

# ———— Part I ————

## **Fundamentals of a Literature Review**



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# CHAPTER ONE

## Introduction

The Matrix Method is a versatile strategy for reviewing the literature. The background and philosophy of a literature review and an introduction to the Matrix Method are described in the following sections in this chapter:

- ■ Review of the Literature
- ■ Well Beyond Index Cards
- ■ To Own the Literature
- ■ Research Synthesis: Historical Perspective
- ■ The Matrix Method: Definition and Overview
- ■ Review Matrix: A Versatile Tool
- ■ Overview of Chapters and Appendices
- ■ References to Websites
- ■ Caroline's Quest: Understanding the Process

## Review of the Literature

The purpose of this text is to describe the Matrix Method and the Matrix Indexing System. The Matrix Method is a strategy for reviewing the literature, especially the scientific literature. A review of the literature consists of reading, analyzing, and writing a synthesis of scholarly materials about a specific topic. When the review is of scientific literature, the focus is on the hypotheses, scientific methods, results, strengths, and weaknesses of the study, and the authors' interpretations and conclusions. A review of the scientific literature is fundamental to understanding the accumulated knowledge about the topic being reviewed. The Matrix Indexing System helps the user create and maintain a reprint file.

The term *scientific literature* refers to theoretical and research publications in scientific journals, reference books, textbooks, government reports, policy statements, and other materials about the theory, practice, and results of scientific inquiry. These materials and publications are produced by individuals or groups in universities, foundations, government research laboratories, and other nonprofit or for-profit organizations. Throughout this text, the term *source document* will be used to refer to any of these sources, such as a journal article, a chapter in a book, or a research report. Currently, the most common type of publication used in a review of up-to-date scientific literature is a research paper in a scientific journal, such as the *Journal of the American Medical Association (JAMA)* or the *American Journal of Epidemiology*.

Reviews of the literature are the foundation for theses and dissertations, grant proposals, research papers, summary articles, books, policy and regulatory statements, evidence-based healthcare statements for health professionals, and consumer materials. Given the vast number of scientific publications produced over the past several decades, information retrieval and analysis in the form of a critical review of the literature have become more crucial than ever.

Over the past 20–30 years, the following terms have been used interchangeably: literature review, integrative review, systematic review, and meta-analysis. All share the same basic elements: (1) stating the purpose of the review; (2) screening and selecting scientific papers that meet specified criteria; (3) carefully reviewing the papers for excellence of scientific methods, statistical procedures, and validity and reliability of data collection; (4) summarizing

findings across the studies; and (5) drawing conclusions based on the scientific evidence.

In this text, a *literature review* is defined as an analysis of scientific materials about a specific topic that requires the reviewer to carefully read each of the studies to evaluate the study purpose, determine the appropriateness and quality of the scientific methods, examine the analysis of the questions and answers posed by the authors, summarize the findings across the studies, and write an objective synthesis of the findings.

In describing an integrative review, authors emphasize the review of past research in which the goal of the review is to base conclusions on many different studies.<sup>1</sup> *Integrative review* (or *integrative literature review*) is a term that tends to be found in the nursing literature.

The term *systematic review* appears more frequently in publications about evidence-based medicine. The term has been defined as an overview of scientific evidence in the medical literature that emphasizes treatment, causation, diagnosis, and prognosis.<sup>2</sup> According to this definition, systematic reviews are prepared specifically for clinicians and provide the basis for the practice of evidence-based medicine. Other clinical fields have adopted the strategy of basing their clinical practices and decision-making processes on the evidence in the scientific literature.

A *meta-analysis* is a departure from the other three types of reviews because this kind of literature summary requires precise quantitative methods to summarize the results. The same standards for rigor in identifying the purpose of the review, careful selection of papers, and evaluation of methods is essential to this type of review.

In general, think about the first three types of reviews as being similar, with the names being used in specific fields or disciplines to basically refer to a very rigorous literature review. The meta-analysis is described more fully later in this text.

## Well Beyond Index Cards

In the past, most students conducted their first review of the literature in high school or college when they learned how to do library research. Usually their efforts concentrated on where to gather information and how to use the library.

With the advent of computers, students now learn about electronic information retrieval at the primary school level.

