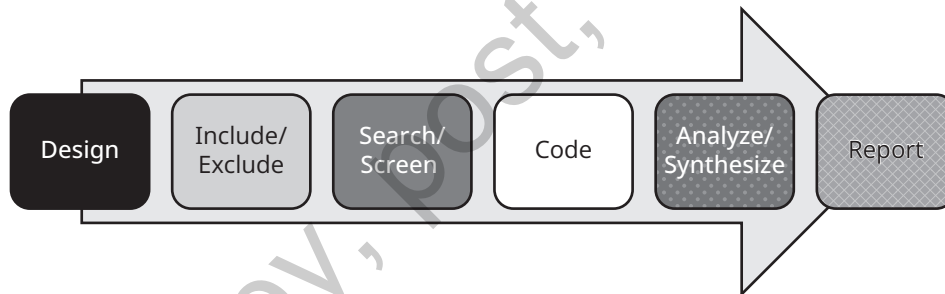


PREFACE

PURPOSE OF THE BOOK

Systematic reviews aim to retrieve and synthesize existing research. There are a few books specifically on systematic reviews; however, most of them are in the health disciplines. This book describes the process of conducting systematic reviews in educational research and can be used by any social or behavioral scientist who is interested in research synthesis through systematic reviews. The readers are guided through the DISCAR Process (designing, including/excluding, searching/screening, coding, analyzing/synthesizing, and reporting). In addition, the book also describes technologies used, ethical considerations, guidelines, and future outlook for systematic reviews of research.

Introduction: Discar Process for Systematic Reviews



FOCUS OF THE BOOK

The first two chapters introduce systematic reviews of research and various secondary research methodologies. Chapters 3 to 8 of the book focus on the DISCAR process, and chapters 9 and 10 focus on technologies, ethical considerations, guidelines, and future outlook for systematic reviews.

1. Introduction to Systematic Reviews of Research
2. Methodologies to Advance Secondary Research
3. Designing Systematic Reviews of Research
4. Including and Excluding Studies in Systematic Reviews of Research
5. Searching and Screening during Systematic Reviews of Research

6. Coding Studies during Systematic Reviews of Research
7. Analyzing and Synthesizing Studies in Systematic Reviews of Research
8. Reporting Findings in Systematic Reviews of Research
9. Technologies for Systematic Reviews of Research
10. Ethical Considerations, Guidelines, and Future Outlook for Systematic Reviews of Research

SIGNIFICANCE OF THE BOOK

Though it is common to conduct literature reviews in educational research, these are considered highly biased. Systematic reviews assist researchers in conducting less biased, highly transparent reviews in a systematic manner. With the increase in educational research during the past decade, systematic reviews provide a highly effective and efficient way to synthesize research. Systematic reviews assist in answering critical questions by analyzing and synthesizing findings. This book is tailored to educational contexts and addresses methodologies and stakeholder considerations relevant to educational research. Systematic reviews in education are beneficial for a wide audience including educators, administrators, government agency officials, policy makers, administrators, students, researchers, parents, etc., who all want quick and thoughtful views on what the research says. This book guides researchers on how to create systematic reviews and present findings for various stakeholders. The book emphasizes ethical and contextual sensitivity and promotes evidence-based practice in education. Overall, this systematic review of research book is tailored for educational researchers to address the nuances and complexities of education as a discipline. It provides targeted examples, practical applications, and ethical considerations to empower educational researchers to produce rigorous, context-sensitive impactful reviews to inform policy and practice in education.

NOT A BOOK ON META-ANALYSIS

The term *systematic reviews* is broadly used to also denote meta-analysis, which focuses on extracting effect sizes and calculating overall effects in quantitative studies. However, this book does not focus on meta-analysis per se. Systematic reviews as described in this book constitute a broader synthesis and can include quantitative, qualitative, and mixed method primary studies to summarize findings. The DISCAR process can be applied to meta-analysis, but quantitative effect size calculation is not included in this book.

KEY FEATURES IN THE BOOK

Systematic Reviews in Educational Research contains a number of features to help readers frame, focus, deepen, exercise, and reflect on their understanding of the material.

Features and What They Provide	
Chapter Features	Benefits for the Reader
Overview	Each chapter includes a chapter overview, which provides a brief introduction to the chapter to set the stage for what is covered, and structure to guide the chapter.
Chapter Objectives	Each chapter includes a list of learning objectives that the reader should achieve by the end of the chapter. These objectives help readers focus on the key concepts and ensure that they can meet these outcomes at the end of the chapter.
Supporting Research	Each chapter includes references to foundational studies, recent research, and frameworks that support and validate the concepts discussed.
Example Systematic Reviews	Each chapter includes example systematic reviews both conducted by the author or referenced to others. These examples assist to illustrate the concepts discussed in a real-world context.
Practice Activity	Each chapter includes practice activities that are application focused to help learners apply the concepts discussed in this chapter. These activities reinforce knowledge and skills through active engagement.
Reflection Questions	Each chapter includes reflection questions to encourage learners to reflect on the concepts learned and connect with practical implications in the systematic review process.
Chapter Summary	Each chapter includes a brief recap of the chapter's main points and highlights. The summary reinforces learning by serving as a quick reference for review.

INTENDED AUDIENCE

Various groups of readers can benefit from this book.

Rewarded Readers	
Our Readers	Their Goals and Interests
Educational Researchers	Academics and professional researchers who are interested in learning about or conducting systematic reviews of research
Graduate Students	Masters and doctoral students learning about or interested in conducting systematic reviews of research
Higher Education Faculty	Faculty who are interested in teaching a course on systematic reviews of research
Educators and Practitioners	School administrators, teachers, and instructional designers who would like to understand how systematic reviews are conducted and how the evidence-based findings from systematic reviews can inform teaching strategies and instructional practices.

(Continued)

Rewarded Readers (Continued)	
Our Readers	Their Goals and Interests
Policy Makers and Educational Leaders	Government officials, superintendents, non-profit leaders, and education policy advisors who use systematic review findings to craft or revise educational policies and ensure policy recommendations are grounded in comprehensive research.
Journal Editors and Peer Reviewers	Journal editors can benefit from this book as they oversee the review and publication of manuscripts of various methodologies. Journal and conference proposal reviewers who review proposals on systematic reviews of research can benefit from this book to stay updated on systematic review methodologies.
Educational Consultants	Consultants who specialize in writing white papers, technical reports, and research summaries for various research organizations, professional organizations, and non-profit and corporate clients.
General Readers	Community members or individuals who wish to gain insight on how systematic reviews contribute to the field of education.

