria
  - Testing and selecting search engines
  - Selecting search terms and creating search strings
- **Step 2: Data Collection**
  - Establishing the start set
  - Forward and backward snowballing
  - Selecting relevant literature
  - Applying filters
    - Filter 1 and Filter 2
    - Critical Appraisal

## DATA ANALYSIS

In the next portion of the methods section, you should describe how you will analyze the data, noting that the data are comprised of your full set of literature. «[Modules 4, 5, and 6](#)» described the data analysis tasks listed below, which you can adapt for your methods description.

- **Step 3: Hybrid coding and analysis**
  - Establishing a codebook
  - Testing and refining codebook with subset of literature
  - Applying codes to full set of literature
- **Step 4: Synthesizing and drawing conclusions**
  - Developing meta-themes using thematic analysis
  - Identifying relationships between meta-themes
  - Connecting, comparing, contrasting existing and newly emerging meta-themes

Throughout the methods section of your proposal, be sure to cite relevant methods and theoretical literature that connect with your work to show that you have a well thought-out, unique project. For example, we explain that our code *Navigation* is created from CCW theory developed by Yosso (2005). CCW includes a concept called “navigational capital,” defined as the strategies, knowledge, and resilience used to maneuver through oppressive and marginalizing systems, such as university campuses. In our methods section, we also cite methodologists Thomas and Harden (2008), who are one of the first to describe thematic synthesis (a meta-synthesis design). We explain why the methods of Thomas and Harden align well with our own methodological choices.

According to retired NSF program officer, Dr. Earnestine Psalmonds Easter (2022), it will be extremely important to demonstrate a coherent alignment among the conceptual framework, design (including methods), and the expected outcomes of your proposed synthesis. Reviewers will be looking for whether there is a logical thread through an “innovative” and “transformative” proposed synthesis that is “grounded” in the current academic literature.

Finally, some funders require a statement about any certifications you have that better qualify you to conduct meta-synthesis or research (e.g., CITI or NIH) and/or IRB pre-approvals you have for your proposed project. Alternatively, you may need to declare that you will follow all IRB requirements from your organization and your funder in conducting your proposed project. Such statements may be placed at the end of the methods section (an alternative place would be in the description of your role under Key Personnel).

### Activity 8c.2.

Take 60–90 minutes to draft a methods section for your proposal. If you have done the activities related to methods in Modules 2 through 6, transfer and refine here.

### Positionality Statement

While a **positionality statement** is not typically a required section of a proposal, it may be a good idea to include one in your proposal to state upfront the elements from your background, cultures, and identities that may influence your motivation for your proposed project and to give reviewers a sense of what might inform your approach to the proposal topic. A program officer from a national funding agency even stated that they are noticing a recent trend of positionality statements in proposals, and that these statements are favorably reviewed.

Positionality statements are described in detail in «**Sub-Module 7c**». An example and an activity are available in that sub-module. The main difference between writing a positionality statement for a manuscript and for a proposal is that your statement in a manuscript is meant to demonstrate what influenced your analysis and to support the trustworthiness of your conclusions. In a proposal, your statement speaks to the strengths that you (and your team, if applicable) bring based on your expertise and background.

## References

- Easter, E. P. (2022). *Writing a Successful Proposal* [Presentation on writing successful proposals for the National Science Foundation]. Institute for Meta-Synthesis Online Workshop, TERC.
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8(45). 1–10.  
<https://doi.org/10.1186/1471-2288-8-45>
- Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education*, 8(1), 69–91.  
<https://doi.org/10.1080/1361332052000341006>



# Institute for Meta-Synthesis

## Sub-Module 8d: Writing the Back Matter of a Proposal (Part 1)

### Objectives

In this sub-module, you will learn:

- To describe your (or your team's) qualifications in terms of prior work related to the proposed project
- To write effectively about the expertise of yourself and senior partners on your project
- To differentiate between the roles of an evaluator and advisory board, and how to determine which is best for your project
- To effectively convey the capacity of your institution to support your meta-synthesis project

### Main Concepts

In this sub-module, we introduce some components of the “back matter” of the proposal, which includes: *prior work related to the proposed project*; *key personnel*; *external oversight*; and *institutional capacity*. (See «[Sub-Module 8e](#)» for discussion of other back matter elements.)

As we explained in «[Module 1](#)», a meta-synthesis project can be difficult to do alone. Our team recommends that you work with internal and/or external collaborators and potentially other experts. This sub-module will cover aspects of building the key personnel for a successful meta-synthesis project and how to write about the expertise of yourself, your team, and your evaluator and/or advisory board, which includes prior work related to the project. The last section briefly discusses how to write about the institutional capacity of your organization to support your proposed project.

#### *Prior Work Related to the Proposed Project*

The purpose of this section is to demonstrate to reviewers and funders that you have successfully led or co-led related grants, and that they should have confidence to fund you yet again. In this section, list only the project(s) in which you have participated that are related to your proposed meta-synthesis—the project may be related in terms of topic or research skills. For each project, describe:

- Its purpose
- Findings and contributions to the knowledge base
- Contributions to society
- Dates of the project

- Name(s) of the project leaders
- Funder and award number
- Grant amount
- Your specific role on the project and
- Relationship of past work to the proposed project

Below is an example (Figure 8d.1) from our team’s computing project that incorporates these elements into a brief paragraph.

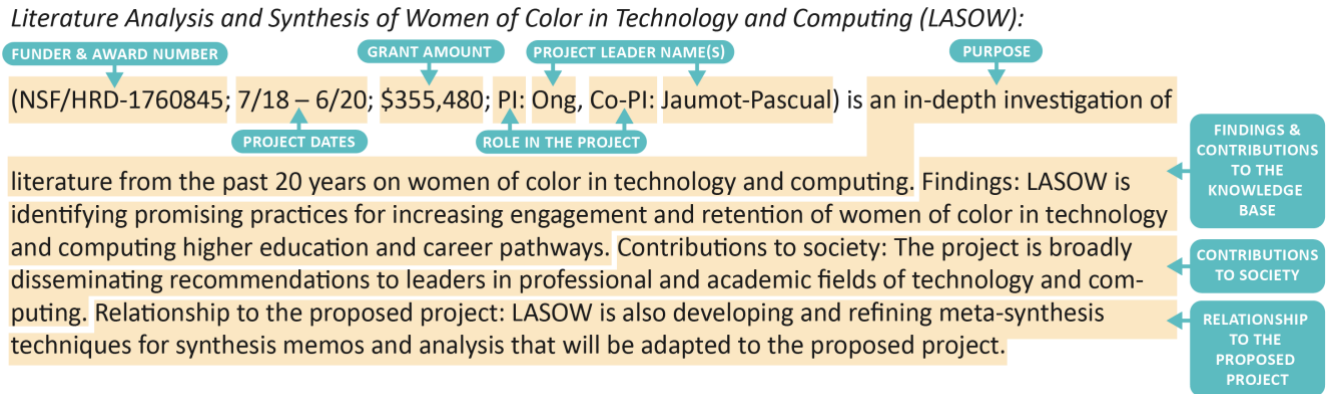


Figure 8d.1. Example of prior work related to the proposed project

You may also want to specifically name the relationship between past projects and your meta-synthesis proposal. Be sure to check whether your RFP requires any additional or alternative details for this section.