Using computers to retrieve information is not the only new development, however. The sheer amount of information to be examined and critiqued has increased exponentially over the past 50 years. The first decade of the 21st century alone witnessed tremendous advancements in scientific knowledge, a dramatic increase in the number of scientific journals, and a bewildering array of new forms of communication. Books and scientific journals are no longer the only venue for scholarly literature. Information is available on the Internet, in national and international meetings of professional societies, and in correspondence by email, on blogs, and through social networking software such as Twitter, Facebook, and wikis. The issue of how, where, when, and whether or not to obtain information from these sources constitutes a present-day dilemma for anyone who reviews the scientific literature. The art of conducting such a review is an entirely separate matter.

Formal instruction on how to systematically organize and carry out a review of the literature is rarely offered in educational programs at any level, including graduate school. In the past, American students were advised to use index cards to record the most salient points of the material being reviewed. Now students keep notes on a computer or on other electronic devices. Despite such technological advances, how to avoid getting lost in the details between generating a computer list of research articles, accumulating electronic notes, and writing the final synthesis is still something of a mystery to many people.

One way to master this process is to realize that a review of any body of literature actually consists of four fundamental tasks, after the subject of the review has been decided:

1. Make decisions about which documents to review.
2. Read and understand what the authors describe in those documents.
3. Evaluate the ideas, research methods, and results of each publication.
4. Write a synthesis that includes both the content and a critical analysis of these materials.

Given the complexity of each one of these tasks, it is easy to become overwhelmed in the process. A strategy is needed to organize the books and papers selected in the search and retrieval process, structure the information in order to understand the progression of ideas by different authors across documents and

over time, and use that structure to develop a critique and write a synthesis of the results of such a review. The Matrix Method provides such a strategy.

## To Own the Literature

Something else can result from a thorough and comprehensive review of the literature that may be even more valuable than a written synthesis—ownership of the literature. To own the literature you must know it—know the major ideas, what has been researched, the names of the authors and their professional affiliations, who collaborated with whom, what databases they did (or did not) use, the methodological strengths and weaknesses of the studies, what has been studied ad infinitum, and especially what is missing.

To own the literature is to be so familiar with what has been written by previous researchers that you know clearly how this area of research has progressed over time and across ideas. Without a thorough and comprehensive review of the literature, you are at the mercy of every critic and reviewer who is aware of what is known, how it evolved, and what has yet to be examined.

Unfortunately, such ownership cannot be acquired easily; you have to complete the entire process of a literature review, from the initial search to the final written synthesis, before you can take possession of the literature on a subject. Ownership is rarely mentioned when people describe the literature in a paper or presentation, but it exists; experienced reviewers achieve such ownership whether or not they realize it.

When you own the literature, you are in a better position to know what is missing in a stream of research. You can defend your ideas and anticipate what other scientists and researchers will say or do. Ownership is the mastery of how a specific body of knowledge evolved, what it currently comprises, and what has yet to be studied.

Acquiring ownership of literature demands more than summarizing the studies or documents you reviewed. A summary merely describes. Your task is to read and analyze each document until you can picture what the authors did in a study or the logical process they went through in making a point. Then you must go back and critically analyze what was right and wrong each step of the way. To own the literature is to dissect each part and decide whether you agree with what the authors did or said. In other words, you must become engaged with the content, argue with the authors' logic, and conclude for yourself whether that paper or study made sense

from a scientific or scholarly standpoint. You must understand how the field has evolved, including the progression of ideas over time and across different authors. To own the literature you must learn about the conceptual models that served as the foundation for the research, and you must deduce what hypotheses were really being tested, who initiated the ideas, and who did the first research study. The Matrix Method will help you acquire ownership of the literature, but it is only a guide. The most important component is your active involvement with the literature.