RELEVANT COURSES

Any institute of higher education offering educational research courses, doctoral research courses, or emerging or special topics courses (i.e., where the students need to quickly survey and summarize huge amounts of research in a growing field) may be able to use this book. The book can be adopted as a whole, or a few chapters can also be used in broader research courses.

1

INTRODUCTION TO SYSTEMATIC REVIEWS OF RESEARCH

OVERVIEW

This chapter introduces systematic reviews of research as a research methodology and describes its role in educational research. First, it provides an overview on the purpose for conducting systematic reviews. Second, it describes various processes for conducting systematic reviews of research. Third, it describes how the DISCAR (designing, including/excluding, searching/screening, coding, analyzing/synthesizing, and reporting) process can be used to conduct systematic reviews. Fourth, this chapter introduces the readers to various resources from Campbell Collaboration, IDESR, EPPI-Center that support those conducting systematic reviews of research. Finally, the chapter concludes with a discussion on the benefits and challenges of using the systematic review methodology.

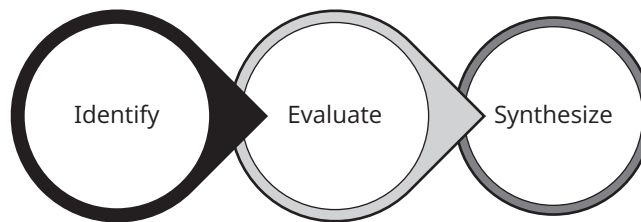
CHAPTER OBJECTIVES

- 1.1 Describe the purpose of systematic review of research and its role in educational research
- 1.2 Describe various processes used for conducting systematic reviews of research
- 1.3 Outline the DISCAR process for conducting systematic reviews of research
- 1.4 Review resources that support conducting systematic reviews of research
- 1.5 Contrast benefits and challenges of conducting systematic reviews of research

As part of identification, all research on the topic is collected from various databases and sources. In the evaluation process, a quality criterion is applied to evaluate the research, and finally, in the synthesis stage, the findings are combined from the various studies to derive comprehensive insights.

1.1 PURPOSE OF SYSTEMATIC REVIEWS OF RESEARCH

Systematic reviews of research are a type of secondary research that aims to identify, evaluate, and synthesize primary research in a logical, transparent, and analytical manner to draw conclusions based on the evidence.

FIGURE 1.1 ■ Aims of Systematic Reviews

The commonly used practice to identify existing research is through literature reviews. All primary study researchers or doctoral students when working on a new research study or on doctoral dissertations conduct literature reviews before describing the methods of the study. Based on the study on literature searching strategies, Cooper (1986) states “The most frequent strategy employed by reviewers to find relevant material is to examine the references provided by previous reviewers” (p. 381). Yet literature reviews can be highly biased as they might just describe selected existing research through cursory searches (Mallett et al., 2012) instead of integrating and synthesizing findings thoroughly from several studies. In addition to literature reviews, secondary research methods such as systematic reviews, meta-analysis, bibliometric/citation analysis and integrated/mixed method reviews can also be used to understand the breadth of research done on a particular topic. These methods are described in detail in the second chapter of this book.

Additionally, there are journals in education solely publishing secondary research. A quick review of publications in two top review journals in education that publish secondary research, *Review of Educational Research* and *Educational Research Review*, over three years (2019-2021) found systematic reviews and meta-analyses were the most commonly published types of secondary research (West & Martin, 2024). Systematic reviews of research assist the understanding of not only what is known about the research topic by providing an overview, but also what is unknown by identifying the gaps. Though some researchers use the term systematic review and meta-analysis interchangeably, in this book we focus on the broader spectrum of systematic review and not specifically on meta-analysis. It is essential to clarify that though all meta-analyses are systematic reviews, not all systematic reviews are categorized as meta-analyses (Martin et al., 2020).

Systematic reviews address critical research questions that may not be answered through primary research alone. For example, researchers initiate systematic reviews for various purposes, including needs assessment, trend identification in research, and research quality appraisal. Conducting systematic reviews serves multiple goals such as having a comprehensive overview on what has been published, identifying the gaps in research published, comparing findings from various years, and examining methods used in studying a particular topic, etc. It is also used to analyze research topics that have resulted in mixed findings in primary research. However, it is important to have a sufficient body of primary research conducted on a topic before an author initiates a systematic review. When systematic reviews of research are conducted following the guidelines, they minimize bias, which are flaws while

TABLE 1.1 ■ Purpose and Sample Research Questions

Review Element	Detail
Article Title	A systematic review of research on bichronous online learning
Purpose	The purpose of this systematic review is to examine design, facilitation and assessment aspects on the blending of asynchronous and synchronous modalities in bichronous online learning
Research Questions	The following research questions are addressed in this study. 1. How are the design aspects blended in asynchronous and synchronous modalities in bichronous online learning? 2. How are the facilitation aspects blended in asynchronous and synchronous modalities in bichronous online learning? 3. How are the assessment aspects blended in asynchronous and synchronous modalities in bichronous online learning?

providing a comprehensive view of the literature. This requires that the process is rigorous and transparent, with a valid literature base available. If not, systematic reviews can also be prone to bias, so extra care must be taken to maintain validity in the selection of studies, ensuring transparency in screening and coding, and examining the quality of studies included (Schlosser, 2007).

Table 1.1 includes the purpose and sample research questions from a systematic review on bichronous online learning, which denotes the blending of asynchronous and synchronous online learning. Asynchronous online learning refers to the anytime and anywhere aspect of online learning where students participate in online courses from anywhere whereas synchronous online learning refers to the real-time meetings that students participate in as part of the online course.

Thus, it is important to have a clear purpose when designing a systematic review. The purpose can be communicated by stating the research problems, questions, or hypotheses under investigation.

1.2 PROCESSES FOR CONDUCTING SYSTEMATIC REVIEWS OF RESEARCH

Researchers and professional organizations recommend processes and frameworks for conducting systematic reviews of research. In this section, we summarize some of the frameworks and processes used.