Regardless of the size of the project, it is important for you to mention any prior projects that are related to your proposal. Here is an example (Example 8d.1) from our team’s engineering proposal, which highlighted and described how a past interview project related to our proposed meta-synthesis:

### Example 8d.1. Prior Work Related to the Proposed Project

The earlier study, focused on individual experiences and on an examination of STEM organizations, was solely based on interviews. This process indicated patterns of persistence and success as they related to women’s participation in support programs and STEM inclusion conferences. The proposed meta-synthesis project is designed to *complement* this earlier study by examining these factors, among others, across empirically based works and by applying formal analysis to the past 10 years of research.

The main point of descriptions of prior work is to establish your familiarity with the topic and/or expertise in methods. If you do not have any past related projects, it is important to state this up front

so that reviewers will not think you have omitted a section. You can make a short statement, such as “[Name] has no relevant funding to report,” and/or “The proposed project, if funded, will be [Name’s] first grant.”

### Activity 8d.1.

Take 30–45 minutes to draft the “Prior Work Closely Related to the Proposed Project” section of a proposal.

### Key Personnel

The grant proposal should also include a section for “Key Personnel” (or “Senior Project Management” or “Expertise and Project Management Plan”). The purpose of this section is to further establish the qualifications of yourself and other members as researchers to do a meta-synthesis. This section should contain brief paragraphs of each senior person involved in your project and what expertise or skills they contribute. If team members have previously been involved in related projects but they were not part of the leadership, this is a good place to highlight that involvement. Be sure that the project responsibilities you list are complementary to the ones you list for yourself. For example, consider including team members with areas of expertise such as library science, the content area of your proposal, or expertise in methods. This section should include descriptions of:

- **Youself (Principal Investigator, PI):** Person responsible for overseeing and managing the entire synthesis project.
- **Co-Principal Investigators (Co-PIs) and Partners** (internal or external): Other people who assist with overseeing and managing the synthesis project.
- **Senior Personnel:** Other researchers or personnel on the project who do not have responsibility for leading the project but are contributing to the project through their expertise and accomplishing specific tasks.
- **Consultants:** Experts who play a small, specialized role in your project (such as evaluators, advisors).

In a brief paragraph for each person, provide the following details:

- Name
- Title
- Role and current organization
- Intended role on the proposed project (e.g., Principal Investigator, Advisor)
- Areas of expertise
- Related publications, presentations, or awards, if any
- Related past or current related work or volunteer activities, if any
- Responsibilities on the proposed project

### Activity 8d.2.

Take 10–20 minutes to create an ideal list of personnel for your meta synthesis project, including yourself, your project team members, partners, evaluators, and advisory board members. Next to their names, list their areas of expertise and skill sets related to your meta-synthesis project.

Note that you may also be required to supply separate resumes or biographical sketches as supplemental documents for many, or all, persons listed above. However, reviewers do not always read the supplemental documents carefully; so, this section is your chance to impress them with how you and your team are uniquely qualified to carry out your proposed meta-synthesis.

Here, in Example 8d.2, are two sample, fictionalized key personnel descriptions. The first one demonstrates a senior person with more research experience and more project responsibility, and the second one demonstrates a more junior person with less research experience and with a smaller project role.

#### Example 8d.2. Personnel descriptions

**Della Moon, Ph.D.**, Senior Research Scientist at NonProfit Research, Inc., will serve on the project as PI. For over 30 years, Dr. Moon has conducted research focused on intersections of gender and race in STEM higher education, including four NSF-sponsored projects, two of which have included syntheses. Dr. Moon's work has appeared in numerous journals such as *American Educational Research Journal* and *Journal of Diversity in Higher Education*. She has been an invited speaker at numerous international and national STEM education meetings, including those hosted at NSF and the National Academies. She has been a member of several national advisory boards, including the Task Force on STEM Inclusive Excellence (2004–2010). Responsibility on this project: Dr. Moon will oversee the research team, participate in data collection, communicate regularly with the Advisory Board, and lead dissemination of findings.

**Carelis Balaguer, M.A.**, Senior Research Associate at NonProfit Research, Inc., will participate in the project as Co-PI. For 10 years, Ms. Balaguer has engaged in research and evaluation related to STEM education with a special focus on marginalized populations. She is part of a research team that explores barriers and success to the participation of people of color in STEM education. Additionally, she has 10 years of experience as an education practitioner. Her writing has been published in trade publications and peer-reviewed journals. Ms. Balaguer is currently a doctoral candidate in STEM Education at the University of the Southeast and a member of NonProfit Research's IRB committee. Responsibility on this project: Ms. Balaguer will lead the data collection and analysis and participate in dissemination tasks.

### Activity 8d.3.

Take 30–40 minutes to draft your bio that would be part of the “Key Personnel” section in your proposal.

### *External Oversight*

Our team recommends that you consult with your program officer or the funding provider to determine whether you need an **external evaluator**, an **advisory board**, or both. An external evaluator's primary goal is to ensure that your activities are consistently aligned with your project goals and objectives. They assist you in making mid-course changes in your project and help you assess to what extent you are meeting project milestones and meeting your goals and objectives by the end of the project. Funding agencies often require external evaluators to be external to your institution (i.e., not in another department on your campus). If you choose to work with an evaluator, a full and detailed evaluation plan should be included in the proposal.

An advisory board has a more expansive role. Members of the advisory board (AB) can fill in knowledge or methodological gaps in your team, and they may help your team carry out different tasks throughout the project. For example, they can support the team's search and selection process by identifying search engines, suggesting search terms, and providing literature. In terms of analysis, they can give feedback on early coding, early thematic analysis, and early drafts of manuscripts. The advisory board may also have an evaluative capacity, such as conducting process evaluation (in other words, making sure your project activities are on track). Because an advisory board may have a dual role of evaluation and providing content or methodological expertise, if your budget is limited, we recommend it over an evaluator. (See “Additional Resources” to identify potential evaluators.) Advisors are usually senior in their field or have expertise on an emergent and/or highly specialized topic and can be internal or external to your institution. You should invite onto your advisory board people who have complementary skills to those of your team, such as content knowledge, library science expertise, and synthesis methods skills. In your proposal, you should describe your external evaluator and/or advisory board members using similar details to what is listed above under “Key Personnel” (e.g., title, role and current organization, area of expertise).