## Research Synthesis: Historical Perspective

### Overview

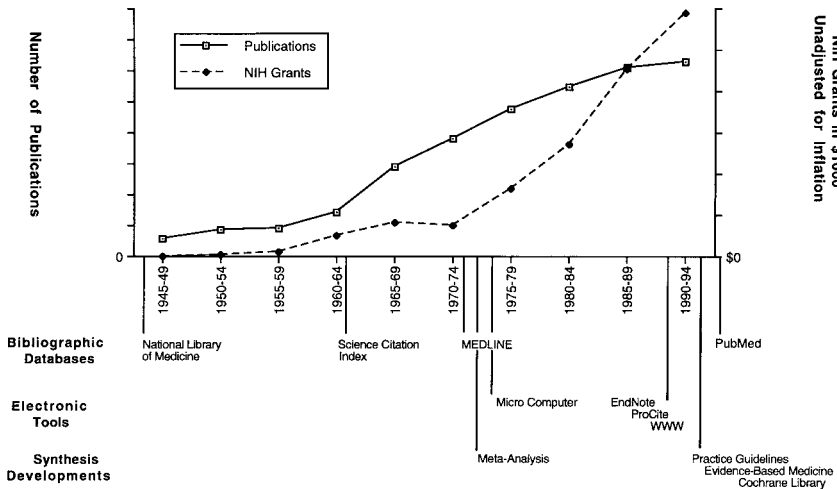
Before delving into the details of the Matrix Method, it might be useful to think about the historical context of a literature review. A literature review is part of the larger endeavor of research synthesis that is the analysis, interpretation, and use of scientific inquiry. Although the term *research synthesis* can be applied to all kinds of knowledge, this discussion is limited to some examples of how the synthesis of health sciences research literature has evolved. The practices and tools used today for reviewing the health sciences literature can be traced back to 1879 with the publication of *Index Medicus*, a medical bibliography that included a subject and author index to articles published in medical journals.<sup>3</sup> Today's most useful tools, however, are relatively recent innovations. A historical awareness of how the research literature has grown and when some of these tools were introduced will help put these developments into perspective.

Since the mid-1940s, the number of scientific publications has increased dramatically. What spurred this increase is complicated and best left to social and medical historians to explain, but certainly a major factor has been a concomitant rise in the amount of funding for research by the National Institutes of Health (NIH). These growth rates are shown in Figure 1-1. In this example, publications are those defined by the Science Citation Index as original substantive articles, editorial materials, letters, reports of meetings, correction notes, and reviews for the period from 1945 to 1996.<sup>4,5</sup> The NIH dollars are those allocated for research grants.<sup>6</sup>

Some critics suggest that there is no evidence of an increase in the rate of scientific publications over time, citing the following two reasons for this rationale: (1) the quantity of scientific publications has increased, but the quality has not,<sup>7</sup> and (2) the rate of publications per health scientist has remained the same, but the number of health scientists has increased.<sup>8</sup> Neither argument addresses the fact



**Figure 1-1** Developments in research synthesis compared with number of scientific publications and funding for research grants from the NIH



Source: Data about publications are from Science Citation Index 1945-1954 Cumulative Comparative Statistical Summary, in *SCI Science Citation Index Ten Year Cumulation 1945-1954: Guide and Lists of Source Publications*, pp. 18-19, © 1988, Institute for Scientific Information; and *Comparative Statistical Summary 1955-1996*, in *SCI Science Citation Index 1996 Annual Guide and Lists of Source Publications*, pp. 57-63, © 1997, Institute for Scientific Information. Data about NIH research funds are from *NIH Almanac 1997*, in Branch EO, Publication No. 97-5, 1997, National Institutes of Health.

that an individual health scientist today must cope with an increase in the absolute number of journals and publications that have to be considered when reviewing the literature.

In examining the growth rates in Figure 1-1, the increase in NIH grant dollars may not be as steep as indicated because the figures are actual dollars spent for each 5-year period, unadjusted for inflation. The real rate of growth may be flatter or dip more in some years than others, after inflation has been taken into account. For the sake of argument, however, consider the two rates of growth at their face value and assume an upward trajectory for both.

What is important is the juxtaposition of the growth in the number of publications, the amount of research funding, and developments in resources for creating a synthesis of the research literature. Examples of these developments over the past 50 years can be assigned to three categories: (1) the establishment of bibliographic databases, (2) the availability of electronic tools for manipulating information, and (3) the emergence of synthesis applications.