Methodological Guidance for Systematic Review Process

In a methodological guidance paper published in the *Review of Educational Research*, Alexander (2020) addresses the quality of systematic reviews through a lens of challenges and corresponding solutions that novice and experienced researchers may wish to consider as they undertake their systematic reviews. The challenges are associated with the complete systematic review

process, which starts from formulating a critical research question to framing transparent search procedures and communicating patterns that address the core problem of the review. Alexander (2020) categorized challenges and their underlying concepts based on framing, procedural, consolidating and summarizing, and interpreting and communicating challenges. These steps can be used when authors frame, conduct, and interpret findings from the review. Alexander suggests that this may not be an exhaustive list but a good starting point. The steps may not always be conducted in a linear manner but mostly in an iterative and nonlinear manner as researchers can expect challenges during the review process. The challenges that can occur during the review process are identified in ten steps (p.7):

Framing Challenges include (1) Finding a “critical question” worthy of review and (2) Posing an unanswered but answerable critical question.

Procedural Challenges include (3) Formulating appropriate search parameters and (4) Establishing justifiable inclusion and exclusion criteria.

Consolidating and summarizing challenges include (5) Recording the basics, (6) Charting other relevant characteristics, and (7) Considering potentially informative grouping.

Interpreting and communicating challenges include (8) Recognizing meaningful outcomes, (9) Capturing significant patterns and trends, and (10) Communicating contributions.

Taxonomy of Literature Reviews

Cooper in his fifth edition of his book on research synthesis and meta-analysis discusses seven steps in conducting research synthesis. Cooper (2017) recommended the following seven steps while conducting a systematic review: (1) formulating the problem, (2) searching the literature, (3) gathering information from the studies, (4) evaluating the quality of studies, (5) analyzing and integrating the outcomes of studies, (6) interpreting the evidence, and (7) presenting the findings. The first edition published in 1988 is a seminal piece that presents a taxonomy of literature reviews that distinguishes and categorizes reviews of literature. In this guidebook, Cooper applies the taxonomy to seven AERA (American Educational Research Association) awarded reviews and demonstrates how the use of the taxonomy can improve interrater reliability and support judgments of review quality. Cooper (1988) highlights the significance of methodology through which the comprehensive integration of studies is performed and how this process impacts the validity of conclusions. This validity is critical in portraying outcome trustworthiness and reliability, which drove his argument that systematic reviews should relatively go through rigorous methodological standards.

PIECES

PIECES abbreviated for planning, identifying, evaluating, collecting/combining, explaining, and summarizing is another framework used to guide the systematic review process

(Foster & Jewell, 2017). *Planning* focuses on the methods of the systematic review; *Identifying* focuses on searching for studies based on the criteria; *Evaluating* focuses on sorting all retrieved articles and assessing the risk of bias for each study; *Collecting/Combining* focuses on coding using a form to synthesize data; *Explaining* focuses on synthesizing context, strengths, and weaknesses of the studies; and finally *Summarizing* focuses on reporting the methods and results. It is a framework that provides guidance to librarians and researchers who are interested in conducting systematic reviews in their respective disciplines. The framework provides a holistic approach into designing and refining systematic reviews of research by putting emphasis on practice and awareness of methods and standards.

Six-Stage Process for Systematic Reviews

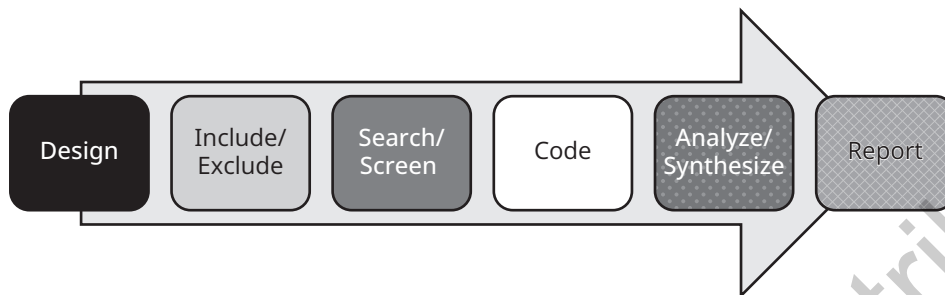
Gough and collaborators (2017) in their second edition of their book on an introduction to systematic reviews describe a six-stage process for systematic reviews: (1) clarify the problem and question, (2) find studies within scope, (3) describe conceptual framework and manage the review, (4) synthesize using conceptual framework, (5) appraise relevance and quality of the evidence, and (6) take next steps to engage stakeholders to interpret and make use of the evidence. As part of clarifying the problem and question, they describe the importance of engaging stakeholders, forming a review team, exploring the problem, developing review questions and scope, and deciding work to be done and developing the conceptual framework (p.16). Gough et al. (2017) describe how systematic reviews can vary depending on questions and data and method used. Similar to primary research, systematic reviews can either be conducted well or badly, and hence, it is important for a quality assurance process to be used when conducting systematic reviews.

Overall, systematic review processes include a number of steps or phases. Some researchers describe the processes at a very broad level, whereas some researchers have discussed it in more specific steps.

1.3 DISCAR PROCESS

After analyzing the various processes and frameworks for conducting a systematic review, the DISCAR process was developed, which is being introduced in this chapter. DISCAR stands for designing, including/excluding, searching/screening, coding, analyzing/synthesizing, and reporting. It is a six-step process that provides guidance on conducting systematic reviews. Figure 1.2 provides a visual representation of the DISCAR process. While this introductory chapter provides an overview of the DISCAR process, future chapters discuss each phase in detail.

Design. In the design or framing phase, the research team designs the systematic review. In this phase, it is important to conduct a preliminary search to examine if there is sufficient primary research and situate and refine the review to answer meaningful questions. This assists in refining and framing the review to provide a critical synthesis. Researchers also create a research protocol at the design phase. This not only assists staying on track with the timeline but

FIGURE 1.2 ■ DISCAR Process of Systematic Reviews of Research

also enhances methodological transparency during the review process. Also, during this phase researchers explore resources available at one's organization to initiate and manage the review. This includes establishing a team with clear responsibilities for conducting systematic reviews. In this phase, researchers also develop a project management plan with estimated timelines and tools to conduct the systematic review.

Inclusion/exclusion. In the inclusion/exclusion phase, the research team establishes the various inclusion/exclusion parameters to carry out the systematic review. Inclusion criteria describe the attributes of research studies required to be included in the review, and exclusion criteria describe attributes that exclude the studies from the review. In this phase, the review team finalizes the inclusion criteria to use for the systematic review (e.g., identifying possible search terms, determining appropriate search years, and narrowing down the types of publications such as journal articles, dissertations, proceedings, technical reports, white papers, gray literature, study designs, etc.). The research team also uses various strategies to develop and adapt inclusion and exclusion criteria (e.g., reviewing existing literature, conducting an initial search, consulting stakeholders, determining availability of resources, etc.). Based on the inclusion criteria, exclusion parameters are also set, such as excluding nonempirical research, certain publication years, or languages published in.