There may or may not be a cost difference between an external evaluator and an advisory board. Factors include your project needs, the daily rates of these external consultants, and how many people you are working with. Evaluators and advisory board members are accustomed to negotiating rates and tasks. Given that guidelines around external oversight vary from funder to funder, we recommend you check the call for proposals you are applying to or check with your program officer before submitting a proposal.

Here is an abbreviated example of descriptions and complementarity in expertise of advisors from our computing proposal (pseudonyms and anonymized locations are used):



### Example 8d.3. Advisor descriptions

**Emily Martin, Ph.D.**, is Director of Equity and Inclusion and Professor of Sociology at the Commonwealth University. Dr. Martin’s expertise includes gender, race, racism, inequality, intersectionality of gender and race, work, and diversity in STEM. Dr. Martin will bring to the project theoretical insights about intersectionality and STEM from a sociological standpoint, as well as advice for dissemination and real-world implementation of solutions.

**Mirabella Madrigal, Ph.D.**, is Assistant Professor of Information at the University of Encanto. Dr. Madrigal studies how the use of culturally responsive computing practices can increase Black and Brown women’s participation in STEM activities. Drawing on her background as an information specialist in the field of equity and inclusion in STEM, Dr. Madrigal will serve as the project’s methodology advisor.

**Bruno Robles, Ph.D.**, is Director of STEM Education Research at the Computing Research Association. For six years, he was an Assistant Professor in the Computer Science Department at Middletown University, where he taught and conducted research in Human Computer Interaction (HCI). Dr. Robles will provide experiential knowledge about technology and computing environments as a Black man in computing, and he will advise about recommendations and actions regarding policy.

*A Letter of Collaboration from each Advisory Board member is provided.*

If you choose to have an external evaluator and an advisory board, you will need to have clear, non-overlapping roles for each. The evaluator would oversee formative, process, and/or summative evaluation, while the advisors would complement the team’s skills and networks. Some examples of the types of tasks that they could fulfill include providing access to literature that the team did not find through the meta-synthesis process, providing feedback to manuscript drafts, and supporting project dissemination activities.

### Activity 8d.4.

Take 10–20 minutes to create an ideal list of evaluators and/or advisory board members. Next to their names, list their areas of expertise and skill sets related to your meta-synthesis project.

### *Institutional Capacity*

Finally, be sure to include a few sentences about the capacity of your institution to support your proposed meta-synthesis. You want to be able to demonstrate that you can practically carry out the project within the given time period of the grant. This institutional information can be obtained by speaking to administrative staff, such as grant coordinators or other researchers with experience with

grants in your institution who may be more knowledgeable or can direct you to staff who can assist you. Some elements of institutional capacity relevant to a meta-synthesis project might include:

- Relevant technology support:
  - Secure digital (local and cloud) and physical storage for project materials
  - Personalized conference bridge lines (such as Zoom) for webinars or online meetings
  - Data management databases such as FileMaker or Covidence
  - Bibliographical management tools such as EndNote or Zotero
  - Data analysis tools such as NVivo or Atlas.ti
- University library access that includes extensive physical collection and access to a vast digital network
- An institutional review board to provide ethical overview of the project

Most of the elements in the list above will likely be part of the proposal. Your RFP may require you to submit separate documents that speak to your institution's capacity to support your project. For example, NSF proposals must include two documents—one called "Facilities, Equipment, and Other Resources" and the other called "Data Management Plan"—where the relevant elements in the list above are included.

## Additional Resources

These resources will help individuals with identifying an external evaluator:

- American Evaluation Association: <https://my.eval.org/find-an-evaluator?reload=timezone>
- Greater Boston Evaluators' Network (GBEN): <https://greaterbostoneval.org>
- Evaluation Association of St. Louis (EASL): <https://easl.wildapricot.org/>
- Strengthening Capacity for Equity in New England Evaluation (SCENE) collaboration: <https://www.bc.edu/bc-web/academics/sites/ila/events/SCENE.html>

These resources will help individuals understand the steps to formalize their partnerships within their meta-synthesis project proposal as they build their project team and expertise.

- Geraghty, L., & Feeney, L. (2021, March). *Formalize research partnership and establish roles and expectations*. The Abdul Latif Jameel Poverty Action Lab (JPAL). <https://www.povertyactionlab.org/resource/formalize-research-partnership-and-establish-roles-and-expectations>
- Keesler, V. A. (2015). Building productive research partnerships. In B. Gross, & A. Jochim (Eds.), *Building agency capacity for evidence-based policymaking* (pp. 40-52). San Antonio, TX: Building State Capacity and Productivity (BSCP) Center. <https://files.eric.ed.gov/fulltext/ED562509.pdf>

These resources will help individuals with drafting their biographical sketches (a.k.a. biosketches) for their meta-synthesis project proposal to NIH and NSF. Note that for researchers applying for NIH and NSF grants, biosketches must be created using the researcher profile system, SciENCv (Science Experts Network Curriculum Vitae). You can navigate to the SciENCv site through either link below.

- National Institutes of Health. (n.d.). Biographical Sketch format pages, instructions, and samples: <https://grants.nih.gov/grants/forms/biosketch.htm>
- National Science Foundation. (n.d.). Biographical Sketch formats and guidelines: <https://www.nsf.gov/bfa/dias/policy/biosketch.jsp>

This resource will help individuals with organizing their proposal submission timeline up to 25 days before the submission deadline.

- San Jose State University (SJSU) Research Foundation. (2021, September 7). Proposal submission timeline. <https://www.sjsu.edu/researchfoundation/principal-investigators/submitting-proposals/proposal-submission-timeline/index.php>



## Sub-Module 8e: Writing the Back Matter of a Proposal (Part 2)

### Objectives

In this sub-module you will learn:

- To convey a strong dissemination and communication plan and why it is important
- To communicate a project timeline in two different ways
- To consider and develop other proposal elements for a strong proposal

### Main Concepts

In this sub-module, you will be introduced to additional elements of the “back matter” of a grant proposal, which is comprised of two main sections that often appear towards the end of the proposal: (1) the dissemination and communication plan, and (2) the timeline. Both are described in depth below. The sub-module ends with some reflections on the time and effort it takes to get a proposal for a meta-synthesis funded.