## ***Bibliographic Databases***

Bibliographic databases include information in print and electronic form. The first major development in this category for the health sciences was the creation of the National Library of Medicine (NLM) under the aegis of the Public Health Service of the Department of Health, Education, and Welfare. The NLM evolved from the Library of the Army Surgeon General's Office, which was established in 1836.<sup>3</sup> With major funding from Congress in 1942, the NLM gathered a national collection of scientific books, papers, and reports located in Washington, DC. Accessing this information electronically was difficult for scientists in other parts of the country; this was only partially solved in 1961 with the creation of the Science Citation Index and later its sister application, the Social Science Citation Index, by Eugene Garfield, PhD.<sup>9</sup> These indexes are owned and published by the Institute for Scientific Information, which was acquired by Thomson Scientific in 1992. In 1971 MEDLINE, an electronic database of the scientific literature in medical and other health-related journals and publications, was launched by the NLM and became one of the premier tools for health sciences researchers. Initially, access to MEDLINE was brokered by reference librarians, which made frequent or spontaneous use awkward in the daily life of most scientists. Such use could also be expensive; a charge per reference had a chilling effect on financially strapped graduate students and unfunded assistant professors—the very users who most needed such access.

The rules for searching MEDLINE were also complicated. Reference librarians had to undergo specialized training to master the intricacies of the search, and not all research libraries had specialized personnel. Nonetheless, the availability of an electronic database that could be searched to locate specific studies was a major advantage for health scientists engaged in research synthesis.

Gradually an infrastructure for an electronic bibliographic database became more refined, with standardized key words and more easily understood rules for creating a search strategy. Although scientists intent on using the electronic version of MEDLINE were still bound to one of the research libraries, and bound even more tightly to the services of a knowledgeable librarian, this ability to access the research literature was a major advantage. The number of research publications had already begun an upswing by this point in time. This is reflected in the rate of growth shown in Figure 1-1 for the period after MEDLINE became available, although cause and effect have not been clearly established between the development and the rate.

The period since MEDLINE's inception has seen the creation of myriad other bibliographic databases, such as PsycINFO, International Pharmaceutical Abstracts, and CINAHL. Two additional bibliographic databases were launched around the turn of the 21st century: PubMed in 1997 and PubMed Central in 2008. PubMed, based in the NLM, provides worldwide access to MEDLINE on the Internet. Anyone—scientist or layperson—now has access to the MEDLINE database of over 18 million references just by signing onto its website. Not only is PubMed free, but the use of MEDLINE is no longer tied geographically to a library or restricted to the availability of a qualified librarian. All that is needed is a computer and access to the Internet.

PubMed Central, a part of the NIH, is a free digital archive of biomedical and life sciences literature. The goal of PubMed Central is to provide full-text papers, not just abstracts, of scientific research funded by the NIH. These two databases, PubMed and PubMed Central, are interrelated, and together they provide rapid and often complete access to research publications.

### ***Electronic Tools***

Only a few examples of developments in the second category, electronic tools, are described, beginning with the microcomputer. Without a doubt, the introduction in the mid-1970s of a reasonably priced personal computer represents a seminal event in any historical description of the late 20th century. For reviewers of the literature, the availability of a personal computer vastly improved the quality of scholarly life. Word processing software, together with information in bibliographic databases, made the tasks of searching and abstracting the scientific literature far more efficient.

There continued to be other problems, however, one of which was the lack of a standardized format for citations and references to articles in scientific journals or books. If a health scientist had to switch from one formatting system to another in the preparation of a paper or report, then he or she was forced to go back through the entire document and make the changes one by one. Although there is still no single, universal format, another kind of solution was developed. In the late 1980s, two reference management software packages were produced that automatically made changes from one formatting system to another, thus providing some relief for time-strapped researchers. Academicians created both software products. EndNote was introduced in 1988, and ProCite was introduced in 1989.

RefWorks, introduced in 2002, is a web-based product that is generally available to faculty and students through an institutional subscription from university and college libraries. Not only do these software packages satisfy their original intent of allowing the user to switch from one reference formatting system to another, but they now have additional features such as the creation of a reference library on the user's own computer or web-based document, a search and sort capability, a seamless download of a reference and its abstract from electronic bibliographic databases to desktop computers, and the flexibility of user-defined information for each reference.