Searching/screening. In the searching/screening phase, the research team searches or identifies studies by identifying the various databases and conducting hand searches. Strategies such as conducting forward and backward searches are utilized to identify all the studies on the topic. Once articles are identified, the research team participates in screening through a process of deduplication to eliminate duplicate articles, which often occurs due to overlapping databases or as a result of article findings being disseminated at various stages. After the search, the articles are screened by a team of screeners to narrow down and identify articles that can be used to address the research questions. It is best practice to include multiple screeners for calculating interscreener reliability. Screening the studies through title screen, abstract screen, and full-text screen assists in narrowing down the articles for the review. In this phase, processes such as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart assist researchers in documenting the review process carefully by reporting articles at each stage of the review (Page et al., 2021).

Coding. In the coding phase, developing or adapting a codebook with all variables for the systematic review is the first step. A coding form is used to extract and record relevant data from each study. The coding form can include both descriptive and operational variables and consists of both quantitative and qualitative data. During the coding phase, the codebook is pilot tested by coding a few studies with multiple coders before coding all the studies. It is best practice to include multiple coders in the pilot test for calibrating coders and improving transparency of the process, including calculating intercoder reliability. The multiple coders are involved in coding the articles using both inductive and deductive coding methods.

Analyzing/Synthesizing. In the analyzing/synthesizing phase, the research team analyzes the coded articles to synthesize the findings. This includes appraising the quality of primary research as this is as important as analyzing the data in the study but also very challenging. Results from a poorly conducted study can be biased and should be interpreted with caution. When a question on publication patterns is included, this analysis, including years, journals, and patterns, leads to identifying gaps in primary research. In this phase, the members of the research team write the findings and present them to synthesize quantitative and qualitative data and provide a critical interpretation in addition to providing descriptive summaries and thematic synthesis. When conducting systematic reviews, it is best practice for researchers to engage critically with the studies by appraising the quality of the primary studies.

Reporting. In the reporting phase, the research team reports findings from the analysis to help draw conclusions on the findings. This includes reporting both descriptive data and narrative data utilizing multiple methods. For quantitative data analysis, cross-tabulations, and data visualizations can be used. Similarly, for narrative data, the importance of including a critical synthesis will be discussed. Also, as part of reporting findings, it is essential to identify implications for researchers as well as practitioners.

This section introduced a number of processes including the DISCAR process. Using a framework is critical to successfully carrying out the various steps of a systematic review. Also, documenting the various steps will help in keeping the systematic review transparent for easy replication.

1.4 SUPPORTING RESOURCES

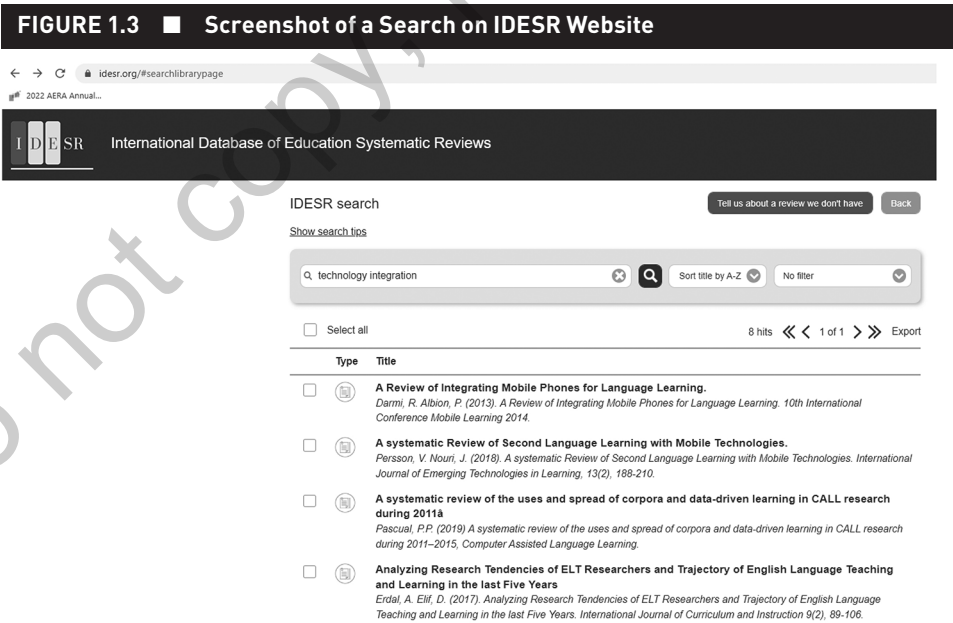
In this section of this introductory chapter, we look at resources that support researchers to conduct systematic reviews of research. While systematic research is a fairly new approach in education, it has been conducted in the health care setting much longer before being introduced to the social sciences. Cochrane Collaboration provides resources for conducting systematic reviews in health disciplines in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins et al., 2024).

Campbell Collaboration includes a number of resources for those interested in conducting systematic reviews of research in education (<https://www.campbellcollaboration.org/>). This collaboration was established to support social and behavioral scientists and social practitioners who are interested in conducting systematic reviews. Specifically, they are intended for guiding the investigation and publication of systematic reviews in the fields of education,

crime and justice, social development, and international welfare. Campbell Collaboration recommends researchers register their reviews and protocols. They inform key stakeholders including practitioners, researchers, and policy makers on aspects involving extent, quality, and results of available research evidence on the investigated study topic. The scope of suitable topics covered by Campbell systematic reviews has been described as those that represent synthesis research that investigates the effectiveness of social interventions “that bring about change on some set of targeted outcomes that represents improvement in the conditions the intervention is designed to address for a population experiencing those conditions” (Welch, 2020, p.7). The core tenet of Campbell systematic reviews is to synthesize existing *evidence* through a process that is transparent in locating, analyzing, and integrating findings of pursued social change research. The requirements for the review and publication process include (1) title of registration, (2) review protocol, and (3) completed review. The title of registration stages verifies the appropriateness and novelty of the topic for the review. The review protocol provides an itemized guideline with the rationale, objectives, and procedures for conducting the review.

EPPI-Center is the evidence for policy and practice information center and provides resources on systematic reviews and evidence synthesis that focus on policy and practice (<https://eppi.ioe.ac.uk/cms/>). This center provides a number of tools including guidelines tools, data management tools, and EPPI Reviewer. The EPPI Reviewer is a web application that can be used for all types of reviews and is useful for uploading studies during screening, coding, and analysis processes of the systematic review.