#### *Dissemination and Communication Plan*

Your proposal should have a strong **dissemination and communication plan**. This plan provides a detailed blueprint of how you will share the actions and outcomes of your project, and it reveals to reviewers the breadth and depth of your planned reach. It should include a list of the types of dissemination you plan, with specific examples for each (i.e., names of journals, podcasts, blogs where you plan to feature project findings). Increasingly, funders want to see a mix of traditional and non-traditional dissemination. Traditional dissemination includes outlets in your academic field(s), such as:

- Academic conferences
- Publications in peer-reviewed, academic journals
- Academic books and book chapters

Non-traditional dissemination includes outlets where your findings might “move the needle” in terms of practices, policies, or public understanding. Such venues include:

- Policy briefs
- Community sharing venues
- Practitioner reports or publications

- Blog posts and other social media
- Communication via national organization websites
- Joint presentations and collaborations with community partners

### Activity 8e.1.

Take 10–20 minutes to research and select 1-2 specific possibilities for **traditional** dissemination (e.g., name of a journal or conference) and 1-2 possibilities for **non-traditional** dissemination for your meta-synthesis findings.

Additionally, if your organization has a communications department, consider meeting with the director to ask what resources they have—such as in-house publications with a wide audience base or regularly maintained social media channels—that can feature your project once you begin to have results. These should be described in your proposal.

Below is an example of a request for information for the proposal about available dissemination and communication resources addressed to our organization’s communications department:

### Example 8e.1. Email request

*Hi Communications,*

*Would you be able to help us with our NSF proposal? We are missing some information for our Dissemination section. Can you please fill out the paragraph below (see **XXs**) about TERC's reach? Also, a brief description of all the ways TERC reaches people would be extremely helpful. Thanks so much!*

*“The recorded webinars will be available on TERC’s website. They will be featured in TERC’s quarterly publication *Hands On!*, which reaches **XX** people interested and active in STEM education throughout the U.S. They will also be featured in TERC’s social media (LinkedIn, Twitter/X, Facebook), which are followed by **XX** people, which will drive traffic to the recorded webinars.”*

Once you obtain the appropriate information from your organization’s communications department, the specific section of your proposal about dissemination may read similar to the following example:

### Example 8e.2. Dissemination section

“The recorded webinars will be available on TERC’s website. They will be featured in TERC’s quarterly publication *Hands On!*, which reaches **2,500 people through the post and 2,000 through email** who are interested and active in STEM education throughout the U.S. They will also be featured in TERC’s social media which are followed by a total of nearly **3,000 people (LinkedIn = 1,107; Twitter/X = 1,227; Facebook = 640)**, which will drive traffic to the recorded webinars. **TERC also hosts promotional booths each year at the NSTA National Conference, NCTM National Conference, Mass STEM Summit, and the STEM Expo and Forum where they advertise staff members’ work, such as recorded webinars.**”

### Activity 8e.2.

Take 15–30 minutes to check if your institution has a communications department. If it does, reach out to see if they have resources or social media channels that are potential avenues to share your meta-synthesis findings. Get specific data (e.g., number of Twitter/X followers, email listserv recipients) to report in your proposal.

### Timelines

Timelines are a succinct way of conveying your plan for getting the work done on schedule. The elements of a timeline include the activities and the timeframe for doing the work; they may also include the names or roles of people leading the activities. The timeline should be descriptive, listing detailed activities between the start of the project through to dissemination at the end. Finally, the activities listed in the timeline should align with your description in your methods section and dissemination and communication plan.

Our team has been successful with two types of timelines—Gantt charts and tables. Most proposals use **Gantt charts**, which illustrate a project schedule, the dependency relationships between activities, and the current schedule status. Some also include who is responsible for the work at each stage. These charts are easy for reviewers to follow because they show the overlapping, simultaneous progress of the different parts of the project and take up less valuable space in the proposal. Tables, however, may contain more details about the project work and, thus, may be harder to follow and take more valuable space. The timeline you select may depend on your proposal space limitations. Below, we include a modified example of each from our project on women of color in engineering education.

Here in Table 8e.1 is a Gantt chart of our activities for a two-year project. The first column shows a list of all the major activities that will take place during the project. The second column lists the sub-tasks/activities for each major activity. The following columns are related to the time period (by quarter) during which each of the major activities and sub-tasks will be completed.

Table 8e.1. Gantt chart example

ACTIVITIES		YEAR 1				YEAR 2			
		SPRING	SUMMER	FALL	WINTER	SPRING	SUMMER	FALL	WINTER
PRE-SEARCH AND START SET	CONDUCT PRE-SEARCH ACTIVITIES								
	ESTABLISH LITERATURE SET								
CONDUCTING LITERATURE SEARCHES	SEARCH AND FILTER LITERATURE								
HYBRID CODING AND ANALYSIS	ESTABLISH HYBRID CODEBOOK								
	WRITE, IMPLEMENT ANALYTIC INSTRUMENT								
WRITING	WRITE SYNTHESIS MANUSCRIPT								
	WRITE POLICY, COMMUNITY PIECES								
DISSEMINATION AND OTHER ACTIVITIES	PRESENT AT CONFERENCES								
	PUBLISH FINDINGS								
	SUBMIT REPORT TO FUNDER								
	CHECK-IN WITH ADVISORY BOARD								

In this second example (Table 8e.2), see how the table includes many more details compared to the Gantt chart.

Table 8e.2. Table example

Pre-Search & Start Set	Lead	Timeframe
<b>Conduct pre-search activities</b> Establish search & selection criteria Select search engines and search terms Solicit feedback from Advisory Board (AB), revise	PI	<b>2 mos.: April – May 2014</b> April 2014 April – May 2014 May 2014
<b>Establish the start set</b> Conduct literature searches Sift through literature: Apply Filters 1 & 2 Track & catalogue literature & filtering decisions	Team	<b>3 mos.: June – August 2014</b> June 2014 July – August 2014 June – August 2014