The impact of reference management software packages does not equal that of the personal computer in a list of important developments in the history of research synthesis or information management. Nevertheless, these software products are good, solid tools for everyday use and are like a set of well-honed kitchen utensils compared with the discovery of fire—the latter is necessary, but after that is available, the former makes the job easier.

Like the personal computer, another advance comparable to the discovery of fire was the establishment of the World Wide Web in 1989. With the Web, individual researchers have free and unlimited worldwide access to information, not only among each other, but also from banks of information such as the electronic bibliographic databases and other scientific forums that have rapidly proliferated. The use of these electronic tools in combination with bibliographic databases, together with an increase in the absolute number of scientific publications and NIH grant dollars, contributed to developments in the third category of development: synthesis applications.

### ***Synthesis Applications***

It is easy to imagine that if the same rate of growth in scientific publications had been seen in the financial market, investors would have been ecstatic. There was more research, better science, and an exponential growth in new information, but the scientific community pondered how to make use of it. How could this growing reservoir of scientific knowledge be managed and used for the betterment of humankind or, at least, for individual patients? Three developments in the late 1990s illustrate a response to these issues: practice guidelines, evidence-based medicine, and the Cochrane reviews of clinical trials. These developments are shown at the far right of the timeline in Figure 1-1. Before

their appearance, however, a new methodological technique, meta-analysis, was proposed in the mid-1970s, just before personal computers and the Web became available.

## ***Meta-Analysis***

Gene Glass, a professor of education, was one of the first to outline a way of statistically summarizing the results of multiple studies on the same topic. His initial paper was published in 1976.<sup>10</sup> Health scientists quickly saw the advantage of this technique and began to apply it to biomedical research studies. The use of this and other techniques contributed to the development of the following prime examples of synthesis applications in the 1990s:

- Clinical practice guidelines generated largely by the Americans
- Evidence-based medicine created by the Canadians
- Reviews by the worldwide Cochrane Collaboration led by the British

All of these resulted from national and international collaborations, made possible by local, national, and international funding. These developments depend on the resources of bibliographic databases, electronic tools, and an intense commitment to making use of available research findings to improve the health care of individuals and the public.

## ***Clinical Practice Guidelines***

Practice guidelines were developed with the intention of providing practitioners, such as physicians, nurses, and allied health professionals, with sound strategies based on the scientific literature for delivering the best possible health care. A formal definition of a clinical practice guideline was provided by the Institute of Medicine in 1992.<sup>11</sup>

In 1993 the first practice guideline was commissioned and funded by the Agency for Health Care Policy and Research (AHCPR), a federal granting agency created by Congress in 1989. Over the following 5 years, AHCPR commissioned practice guidelines on 19 topics that were published between 1992 and 1998. Examples of topics include acute pain management, depression in primary care, HIV infection, otitis media with effusion in children, and poststroke rehabilitation.

In conjunction with the American Association of Health Plans and the American Medical Association, AHCPR developed the National Guideline

Clearinghouse website, <http://www.guideline.gov>, dedicated to enhancing access to the guidelines in 1998. Currently, the successor of AHCPR (the Agency for Healthcare Research and Quality) has redefined its role as that of facilitator to other organizations, such as specialty societies or managed care organizations or local groups of clinicians, in their development of future practice guidelines.

### ***Evidence-Based Medicine***

The basic concepts of evidence-based medicine were conceived by a group of academicians at McMaster University in Hamilton, Ontario, led by Professor G. H. Guyatt. The medical school at McMaster has long been known for its innovativeness in medical education, and these clinician–scholars expanded their audience from a classroom of medical students in southern Canada to healthcare providers throughout the world.

Guyatt and his colleagues recognized the need for members of the medical community to improve their ability to evaluate and use the scientific literature.<sup>9</sup> An ongoing series of users' guides, published in *JAMA*, has provided a set of tutorials for clinicians on such diverse topics as how to use articles about diagnosis, prognosis, grading healthcare recommendations, and applicability of clinical trial results. A list of such articles from 1993 to 2000 is provided in Appendix A.<sup>12–44</sup> The concepts of evidence-based medicine have been adopted by clinicians in other disciplines, including nursing, dentistry, and pharmacy. A term with broader application has begun to emerge, that of evidence-based practice. The relationship between evidence-based practice and clinical practice guidelines has not been fully examined, although logically they are closely linked. Clearly what they have in common is a foundation of scientific literature that has been carefully reviewed and systematically abstracted. At its simplest, evidence-based practice is what a practitioner such as a physician or nurse–clinician does one-on-one with a patient, whereas practice guidelines provide guidance for best clinical practice.