The IDESR is a database of published systematic reviews in education and provides a venue for protocol registration of ongoing and planned systematic reviews (<https://idesr.org/>) for



researchers to access. For example, a search on “technology integration” resulted in the following results in IDESR (Figure 1.3). A similar search is helpful for someone starting a review on technology integration to examine the existing protocols and review studies. Researchers are encouraged to develop a systematic review protocol and register before moving forward with the project. Though this is not commonly practiced, this registration process is to alert other researchers of duplicate projects, connect researchers working on similar topics, and make it easy for reviewers to access all the systematic reviews on the topic and re-use existing protocols for future studies (Mallett et al., 2012). The different items that are expected to be registered include the protocol, research question, inclusion/exclusion criteria, databases to be searched, search strategy, methodology for data extraction and analysis, and declaration of interests and time frame.

1.5 BENEFITS OF SYSTEMATIC REVIEWS OF RESEARCH

As with any research methodology, benefits and challenges exist.

Conducting systematic reviews of research provides several benefits, and some of them are discussed below.

1. **Comprehensive overview:** Systematic reviews of research are advantageous over literature reviews because they include a greater breadth of studies analyzed and provide a thorough and comprehensive overview of existing research on a particular topic. This assists in understanding the big picture of research on a particular topic.
2. **Interpreting primary research with mixed findings:** Systematic reviews synthesize evidence from multiple primary studies and help come to reliable conclusions when primary studies might have mixed findings.
3. **Reduction in bias:** By following a systematic and rigorous process, systematic reviews aim to minimize bias in each step of the process. For example, this could be in the selection of keywords or identifying databases, or in the process of screening and coding.
4. **Transparency and replicability:** Systematic reviews provide transparency in the review process with the inclusion of search terms and databases, inclusion and exclusion criteria, and methodological screening and coding process that enhance the replicability of the systematic review. This enables the review to be easily reproducible.
5. **More rigor:** Systematic reviews are considered more rigorous than other types of reviews such as literature reviews or conceptual syntheses due to the systematic process followed and thorough and comprehensive overview of research.
6. **Research trends and gaps:** Systematic reviews assist in understanding research trends on various topics. They also assist in identifying research gaps from current research on specific topics and provide directions for future research.

7. Foundation for empirical studies: Systematic reviews can serve as a foundation for empirical studies to guide the researcher in addressing the gaps that have been identified.
8. High impact studies: Systematic reviews are usually high impact studies that are empirical and publishable.
9. Informs stakeholders in decision-making processes: Systematic reviews inform policy makers and practitioners by providing recommendations from synthesizing findings on a large number of studies.
10. Enhances generalizability of findings: Since systematic reviews synthesize findings from several studies conducted in various settings and populations, the applicability of findings is extended to various settings.

Challenges of Systematic Reviews of Research

Systematic reviews also have challenges, and some of them are discussed below (Nicholson et al., 2017).

1. Time-consuming: Systematic reviews are time-consuming and require a good-sized team with skilled members to screen, code, and synthesize in a timely manner.
2. Scope being broad or narrow: Some of the methodological challenges from conducting systematic reviews include research questions being defined too broadly or too narrowly.
3. Quality of primary studies: Systematic reviews rely on primary research quality. If sufficient detail is not provided or if the primary study is flawed in methods, it can affect the quality of the systematic review.
4. Lack of access to databases and resources: A researcher may not have access to a comprehensive list of all databases and full texts, which limits the research that gets synthesized.
5. Limitations due to search strategy: Though the research team takes efforts to create comprehensive search strategies, there is a possibility of missing some keywords, which results in some relevant studies being missed.
6. Limitations due to languages: A researcher might examine research only in languages spoken by the research team, which might exclude research conducted in other languages.
7. Methodological challenges: Methodological challenges might exist such as not tracking the reasons for exclusion and not evaluating study quality.
8. Exclusion of unpublished research: Researchers tend to only focus on published research and exclude unpublished research such as dissertations and gray literature such as government reports and policy documents, which might bias the findings.

9. Subjectivity or bias: There is also subjectivity or bias during the screening and coding process where different members of the research team might interpret the criteria differently.
10. Interpersonal challenges: Some of the interpersonal challenges include that the research team does not use multiple screeners and coders, and the research team has either too few or too many members. There can also be challenges during the team collaboration.
11. Updated terminology and research: Rapid escalations of terminology and the influx of new research that evolve over time result in blurring concepts. This results in reviews becoming outdated and not accurately reflecting the research.
12. Keeping up with the latest research studies: Since the systematic review process takes a few months to be completed, newer research might have emerged during the process, so it gets challenging to include the latest research in the review.

PRACTICE ACTIVITY

Think about a research topic for which you would like to conduct a systematic review. Now utilizing the DISCAR process, write out the various tasks you will be doing in each of the six DISCAR phases of systematic review. At this stage in this project, you may not have all the tasks finalized. However, this will be a good first step to start thinking about it. By the end of chapter 8 of this book, you will have all the information needed to create this comprehensive review.

Discar Tasks Practice Activity

Phase	Task	Task	Task	Task
Design				
Inclusion/Exclusion				
Searching/Screening				
Coding				
Analyzing/Synthesizing				
Reporting				

REFLECTION QUESTIONS

1. What is the purpose of conducting a systematic review of research?
2. Describe the DISCAR process for conducting systematic review of research.
3. How do the benefits of conducting a systematic review outweigh the challenges?

CHAPTER SUMMARY

This chapter described the purpose of the systematic review of research, its role in educational research, and the various processes used for conducting systematic reviews of research. First, it provided an overview on the purpose of conducting systematic reviews of research. From this chapter, readers will gain insight into why systematic reviews are essential for synthesizing research. Second, it described the various processes used in conducting systematic reviews. Third, it introduced and described the developed DISCAR (designing, including/excluding, screening, coding, analyzing/synthesizing, reporting) process. Through these processes, readers are provided a road map for planning for reporting, and it provides them an organized method for conducting systematic reviews and making it more manageable and efficient. Fourth, this chapter introduced readers to various resources from Campbell Collaboration, IDESR, and EPPI-Center that support conducting systematic reviews of research. These resources enhance quality in reviews through the methodological guidance these resources provide. Finally, this chapter discussed benefits and challenges of using the systematic review methodology. From these, readers develop a balanced understanding of both advantages and limitations of this methodology and are prepared to navigate the potential obstacles while maximizing the benefits.