Conducting Literature Searches	Lead	Timeframe
<b>Search and filter literature</b> Conduct full data collection & filtering Track & catalogue literature & filtering decisions Share methods, solicit feedback from AB Make corrections, changes per AB feedback	Co-PI	<b>5 mos.: Sept 2014 – Jan 2015</b> Sept – Dec 2014 Sept – Dec 2014 Dec 2014 Dec 2014 – Jan 2015
Hybrid Coding & Analysis	Lead	Timeframe
<b>Establish hybrid codebook</b> <b>Write, implement analytic instrument</b> Establish template for analytic instrument Share codes, instrument drafts with AB Refine codes, instrument per AB feedback Write analysis for each lit. piece Enter codes and analyses into NVivo	Co-PI Co-PI	<b>1 mos.: Jan 2015</b> <b>3 mos.: Jan – Mar 2015</b> Jan 2015 Jan 2015 Jan 2015 Jan – Mar 2015 Mar 2015
Writing	Lead	Timeframe
<b>Write meta-synthesis methods manuscript</b> <b>Write blog entries re: early, ongoing findings</b> <b>Write policy briefs, community pieces re: findings</b> Get AB feedback, make revisions <b>Draft full meta-synthesis manuscript</b> Draft sections by themes arising from analysis; revise <b>Re-write, edit full manuscript</b> Share revised draft with AB Advisory Board meeting, get manuscript feedback Revisions based on AB feedback Edit, finalize synthesis	Co-PI RA PI, Team  AB, Team  PI, Team	<b>4 mos.: Jan – April 2015</b> <b>12 mos.: April 2015 – Mar 2016</b> <b>12 mos.: April 2015 – Mar 2016</b> April 2015 – Mar 2016 <b>5 mos.: May – Sept 2015</b> May – Sept 2015 <b>6 mos.: Oct 2015 – Mar 2016</b> Oct 2015 Nov 2015 Nov 2015 – Jan 2016 Feb – Mar 2016
Other Activities, Dissemination	Lead	Timeframe
<b>Other Activities</b> Build and oversee Team, IRB requirements Write and submit NSF annual, final reports <b>Disseminate project findings</b> Post findings on blog, virtual outlets Share briefs w/STEM leaders, policy orgs, industry, HR orgs Present at conferences Submit synthesis manuscript to peer-reviewed journal	PI  Team	<b>24 mos.: Apr 2014 – Mar 2016</b> April 2014 – Mar 2016 Feb 2015, Mar 2016 <b>12 mos.: Apr 2015 – Mar 2016</b> April 2015 – Mar 2016 April 2015 – Mar 2016 April 2015 – Mar 2016 Mar 2016



See the section on “Additional Resources” in this sub-module for websites where you can find free templates and other information to help you create Gantt charts or use other project management tools.

### Activity 8e.3.

Take about an hour to develop a Gantt chart or table timeline for the completion of your meta-synthesis project.

### *Other Elements for the Proposal*

Depending on the funder you are writing your proposal for, you may need to include additional elements in your submission. These elements may include:

- Budget and budget justification
  - Your proposal budget outlines how much money you are requesting for your proposed project. It is typically broken down by category (i.e., direct, indirect) and by year of support requested.
  - Determine your direct costs, including: labor of team members (salaries, wages & fringe), computer services (IT support), travel (conferences, travel for expert consultants), supplies (software, books and articles, office supplies), consultants (evaluators, partner consultants, advisors), telephone and postage, photocopying, and other such as in-person team meetings and publication fees.
  - You will also need to work with your organization’s finance director determine your indirect costs: facilities and equipment, group overhead, general and administrative expenses, etc.
  - Your budget and budget justification should be compliant with the policy manual instructions or agency instructions.
  - Your budget and budget justification should be coherent with your project description; in other words, the costs should make sense and align well with the project activities.
  - A budget justification will explain how the funds requested in the budget will be spent. Most funders, including the National Science Foundation, have a template for budget justifications and you should follow the instructions provided by your funder.
  - You should have early and frequent communication with your organization’s finance director and/or sponsored projects office (SPO) about the budget and budget justification.
- Letters of support/collaboration from partners, consultants, evaluators, or advisors. Keep in mind that funders may have a template that you may need to adhere to.
- Other documents required by the funder, such as:
  - **Resume or biographical sketch**  
This document outlines your qualifications to successfully conduct the proposed project. Funders may have page limits, specific information they require, or templates for you to follow.

- **Current and pending funding**  
This document declares current projects you have that are currently funded and/or other proposals you have submitted and are awaiting funding decisions. This document helps funders determine whether you have time to successfully conduct your proposed project.
- **A list of current and previous collaborators**  
This list—typically of your advisors, co-authors, fellow researchers, and editors—helps program officers avoid conflicts of interest when selecting reviewers.
- **A data management plan for storing and sharing project data**  
This plan shows how you will ensure that sensitive physical and digital data you collect will be kept safely. Synthesis projects typically use published data, which are not confidential based on the criteria for ethical research practices overseen by institutional review boards. This differs from the ethical research practices related to interview or survey data, which need to be protected and kept confidential given their connection and impact on individuals. However, some funders nonetheless require a statement of data management.
- **A facilities and resources statement confirming the capacity of your institution to support the project**  
This document declares the spaces and resources provided by your institution to support the success of your proposed project. For example, as explained in «**Sub-Module 8d**», you want to describe how your institution has access to online libraries or other resources, which will support your meta-synthesis searches.
- **A mentoring plan for graduate students or postdoctoral fellows**  
This plan is a description of the mentoring activities that will be provided for individuals on your team who are hired and designated as postdoctoral researchers.

### *Final Thoughts on Proposal Development*

As you may have gleaned from reading the full proposal module («**Module 8**») and doing the activities, preparing a strong proposal takes a great deal of time. Our team often spends eight to ten weeks (working 10–20 hours per week) to develop a winning proposal from start to finish. (For an alternative proposal timeline of 25 days, see the link to the San José State University [SJSU] Resource Foundation’s guide below.) Be sure to build in time for colleagues to give feedback on a draft of your narrative and for your finance director to review and approve your budget documents.

Even when team members are not actively writing a proposal, members of our team are always developing our professional networks—with the roles of future advisors, consultants, and partners in mind—or reading theory to support future frameworks for our proposed studies.

Finally, if you are entering your proposal to a competitive program, expect to submit more than once. Rejection and disappointment are routine parts of being a proposal writer; so, try to view rejections as opportunities to learn and improve on your previous proposals. In «**Sub-module 7d**», we shared some

strategies to respond to feedback on your manuscript. Similar strategies apply to proposal development:

- Practice kindness to yourself. Give yourself permission to take a long break (several days) after receiving a rejection before you read reviews and start the process again.
- Read the feedback critically without taking it personally, trying to find the useful nuggets of information that you can use for the improvement of your proposal. You may even want to create a table to track what should be revised (and later, how you addressed it in your new proposal).
- Share your reviews with a peer or mentor to try to get some perspective on what was written.
- Re-write the negative feedback in your own words in a way that keeps the useful information but softens the critique.
- Build and learn from rejected proposals. Don't take feedback personally and be willing to learn from your program officer's and reviewers' comments to improve your proposal for the next time.
- Do not be discouraged and submit again! You are not starting from zero since you have a significant amount of the work already done and useful feedback to make improvements. Good luck.

## Additional Resources

### *Project Management & Gantt Chart Resources*

These resources will help individuals with organizing their timelines and managing their projects as they work on their meta-synthesis project proposal.