### ***The Cochrane Collaboration***

An example of a more recent development of a synthesis application is that of the Cochrane Library, an electronic library of systematic reviews of the clinical literature created and maintained by the Cochrane Collaboration.

In 1992 a nonprofit organization, the Cochrane Centre, was created in Oxford, England, in response to concerns expressed 20 years earlier by Archie

Cochrane, a British epidemiologist.<sup>45</sup> An outgrowth of the Centre was the establishment in 1993 of the Cochrane Collaboration, an international, voluntary, collaborative effort to provide systematic and critical reviews of randomized, controlled trials of health care.<sup>46</sup> Participants in the collaboration are organized through collaborative review groups that include researchers, healthcare professionals, and consumers throughout the world, including experts in the United States and Canada.

The ongoing mission of the Cochrane Collaboration is to prepare, maintain, and promote the accessibility of systematic reviews of the effects of healthcare interventions. Current information about the Cochrane Collaboration can be found at <http://www.cochrane.co.uk>.

The Cochrane Collaboration is an example of the international, multidisciplinary nature of the current field of research synthesis. Communication is rapid and easily accessible via the Internet. Lay audiences can readily obtain information available in the Cochrane Library. Thus, the Cochrane Library has an important role to play in the democratization of healthcare information. The availability of the Cochrane Library dates back to the mid-1990s. The further development and impact of this resource for health professionals, policy makers, and consumers bear close scrutiny in the future.

This brief history of the emergence of the field of research synthesis in the health sciences has focused exclusively on developments in English language systems, and largely in North America, with some mention of the role of the British. Linguistic and geographic boundaries of science are disappearing daily, however, and the full scope of developments and use of research synthesis cannot be confined to a single language or these few countries. Globalization exists in the scientific arena, including the private sector.

In the future, the history of research synthesis will need a broader cultural and linguistic perspective to provide a complete understanding of the impact of this discipline on the health of people. The role of the Internet, the importance of multidisciplinary collaboration, and access to scientific knowledge by people who are not health professionals will also be important factors in understanding how research synthesis can have an impact on the health and lives of people throughout the world.

For the present, the surfeit of information in the health sciences literature presents both a challenge and an opportunity. A systematic way of conducting a literature review incorporating the efficient use of those resources is needed. The Matrix Method offers one such system.

## The Matrix Method: Definition and Overview

The Matrix Method is both a structure and a process for systematically reviewing the literature. The structure is provided by the Lit Review master folder that contains all of the notes and documentation you accumulated as you reviewed the literature. The Lit Review master folder includes four other folders, as shown in Exhibit 1–1, consisting of the following:

1. Paper Trail folder—keeping track of where you have been: This is a record of the search process used to identify relevant materials. Examples include notes about the materials examined, key words used to search the electronic bibliographic databases in the library, and instructions for electronic searches. Think of this as a chronologic diary or personal blog about the process you went through as you conducted this review of the literature.
2. Documents folder—organizing documents for review: This section includes a downloaded copy, PDF file, or link of the journal articles, book chapters, and other materials gathered for your review of the literature. These are the documents used to create a review matrix, which goes in the third folder.
3. Review Matrix folder—abstracting each document: The review matrix is a spreadsheet or table with columns and rows that you use to abstract selected information about each journal article, book chapter, or other materials included in your review of the literature.
4. Synthesis folder—writing the review of the literature: This is the outcome of your use of the Matrix Method, a written synthesis of your critical review of the literature based on the materials you abstracted in the review matrix.