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2

METHODOLOGIES TO CONDUCT SECONDARY RESEARCH

OVERVIEW

This chapter discusses various methodologies to conduct secondary research. First, the chapter describes the difference between research providing summary and advocacy arguments and then categorizes the secondary research methodologies into these two types. Second, different methodologies that are used to advance secondary research are described. In addition to the broader systematic reviews, these include meta-analysis, citation analysis or bibliometric reviews, integrated or mixed studies review, scoping reviews, literature synthesis, theoretical frameworks, and conceptual papers. Finally, this chapter concludes by providing an overview of journals that publish secondary research studies.

CHAPTER OBJECTIVES

- 2.1 Describe the difference between summary and advocacy arguments in educational research
- 2.2 Describe different methodologies used to advance secondary research
- 2.3 List journals that publish systematic review articles

2.1 SUMMARY AND ADVOCACY ARGUMENT

In the previous chapter, you were introduced to the definition of systematic review through the “identify, evaluate, and synthesize” lens. Building on Machi and McEvoy’s (2022) use of the terms, and West and Martin’s (2024) initial categorization of the secondary research methodologies, in this book, the secondary research methodologies are categorized to either focus on summary argument or advocacy argument.

Summary Argument. Summary argument is a secondary research methodology that focuses on summarizing the findings from existing research (West and Martin, 2024). These studies focus on identifying, evaluating, and synthesizing research. Additionally, meta-analysis, systematic review, bibliometric/citation analysis, scoping reviews, and

TABLE 2.1 ■ Characteristics of Summary and Advocacy Argument		
Category	Types	Characteristics
Summary Argument	meta-analysis, systematic review, bibliometric/citation analysis, scoping review, integrated/mixed review	rigor, replicability, objectivity
Advocacy Argument	conceptual synthesis, literature synthesis, and theoretical review	relevance, originality, utility

Adapted from Figure 1 of West and Martin (2024). What type of paper are you writing? A taxonomy of review and theory scholarship distinguished by their summary and advocacy arguments. *Educational Technology Research and Development*, 72, 2443-2476. <https://doi.org/10.1007/s11423-023-10233-0>

integrated/mixed method reviews provide a summary argument and focus on rigor, replicability, and objectivity. *Rigor* describes how thorough, exhaustive, or accurate the process is. *Replicability* describes the ability of the study to be reproduced to obtain consistent findings, and *objectivity* describes the quality of being objective, which is considering and representing facts rather than opinions.

Advocacy Argument. Advocacy argument focuses on using the findings from existing research to advocate or argue for or against a finding (West and Martin, 2024). Conceptual papers, literature synthesis, and theoretical framework are examples of secondary research methodologies that provide an advocacy argument and focus on relevance, originality, and utility. These studies are analyzed for their *relevance* describing the quality of being closely connected or appropriate, *originality* describing the quality of being creative or novel, and *utility* describing the condition of being useful.

Table 2.1 summarizes the types and characteristics of secondary research focusing on summary and advocacy arguments.

2.2 METHODOLOGIES THAT ADVANCE SECONDARY RESEARCH

This section describes the various secondary research methodologies and summarizes unique characteristics of each method. Grant and Booth (2009) in their taxonomy discussed 14 types of reviews in health sciences. This included critical review, literature review, mapping review, meta-analysis, mixed studies review, overview, qualitative systematic review, rapid review, scoping review, state of the art review, systematic review, systematic search and review, systematized review, and umbrella review. Though Grant and Booth described these 14 types of reviews, there is some overlap among some of the reviews, and they are not mutually exclusive from each other.

Alternatively, West and Martin (2024) focused on eight review types specifically in education. In their review, they included meta-analysis, systematic review, bibliometric/citation analysis, scoping review, integrated/mixed review, conceptual synthesis, literature synthesis, and theoretical review.

Systematic Reviews

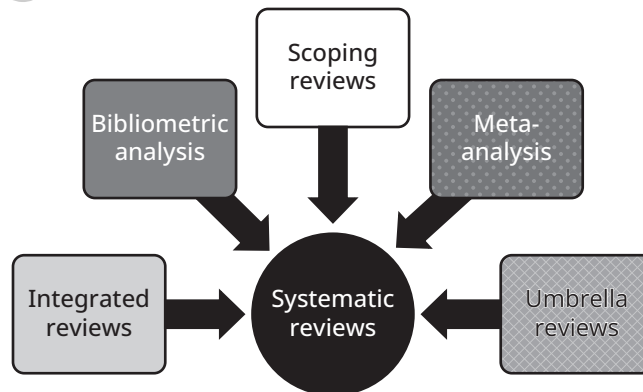
In the previous chapter, you were introduced to systematic reviews as a “type of secondary research that aims to identify, evaluate, and synthesize primary research in a logical, transparent, and analytical manner to draw conclusions based on the evidence.” Through the three phases—identify, evaluate, and synthesize—all research on a topic is collected, a quality criterion is used to evaluate the research, and the findings are synthesized. Systematic reviews examine all empirical research including quantitative, qualitative, and mixed method studies. Some of the characteristics of systematic reviews of research include answering critical questions by synthesizing findings from several primary research studies by following a rigorous and transparent process. This also involves having a valid literature base available that can influence research and practice and critiquing and evaluating the existing research in addition to providing descriptive analysis. Systematic reviews are becoming more prevalent in educational research as they synthesize existing research and inform policy, practice, and future research. There has been an increase in the number of systematic reviews that have been conducted in educational research. Martin et al. (2020) edited a special issue on systematic reviews on emerging learning environments and technologies, and another one on systematic reviews in online learning (Martin et al., 2023).

Figure 2.1 shows that five types of reviews, meta-analysis, integrated reviews, bibliometric or citation analysis, scoping reviews, and umbrella reviews can be considered as types of systematic reviews as they overlap in the process, though each method is also identified uniquely due to specific characteristics. These reviews are discussed next before moving on to additional secondary research methodologies.