- Free project management templates: <https://www.projectmanager.com/pm-templates>
- Gantt chart templates: <http://teamgantt.com>
- Projectmanagement.com YouTube channel: [https://www.youtube.com/watch?v=d8\\_gaRlrrUw&list=PLF1064CD7B0A98261](https://www.youtube.com/watch?v=d8_gaRlrrUw&list=PLF1064CD7B0A98261)
- Mike Clayton project management YouTube channel: [https://www.youtube.com/watch?v=XT-wb6b64\\_E](https://www.youtube.com/watch?v=XT-wb6b64_E)
- San José State University (SJSU) Resource Foundation – Proposal Submission Timeline - <https://www.sjsu.edu/researchfoundation/principal-investigators/submitting-proposals/proposal-submission-timeline/index.php>

This resource will help individuals with creating their project's budget and budget justification as they work on their meta-synthesis project proposal.

- U.S. National Science Foundation – Preparing Your Proposal Budget - <https://new.nsf.gov/funding/proposal-budget>



## Glossary Terms

### Advisory board

*Sub-Module 8d*

An advisory board is a group of subject matter and/or methodological experts who have been selected to support a project team because their areas of expertise complement those of the team. They typically provide feedback on the team's work and can help carry out different tasks throughout a project that are pertinent to their areas of expertise. The advisory board may also have an evaluative capacity, such as conducting process evaluation. Advisors are typically senior in their field, but they do not need to be, particularly in emerging areas with limited available expertise. They can be internal or external to the project team's institution.

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### Analytical themes

*Sub-Module 6a*

Analytical themes are words or phrases that represent new interpretations of a literature data set, going beyond simply describing the primary studies to generating "new interpretive constructs" (Thomas & Harden, 2008, p. 1). Analytical themes can be more abstract than descriptive themes, but they ultimately need to be able to describe or explain all of your descriptive themes as well as address your synthesis question.

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### Author agreement

*Sub-Module 7d*

An author agreement is a legal agreement between the author(s) and publisher. It is a declaration, signed by the author(s), that the manuscript submitted is an original work that has not been published and is not currently being considered for publication elsewhere. Author agreements may also dictate the terms of ownership and copyright, distribution and reproduction rights, and licensing.

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### Audit trail

*Sub-Module 2b*

An audit trail enhances the credibility of your synthesis by keeping track of "the procedural and interpretive moves made during the course of your study" (Sandelowski & Barroso, 2007, p. 229).

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### Author guidelines

*Sub-Module 7d*

A journal's author guidelines provide key information to potential authors who want to publish a manuscript in that particular journal. They include the journal's citation style requirement, maximum length of a manuscript, what is included in the word count, formatting requirements, type of abstract, and whether to anonymize a manuscript.

**Backward snowballing**  
*Sub-Module 3d*

Backward snowballing is a sampling strategy for literature searches that complements forward snowballing. It is the process of using the reference list of each of your articles to identify new papers to include in your meta-synthesis.

---

**Boolean rules**  
*Sub-Module 2c and 2d*

Boolean rules are commands that determine the results that your search will generate based on “true” and “false” logic statements. The combination of keywords, operators (such as AND, OR, and NOT), parentheses, and quotation marks will assist you with narrowing or broadening your literature search.

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**Citational justice**  
*Sub-Module 2b and 8b*

Citational justice is the practice of referencing works by authors not traditionally represented in the academic canon because they are from non-dominant groups (e.g., women, people of color) with the purpose of uplifting their work and resist the systems imposed by white supremacy.

---

**Codebook**  
*Sub-Module 5a, 5b, 5c, 5d, and 5e*

A codebook is a record of the codes you use for coding your data that includes sections that help in understanding what each code means and how to implement it, such as a title for the code, a description, and examples.

---

**Codes**  
*Sub-Module 5a*

Codes are words or short phrases that you create based on the data or that you assign based on concepts from your selected theoretical framework. They summarize meanings that you then group together and use to explain your phenomenon of interest.

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**Coding**  
*Sub-Module 4a and 5a*

Coding is a process of examining the data that helps you to break it down into smaller pieces that have a core feature in common and can, thus, be grouped together.

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**Computer-assisted qualitative data analysis software (CAQDAS)**  
*Sub-Module 5f*

CAQDAS (pronounced “kack-duss”) are software packages that can be used to store, organize, and manage data, in addition to coding and analyzing them. They support your meta-synthesis by assisting with organizing and working with your data, but they do not code or analyze the data for you.

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**Conference proceedings**  
*Sub-Module 2b*

Conference proceedings are the published record of a professional or academic meeting sponsored by a society or association. They usually include abstracts or reports of papers presented by the participants.

Co-PI or Co-Principal Investigator  
*Sub-Module 8d*

Co-PIs are individuals who assist the PI (Principal Investigator) with the conceptualization, oversight, and management of a research or synthesis project.

Critical appraisal  
*Sub-Module 3c*

Critical appraisal is the process of evaluating the rigor of a piece of literature to make decisions about its inclusion in the meta-synthesis. It typically includes the assessment of the elements of the research methodology, the ethical dimensions of a study, the use of sufficient evidence to support findings, and the existence of an audit trail.

Database  
*Sub-Module 2c*

A database compiles resources on a specific discipline that an individual or an organization has selected for their quality and relevance. They contain references for journal articles and typically offer the widest possible retrievals of peer-reviewed material. They may have full-text resources available for downloading.

Deductive coding  
*Sub-Module 5a, 5b, and 5c*

Deductive coding is a top-down method by which you use predetermined codes based on a particular theoretical framework, knowledge of the literature, or your synthesis question. You develop your deductive codebook before coding with an initial set of codes from the selected theory, and let the theory guide the data analysis.

Descriptive themes  
*Sub-Module 6a*

Descriptive themes are themes that closely represent what was found in the primary studies. This is where you group the data into batches of shared meaning. They are specific and closely tied to the data.

Desk rejection  
*Sub-Module 7d*

A desk rejection means that a manuscript has been rejected by a journal editor without being sent out for review. There are various reasons for desk rejection, the most common being improper fit for the journal, the manuscript not following the requirements of the journal (e.g., formatting), and poor writing quality.

Dissemination and communication plan  
*Sub-Module 8e*

A dissemination and communication plan is a strategy for widely communicating research or synthesis findings or products. A dissemination plan may describe the types of communication (e.g., publications in academic journals, conference presentations, blogs, social media) and audiences (e.g., researchers, practitioners, legislators, parents).

**Double-redacted review**

*Sub-Module 7d*

A double-redacted review during the manuscript reviewing process involves the reviewer and author being anonymized and not knowing each other's identity.

---

**Evidence**

*Sub-Module 4c and 6b*

In our meta-synthesis methods, evidence means examples and quotes from the data as well as explanations in the authors' words that support the main argument so that the reader can understand it.

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**External evaluator**

*Sub-Module 8d*

An external evaluator is a person outside your organization whose primary goal is to ensure that your activities are consistently aligned with your project goals and objectives.