In addition to structure in the form of a Lit Review master folder, the Matrix Method also provides a process for how to create and use the materials in each of

**Exhibit 1–1 Structure of the Matrix Method: Section of the Lit Review Master Folder**

Type of Folder	Purpose
• Paper Trail folder	Keeping track of where you've been
• Documents folder	Storing documents for review
• Review Matrix folder	Abstracting each document
• Synthesis folder	Writing the review of the literature



the four folders. The Matrix Method was specifically designed for reviews of the health sciences literature, but it can be used for reviews of the literature in any field by anyone at any level of expertise, from novice to seasoned reviewer. The key to the versatility of the Matrix Method lies in the use of the review matrix, which is described briefly here.

In the first two editions of this text, a lit review book was described as a three-ring notebook with four sections. This was a hard copy approach to creating and using the Matrix Method. With the third edition, however, the Matrix Method was converted to an electronic system through the use of a master folder and four separate subfolders. If you want a hard copy approach, locate the second edition of this text. If that is not possible, substitute a three-ring notebook for the master folder, and create four sections with tab dividers, one each for the four types of folders in Exhibit 1–1.

## Review Matrix: A Versatile Tool

With a review matrix, you create a structured abstract of all the source documents from your literature review. A review matrix is like a spreadsheet or a table—a rectangular arrangement of columns and rows. All that is needed to set up a blank review matrix is a blank spreadsheet or the table option in a word processor.

The columns across the top of a review matrix are the topics or headings you use to abstract each document or study. The rows down the page are the documents or studies. The point at which each column and row meets is a cell, which is where you write notes about a document. An example of the format for a review matrix is shown in Exhibit 1–2, in which there are four columns and two rows. Each column has a topic—such as author/title/journal, year, purpose, or type of study design—and each row consists of a journal article. Thus, the review matrix is a place to record notes about each article, paper, study, or report on the basis of a standard set of column topics.

Column topics can range from very general to specific. For example, a review matrix for Shakespeare’s plays might include these column topics: setting, characters, protagonist, antagonist, and psychological theme. Alternatively, if the focus was on the scientific literature, the matrix would feature other kinds of column topics: hypothesis, independent variables, dependent variable, methodological design, and sampling design.

**Exhibit 1–2 Example of the Format of a Review Matrix**

<b>Column 1</b>	<b>Column 2</b>	<b>Column 3</b>	<b>Column 4</b>
Example: <b>Author, title, journal</b>	Example: <b>Year</b>	Example: <b>Purpose</b>	Example: <b>Type of study design</b>
Row 1 Journal article 1	1995	Drug treatment for epilepsy	Experimental study
Row 2 Journal article 2	1997	Drug treatment	Case-control study for depression

No matter the level of expertise or area of focus, you are entirely in control of the review matrix. You decide which column topics to use and which documents or studies to review. The process you use to make those decisions—which topics, which documents—is described in this text. In the course of making those decisions, abstracting the articles, and writing the synthesis, you begin to take ownership of the literature.

## Overview of Chapters and Appendices

The creation and use of the review matrix and Lit Review master folder are described in the remaining chapters. Although the Matrix Method can be applied to the literature on just about any topic, there is an emphasis throughout this text on the health sciences. The nine chapters in this text are organized into the following three parts:

- ■ Part I. Fundamentals of a Literature Review—Chapters 1 and 2
- ■ Part II. The Matrix Method—Chapters 3 through 6
- ■ Part III. Applications Using the Matrix Method—Chapters 7 through 9

Chapters 2 through 9 are described briefly here, followed by an overview of the Appendices. At the end of each chapter is a section titled “Caroline’s Quest,” which includes practical examples of how the concepts can be applied.

## ***Chapter 2: Basic Concepts***

This chapter consists of definitions of concepts that are fundamental in any review of the literature, especially those used in the Matrix Method. Also included in this chapter is a description of the different parts of a typical scientific paper published in most health-related journals. If you know where to find specific topics, then you will be in a better position to abstract the study. Chapter 2 also describes the basic elements of a methodological review of the literature. These elements can be used as the sole basis of a review, or more realistically, as a list of possibilities for inclusion, together with the content of the field under review. A list of potential column topics for reviewing the research methodology in the scientific literature is given in the section “Guidelines for a Methodological Review of the Literature.”

## ***Chapter 3: Paper Trail: How to Plan and Manage a Search of the Literature***

This chapter describes what steps to take in doing a review of the literature, how to develop a key words list, how to locate source materials, how to use the snowballing technique, what to consider in a computer search of established databases such as MEDLINE, PsycINFO, and Science Citation Index, and use of the Internet.