Meta-Analysis

Pigott and Polanin (2020) describe a meta-analysis as “a set of statistical techniques for synthesizing the results of multiple studies. Such techniques are used when the guiding research question focuses on a quantitative summary of study results” (p. 24). Meta-analysis research

FIGURE 2.1 ■ Types of Systematic Reviews of Research



is conducted within quantitative studies and will typically synthesize effect sizes from studies with similar learning outcomes, and they seek to provide an estimate of the average effect and its heterogeneity. Meta-analysis estimates a treatment effect, or magnitude and direction of an association between two variables in a set of quantitative studies. The main difference between meta-analysis and systematic reviews is that meta-analysis focuses only on quantitative studies where effect sizes are present, while systematic review could use quantitative, qualitative, and mixed method primary studies. In meta-analysis, studies with similar outcomes are pooled and statistically analyzed to obtain an overall estimate of an effect, whereas in systematic review findings from studies on similar topics are synthesized. Some researchers use the term meta-analysis and systematic reviews interchangeably. They also consider meta-analysis to be a subset of systematic reviews. This book focuses on systematic reviews that include all empirical research and does not focus specifically on meta-analysis. Some authors have conducted a systematic review and meta-analysis in the same study. For example, Cook et al. (2013) examined the effectiveness of instructional design features in simulation-based education. Additionally, Zenner et al. (2014) studied mindfulness-based interventions in schools, Gegenfrtner and Ebner (2019) studied webinars in higher education and professional training, and Martin et al. (2021) studied the effects of synchronous online learning. These studies not only identified summary effects but also synthesized findings on additional findings or variables examined in the studies.

Bibliometric/Citation Analysis

Bibliometric analysis is the statistical analysis of publications to track researcher impact. Though bibliometric/citation analysis is similar to the meta-analysis and systematic reviews in retrieval and screening methods, it differs in using a data-mining approach to identify the most highly cited articles, authors, institutions, or topics (Halverson et al., 2014) or use social network analysis strategies to map which authors and works are related to each other and map themes (Cowhitt et al., 2020). Bibliometric analysis is also referred to as citation analysis as researchers use the count of citations to extract and analyze the article. Researchers use either the local or global citation scores from sites such as Histcite, a software package to support bibliometric analysis and visualization to identify and map highly cited articles (Histcite, 2023). Previously, bibliometric analysis focused on an author or the citation information to identify influential publications; more recently, network and sociometric analysis based on titles, keywords, and abstract data is being used by researchers (Han et al., 2020). Mora et al. (2019) describe that the aim of the bibliometric analysis is to visualize the network of publications, map the clusters of publications with related themes, and reveal emerging development paths. Some of the characteristics of a bibliometric/citation analysis are to quantitatively document what has been published and focus on whether the source of the pattern is more driven by a certain author/group of authors to clearly see which studies are driving certain areas of research through a systematic and reproducible process. Bibliometric analysis is different from systematic reviews as it focuses on the extraction of articles based on the citation analysis or network analysis. However, some researchers have combined a systematic review with a bibliometric analysis such as Rojas-Sánchez et al. (2022) who examined virtual reality and education, while there are

several other researchers who have just conducted a bibliometric analysis on various education related topics. These include virtual and remote labs (Heradio et al., 2016), women in science and higher education (Dehdarirad et al., 2015), artificial intelligence (Song and Wang, 2020) and initial teacher education for inclusive education (Cretu and Morandau, 2020).

Integrated Reviews or Mixed Studies Review

While systematic reviews mostly focus on empirical studies, integrated or mixed method reviews include both theoretical and empirical studies and can be referred to as mixed studies reviews. A mixed studies review assists in describing not only the research methods but also the theories' influence on the topic examined. A major characteristic of mixed studies review is the diverseness in the sampling of the articles. Some of the characteristics of an integrated or mixed method review are the use of a variety of data sources to develop a holistic understanding of the research topic and the use of mixed method and qualitative research data analysis methods to combine diverse methodologies from empirical and theoretical sources in the review (Whittemore and Knafl, 2005). Mixed method review is a broad type of review that specifically focuses on the aspects of integration. Researchers are recommended to use a combination of electronic database searches and gray literature hand searches (Hopia et al., 2016). Though integrative reviews are more common in nursing and other health sciences (Foronda et al., 2016; Stormacq et al., 2019), they are not as common in education in comparison with the systematic reviews. However, there is a need for mixed reviews in education to synthesize findings on how theories have impacted research and systematically synthesize both theoretical and empirical studies to integrate primary research to draw conclusions. Integrated reviews are also common in human resource development, and one of their journal editors Cho (2022) describes it as literature integrated such that new frameworks and perspectives are generated.

Scoping Review

A scoping review is another subset of systematic reviews but is used to conduct a preliminary assessment of the size and scope of research literature and tend to have broad research questions. Scoping reviews just as the name sounds focuses to scope the breadth of the literature and is used to map areas lacking sufficient research. Scoping reviews can be preliminary reviews and helpful precursors to systematic reviews and assist in identifying inclusion criteria and research questions (Munn et al., 2018). Scoping reviews are used in ongoing research and are useful when studying emerging topics. These are especially helpful in studying new technological innovations as they evolve. They do not include a critical appraisal but assist with providing an overview of the evidence. Scoping review assists in identifying and analyzing knowledge gaps for future research initiatives. Researchers also refer to scoping reviews as rapid reviews (Arksey and O'Malley, 2005; Peters et al., 2015) as they are used to conduct a rapid assessment of research on a topic. Some examples of scoping reviews in education include reviews on social media in the school context (Dennen et al., 2020), resilience in higher education students (Brewer et al., 2019), and flipped classrooms in higher education

(O’Flaherty & Phillips, 2015). Dennen et al. (2020) in their scoping review of social media explored the range of research to identify gaps.

Umbrella Review

In addition to the methods discussed above, there is another review called umbrella review that is an overview that includes a summary of other review studies such as systematic reviews or meta-analysis. These are also called review of reviews, overview of reviews, second-order reviews, systematic reviews of reviews, syntheses of research syntheses, meta-meta-analysis, and meta-analyses of meta-analyses (Polanin et al., 2017). Umbrella review provides the highest level of evidence synthesis by examining and clarifying conflicting differences that may exist in related traditional first-order review studies. Umbrella reviews consolidate findings from systematic reviews and help draw conclusions from them. Examples of umbrella reviews in educational research are Martin et al.’s (2022) second-order meta-analysis that analyzed the effects of online and distance learning of primary meta-analysis research and Tamim et al.’s (2011) second-order meta-analysis on the impact of technology on learning. Wohlfart and Wagner (2023) conducted an umbrella review with 23 systematic reviews including 50 years of research on digitalizing education. Additional examples of umbrella reviews include those on educational gamification (Metwally et al., 2021), simulation-based learning in nursing education (Cantrell et al., 2017), and augmented and virtual reality in remote higher education (Nesenbergs et al., 2020).

Additional Secondary Research Methodologies

This section describes the additional secondary research methodologies that do not follow a systematic process. These include literature review/synthesis, theoretical review, and conceptual review.