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**External oversight**

*Sub-Module 8d*

External oversight is guidance and/or evaluation by an individual or group outside of the project team that holds project leaders accountable for actions, such as staying on schedule and on budget, reaching project milestones, and maintaining methodological rigor.

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**Forward snowballing**

*Sub-Module 3d*

Forward snowballing is a sampling strategy that is typically part of a systematic literature search. It helps in the identification of relevant studies by using the start set of literature to trace recent publications that cite literature in that set.

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**Free-text words**

*Sub-Module 2c and 2d*

Free-text words are terms located within the title of the article, the abstract, or the full text of the publication. These include keywords associated with the topic or synthesis question for your meta-synthesis project that you generate or identify in relevant articles.

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**Gantt chart**

*Sub-Module 8e*

A Gantt chart is a visual display, often a type of bar chart, that illustrates the project schedule, dependency relationships between activities, and the current schedule status. Some may also indicate who is responsible for the work at each stage. These charts are easy for reviewers to follow because they show the overlapping, simultaneous progress of the different parts of the project and take up minimal space in a grant proposal.

---

**Golden Quotes**

*Sub-Module 5b*

*Golden Quotes* is a term created and used by the authors of this user guide to refer to quotes that provide particularly insightful examples from the data.

**Gray literature**  
*Sub-Module 2b*

Gray literature is any literature that contains unpublished studies and/or manuscripts that have not been peer reviewed. These include book chapters, conference proceedings, dissertations, government reports, and white papers.

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**Hybrid coding**  
*Sub-Module 5a, 5b,  
and 5e*

Hybrid coding is a method that uses both inductive and deductive coding practices; it is a melding of inductive codes that are generated from the data with deductive, theory-driven codes.

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**Index terms**  
*Sub-Module 2c and 2d*

Index terms, also known as subject headings, are terms assigned to articles by authors and managers of bibliographic databases. These may be technical terms that are used in the specific area of your meta-synthesis that are not commonly used otherwise. Index terms may also be specific to a particular database.

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**Impact factor**  
*Sub-Module 7b*

The impact factor of a journal is a metric used to evaluate the journal's relative importance within its field. The impact factor is determined by measuring the frequency with which the "average article" in a given journal has been cited within a particular time period. It is commonly perceived that the higher the impact factor, the higher the quality of the journal due to the demand of its articles by readers in the field.

---

**Inductive coding**  
*Sub-Module 5a, 5b,  
and 5d*

Inductive coding, or open coding, is a method of developing your codes as they appear in your textual data. You move from specific observations drawn from the data and generate your own codes, rather than starting with a preset list of codes. It is a bottom-up approach, as you are creating codes that are rooted in the data and looking at patterns with the aim of developing theory.

---

**Interpretation/  
interpreting**  
*Sub-Module 6b*

Interpretation (or the verb "interpreting") involves the understanding of the larger context and social significance of the findings described beyond a specific meta-synthesis project, such as understanding the relationships that exist among different elements of the findings. It involves making inferences of how and why those findings occurred based on the description provided.



**Literature review**  
*Sub-Module 1c and 8b*

The literature review is a distillation, organization, and description of concepts within the literature of a particular field. The purpose of a literature review is to summarize where the field is currently with the goal of identifying gaps in the literature where new research questions can be asked and pursued. It is not systematic, meaning that it does not try to include all the existing literature on the topic of interest or to use methods that are replicable by others. It also does not use analysis methods (e.g., narrative analysis, thematic analysis) to arrive at its conclusions.

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**Mentor text**  
*Sub-Module 7c*

A mentor text is typically an article or piece of work that can serve as a model for your own writing.

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**Meta-analysis**  
*Sub-Module 1c*

A meta-analysis is the statistical combination of results from multiple studies in order to yield results that may be generalizable for a particular phenomenon.

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**Meta-engine**  
*Sub-Module 2c*

A meta-engine is a search engine tool that has the capacity to conduct searches in several search engines at the same time. It allows you to search multiple databases at once.

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**Meta-findings**  
*Sub-Module 3c and 6b*

Meta-findings are developed from analyzing the findings of other studies. They are the outcomes of a meta-synthesis process that links common findings across studies and the answers to your synthesis question.

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**Open peer review**  
*Sub-Module 7d*

Open peer review is a manuscript review process in which all involved parties—publisher, editor, and author(s)—know the identities of one another.

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**ORCID number**  
*Sub-Module 7d*

ORCID stands for “Open Research and Contributor ID”; an ORCID number is a unique, persistent identifier that allows a researcher to be connected to their contributions. You may register for your ORCID number at [orcid.org](https://orcid.org).

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**Parking Lot**  
*Sub-Module 5b*

The *Parking Lot* is a temporary code category within a codebook that the authors of this user guide use to place codes that seem relevant to a meta-synthesis project that require further development and evidence.

**Peer review**  
*Sub-Module 7b and 7d*

In the peer review process, reviewers who have experience in research and publishing similar work are asked to evaluate manuscripts to support editors' decision-making about the publication of manuscripts. Reviewers typically suggest revisions and make recommendations about manuscripts' publication.

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**Peer-reviewed journals**  
*Sub-Module 2b and 7b*

Peer-reviewed journals are publications that publish articles that have gone through a process called peer review. In this process, colleagues with experience in research and publishing similar work review a manuscript, suggest revisions, and generally help editors make decisions about the publication of manuscripts.

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**PI (or Principal Investigator)**  
*Sub-Module 8d*

PI stands for Principal Investigator, who is the person responsible for overseeing and managing a research or synthesis project.

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**Positionality statement**  
*Sub-Module 7c & 8c*

A positionality statement is a brief statement of your background and identities—for example, gender, race/ethnicity, disability status, class, profession, or discipline—that might influence or bias your interpretations of the data.

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**Pre-submission inquiry**  
*Sub-Module 7b*

A pre-submission inquiry is a brief, informal query, usually conducted via email, from a potential author to an editor seeking advice about whether a particular topic or methodological approach would be a good fit for the editor's journal.

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**Pre-writing phase**  
*Sub-Module 7a*

The pre-writing phase is the first phase of the writing process that involves preparation work prior to actual writing. Preparatory activities for a meta-synthesis manuscript may include gathering evidence and observations; deciding the intended audience, manuscript purpose and context; refining the synthesis question; brainstorming; and concept mapping.

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**Primary code**  
*Sub-Module 5b*

A primary code is an umbrella term or phrase that summarizes more specific terms, otherwise called secondary codes. For example, a primary code might be "experiences of discrimination," which would encompass different forms of discrimination. "Being harassed" or "being excluded" would be secondary codes.

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**PRISMA diagrams**  
*Sub-Module 7c*

PRISMA stands for *Preferred Reporting Items for Systematic Reviews and Meta-Analyses*. They are flow diagrams that visually demonstrate and describe your methodological process in a meta-synthesis manuscript.