## ***Chapter 4: Documents Folder: How to Select and Organize Documents for Review***

This chapter includes a description of how to choose documents and organize journal articles and other source materials. The advantages of maintaining a chronologically ordered set of pdf files or other types of electronic copies in the Documents folder are also discussed.

## ***Chapter 5: Review Matrix: How to Abstract the Research Literature***

The review matrix is the heart of the Matrix Method. This chapter describes how to set up a review matrix, including issues such as choosing topics to abstract,

variations in topics, addition of topics later in the process, and a step-by-step guide for constructing the review matrix.

### ***Chapter 6: Synthesis: How to Use a Review Matrix to Write a Synthesis***

This chapter is a description of how to use the review matrix to critically analyze and write a review of the literature, including a discussion of the differences between a summary and a synthesis.

### ***Chapter 7: A Library of Lit Review Master Folders***

This chapter describes the advantages of maintaining a collection of Lit Review master folders for use over time, or by a team of people, or across interrelated topics. Specifics include how to create and expand a library of Lit Review master folders.

### ***Chapter 8: The Matrix Indexing System***

This chapter describes a system for integrating information from electronic databases and reference libraries created with reference management software and copies of papers in the Documents folder in the Lit Review master folder. The advantages of this system are discussed, together with information about how to set up and use such a system.

### ***Chapter 9: Matrix Applications by Health Sciences Professionals***

This chapter describes four kinds of applications for the experienced health sciences professional. These include the use of the Matrix Method in (1) conducting a research project, from writing a grant proposal to publishing the results; (2) standardizing the review process for a meta-analysis; (3) creating and using clinical practice guidelines; and (4) applying the concepts of evidence-based medicine.

### ***Appendix A: Useful Resources for Literature Reviews***

This is a handy list of books, journals, and Internet websites that can be useful when searching for scientific literature that is not available in the standard sources. The appendix is a potpourri of useful information.

## ***Appendix B: Structure of Computer Folders for the Matrix Method***

This appendix describes how to create and organize computer folders on your desktop for the Matrix Method. Examples are given to help you understand this structure before you use the Matrix Method to review the literature.

## ***Appendix C: Data Visualization: A Digital Exploration***

This appendix describes recent advances in data visualization and how these resources could be used in describing scientific research. In this appendix, you go into a digital environment and explore the possibilities for the use of data visualization for a review of the literature now and in the future.

## **References to Websites**

Website addresses are given throughout the remaining chapters and especially in Appendix A. Each address on the Internet, called a universal resource locator (URL), was examined and determined to be accurate and functional at the time this text was published; however, the Internet is a dynamic environment, and URLs can change on an hourly basis. For this reason, neither the author nor the publisher is responsible for the accuracy of the URLs provided in this text.

## **Caroline's Quest: Understanding the Process**

Just as a picture can be worth a thousand words in explaining a concept, a practical example can be equally valuable in demonstrating how the process of using a strategy such as the Matrix Method. With that in mind, each of the nine chapters in this text will conclude with a description of the experiences of a typical graduate student, Caroline Collins, as she learns about matrix applications. Caroline Collins is learning how to use the Matrix Method and the Matrix Indexing System to review the literature on smoking behavior for her master's thesis in public health. Caroline's thesis topic is the characteristics of teenage girls who smoke.

Caroline tends to be a bit impatient and will occasionally try to take shortcuts to avoid some of the more time-consuming details of the Matrix Method. Fortunately, she meets weekly with her advisor, Professor Dickerson, who gives her advice about using the matrix applications. Caroline's experiences and Professor Dickerson's explanations illustrate not only the process but also the rationale for why certain steps in the Matrix Method are needed and how the Matrix Indexing System can help her organize her materials.

In medieval times, a quest was a chivalrous enterprise involving an adventurous journey that often required courage or determination. In modern times, a quest is defined as a search or pursuit. Although Caroline does not have to deal with dragons in the library, her review of the literature does require persistence and determination in her pursuit of knowledge—a pursuit that is occasionally adventurous. Thus, in both the modern and the ancient senses of the word, Caroline has embarked on a quest.

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