Literature Review/Synthesis

Booth et al. (2021) in their book on systematic approaches to a successful literature review describe a literature review by four aspects--includes textual information, focuses on collective strengths and weaknesses, spots patterns that link items together, and finally summarizes the studies. A literature review summarizes research on a topic using informal or subjective methods to collect and interpret studies. Literature synthesis typically combines different elements of research into a whole and can provide background information for a new piece of research but can also be a stand-alone guide to what is already known about a particular topic. Literature reviews are also commonly referred to as qualitative synthesis, narrative reviews, thematic synthesis, and state-of-the-art reviews. They strive to synthesize and report findings by making an advocacy argument. One of the characteristics of a literature synthesis is to provide an analysis of both sides of the debate, though a synthesis may not have reviewed all the literature in the domain. Luft et al. (2022) describe a literature review as one that examines current and relevant research associated with the research question and is comprehensive, critical, and purposeful. Examples of literature synthesis are Tawfik et al.’s. (2020) review on the role of questions in inquiry-based instruction and Sweller’s (2020) review on cognitive load theory.

Theoretical Review

West and Martin (2024) describe a theoretical review or framework as a review that uses existing literature and research to significantly expand or deepen our theoretical understanding of a phenomenon. Theoretical reviews help extend theories by identifying the lack of appropriate theories or revealing that current theories are inadequate for explaining new or emerging research problems. Luft et al. (2022) describe a theoretical framework as an approach that clarifies the phenomenon that is researched and the underlying assumptions the researcher has made. Examples of theoretical reviews in education are Kimmons et al. (2020) PICRAT model (passive, interactive, creative, replacement, amplification, transformation) and Koehler and Mishral's (2009) TPACK framework (technological, pedagogical, content knowledge) for technology integration.

Conceptual Review

The conceptual review focuses on the advocacy argument by proposing new concepts or ideas. Conceptual review also assists to categorize and describe concepts on a topic, outline a relationship between them, and develop a theory or empirical research. One of the differences between theoretical review and conceptual review is that a theoretical review describes the theoretical foundations based on existing research, while a conceptual review allows readers to draw their own conclusions by examining variables for research and the relationship between them. Example conceptual reviews include Borup et al. (2020) on Academic Communities of Engagement (ACE). Borup and colleagues synthesized literature to develop the new ACE framework to help practitioners provide support structures to engage with students while also providing support for researchers, and this included independent support, course community support, and personal community support.

Overall, both summary and advocacy arguments can be used in secondary research. Table 2.2 summarizes the unique characteristics of secondary research methods including ones that focus on summary argument and those that focus on advocacy argument.

TABLE 2.2 ■ Unique Characteristics of Secondary Reviews

Type of Secondary Review	Description of Methodology
Systematic Reviews	Systematic reviews examine all empirical research including quantitative, qualitative, and mixed method studies to identify, evaluate, and synthesize research.
Meta-Analysis	Meta-analysis summarizes only quantitative studies.
Bibliometric/Citation Analysis	Bibliometric/citation analysis summarizes using a data-mining approach to identify the most highly cited articles, authors, institutions, or topics to identify trends or use network analysis.
Integrated Reviews	Integrated reviews summarize both empirical and theoretical research to review theories on particular research.

(Continued)

TABLE 2.2 ■ Unique Characteristics of Secondary Reviews (Continued)	
Type of Secondary Review	Description of Methodology
Scoping Reviews	Scoping reviews provide a preliminary assessment of the size and scope of research literature. They do not include critical appraisals and focus mostly on emerging topics.
Umbrella Reviews	Umbrella reviews focus on reviewing secondary research.
Literature Review/Synthesis	Literature reviews comprehensively review the literature but may not follow a systematic process.
Theoretical Reviews	Theoretical reviews focus on conceptualizing existing theory to describe new insights. They may not use a systematic process.
Conceptual Synthesis	Conceptual synthesis focuses on creating new theory, concepts, or models and may not use a systematic process.

2.3 JOURNALS THAT PUBLISH SYSTEMATIC REVIEWS IN EDUCATION

Though most of the educational research journals publish systematic reviews, there are a few journals that specifically publish secondary research studies including systematic reviews in educational research (See Table 2.3).

TABLE 2.3 ■ Sample Journals that Specialize in Publishing Review Studies		
Journal Name	Publishing Professional Organization	What do they publish?
<i>Review of Educational Research</i>	American Educational Research Association SAGE Journals	Critical, integrative reviews of research literature
<i>Educational Research Review</i>	European Association for Research on Learning and Instruction Elsevier	Review of studies and theoretical papers in education at any level
<i>Review of Education</i>	British Educational Research Association	Reports of major studies, substantial research synthesis, and original state-of-the-art reviews
<i>Educational Psychology Review</i>	Springer	Peer-reviewed integrative review articles, special thematic issues, reflections or comments on previous research or new research directions, interviews, replications, and intervention articles—all pertaining to the field of educational psychology

PRACTICE ACTIVITY

Identify if the following reviews assist in providing a summary argument or advocacy argument and list some of their unique characteristics.

Characteristics of Summary or Advocacy Argument Practice Activity		
Secondary Review	Summary or Advocacy	Unique Characteristics
Systematic Reviews		
Theoretical Reviews		
Bibliometric/Citation Analysis		
Umbrella Reviews		
Scoping Reviews		
Literature Review/Synthesis		
Meta-Analysis		
Conceptual Synthesis		
Integrated Reviews		

REFLECTION QUESTIONS

1. What is a summary argument, and what are some methodologies that can be used to advance research through summary argument?
2. What is an advocacy argument, and what are some methodologies that can be used to advance research through summary argument?
3. What are the types of reviews that are considered a subset of systematic reviews, and what are some of their unique characteristics?

CHAPTER SUMMARY

This chapter described summary and advocacy arguments and different methodologies used to advance secondary research and then categorized the secondary research methodologies into these two types. This section helped readers distinguish these two types of arguments and how different methodologies can be used to advance secondary research. In addition to systematic reviews, this chapter discussed different methodologies that are used to advance secondary research including meta-analysis, citation analysis or bibliometric reviews, scoping reviews, integrated or mixed studies review, umbrella reviews, literature review/synthesis, theoretical frameworks, and conceptual papers and unique characteristics of the other methodologies.

This broad overview provided readers with knowledge to select appropriate research methods and identify unique characteristics of each method. This chapter also listed the journals that published secondary research studies. This section guided readers on where they can read additional research on secondary research and also disseminate their work.

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