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**Program officer**  
*Sub-Module 8a*

A program officer is a professional who works for a funding agency, such as the National Science Foundation, to coordinate funding around a specific topic or area. Part of the program officer’s job is to guide interested applicants.

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**Proofs**  
*Sub-Module 7d*

Proofs are typeset, penultimate versions of the manuscript that are sent to the author for review. Proofs are the final opportunity prior to publication to make small, last-minute edits.

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**Qualitative meta-synthesis (or meta-synthesis)**  
*Sub-Module 1a and 1c*

A qualitative meta-synthesis is an umbrella term for different study designs that synthesize qualitative primary studies. It synthesizes individual or primary works belonging to a specific topic “in order to arrive at new or enhanced understanding about the phenomenon under study. It entails an interpretive process” (Hannes & Lockwood, 2012, p. 1).

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**Quartile**  
*Sub-Module 7b*

In statistics, a quartile is a data set that is divided into four parts. In academic publishing, a quartile refers to a position (first, second, third, or fourth) in which a group of journals is ranked relative to its peer journals, with first quartile typically indicating the highest frequency of citations.

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**Redacted submission**  
*Sub-Module 7d*

A redacted submission is a manuscript that has been stripped of all indicators of an author’s identity, including name, affiliated organizations, and projects, before it is reviewed by an editor. We prefer to use this term over “blinded submission” to avoid ableist language.

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**Re-writing (or Revision phase)**  
*Sub-Module 7a*

The re-writing/revision phase is the third phase of the writing process that involves reviewing and evaluating your draft while considering the clarity, logic, and robustness of your argument or evidence, then making improvements where needed.

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**RFP (or Request for proposals)**  
*Sub-Module 8a*

This acronym stands for “request for proposals.” The RFP is a call or solicitation for proposals, and it usually includes a list of performance expectations that you must meet when asking for funding. The RFP often reflects the funding agency’s goals, objectives, and investment priorities that you and/or your team must meet to be funded.

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**Search directory**  
*Sub-Module 2c*

A search directory (or web directory) is a catalog of websites or other resources organized by category by an individual or organization to make it easier for people to find information. College libraries often have directories, where they compile resources according to the needs that they have identified among their target population.

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**Search engine**  
*Sub-Module 2c*

Search engines, such as Google Scholar, use computer algorithms to search the Internet and identify items that match the words you enter. The information is compiled by artificial intelligence technology.

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**Search string**  
*Sub-Module 2d*

A search string is a combination of search terms and Boolean operators that you insert in a search engine's search bar to conduct a literature search.

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**Secondary code**  
*Sub-Module 5b*

A secondary code is a narrow code that might be encompassed by an umbrella term, or primary code. For example, a secondary code would be a specific form of discrimination, such as "being harassed" or "being excluded." These secondary codes would be part of the larger primary code "experiences of discrimination."

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**Single-redacted review**  
*Sub-Module 7d*

A single-redacted review process is a traditional manuscript review process in academia, in which reviewers know the identity of the manuscript author, but the author is prevented from knowing the identities of the reviewers.

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**Snowballing**  
*Sub-Module 3d*

Snowballing is a systematic sampling strategy for literature searches to identify relevant studies by using a start set of literature. It includes backward and forward snowballing.

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**Solicitation**  
*Sub-Module 8a*

Solicitation is an informal term for an RFP or "request for proposals." See Glossary term "RFP."

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**Start set**  
*Sub-Module 3a*

The start set is the initial set of literature found through inputting search strings into selected search engines. This is the initial group of literature that you then use to generate more literature via forward and backward snowballing.

**Sufficient description**  
*Sub-Module 6b*

Sufficient description refers to the need to provide information that allows the reader to understand the situation, thoughts, and environment of the people represented in the manuscript or report. Authors should use evidence, such as examples and quotes from the data, and explanations in the authors' words that support the main argument.

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**Synthesis question**  
*Sub-Module 2a*

The synthesis question is the question that you want to answer with your meta-synthesis project. It delimits the scope and guides the decisions you will need to make throughout the project.

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**Systematic review of the literature (or systematic review)**  
*Sub-Module 1c*

A systematic review of the literature is a stand-alone manuscript that uses systematic methods to identify a comprehensive set of literature on a topic. Given its systematic nature, it provides a comprehensive overview of the literature in a specific area to identify topics that need further research. It typically does not use formal analysis methods to develop findings.

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**Systematic thematic synthesis**  
*Sub-Module 1a and 1c*

A systematic thematic synthesis is a specific design to conduct a qualitative meta-synthesis. This type of synthesis is systematic because it uses methods that are transparent and replicable by others and that cast a broad net to identify a comprehensive set of literature on the phenomenon. They also use thematic methods of analysis to identify key themes across the literature. This allows for the potential integration of qualitative, quantitative, and mixed methods while they retain contextual information necessary for interpretation. This type of synthesis can lead to an expanded theoretical understanding of the phenomenon as a whole.

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**Themes**  
*Sub-Module 4a, 4c, 5a, and 6a*

Themes are groupings of similar codes or underlying ideas across codes. The authors of this user guide develop descriptive and analytical themes. See descriptions for these two types of themes in the glossary.

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**Theoretical framework**  
*Sub-Module 2a*

A theoretical framework helps to guide and direct the synthesis process; it is a particular perspective, or lens, through which to examine a topic.

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**Triple-redacted review**  
*Sub-Module 7d*

A triple-redacted review is a manuscript review process in which the editor and reviewers do not know the identity of the author, and the author does not know the identities of the editor or reviewers.

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### Truncation

*Sub-Module 2c and 2d*

Truncation is a function used in the Boolean rules of search engines in which you replace the letters within keywords with symbols as wildcards. For example, if a search engine allows you to use \* as a truncation sign, then we can do a search for “biolo\*” that would refer to all the words that start with “biolo,” such as “biology” and “biological.”

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### Unredacted submission

*Sub-Module 7d*

An unredacted submission is a manuscript whose author’s identity is known by the editor and the reviewers.

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### White paper

*Sub-Module 2a*

A white paper is an informational document (e.g., report, guide) usually issued by a company or non-profit organization to concisely inform readers about a complex issue and to present their perspective on the matter. It is meant to help readers understand an issue, solve a problem, or make a decision. It also helps to promote or highlight the features of a solution, product, or service that the organization offers or plans to offer. White papers are also used as a method of presenting government policies and legislation and gauging public reaction.

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### Writing phase

*Sub-Module 7a*

The writing phase is considered the “middle” phase of the writing process that involves the actual writing of your manuscript. Writing activities may include organizing ideas; making an argument; showing evidence to support your claims; and presenting themes.