The Scope of This Book

1.1   INTRODUCTION: THE AUDIENCE FOR THIS BOOK

The aim of this book is to provide an introductory handbook for anyone wishing to conduct research—or more informally, inquiry—on an aspect of the built environment—from the scale of a building component, a room, a building, a neighborhood, to an urban center.

By this we mean to suggest that this book is intended to be both comprehensive and an entry point. Our intent is to be comprehensive by providing a single text that addresses the full range of research methods available and applicable to the diverse array of topics germane to architectural research. Our intent is also to offer an entry point by introducing readers to the major characteristics and applications of each research method, while simultaneously providing references to more specific books and articles on the methods of interest.

This overarching goal, as articulated in the introduction to the first edition of this book, remains a constant. However, both the nature and role of architectural research, as conducted in the academy and practice, have gradually shifted over the decade since the first edition was published in 2002. Some areas of inquiry—for example, the multiple dimensions and applications of sustainable design—have become relatively more prominent. Other research foci (e.g., the application of notable schools of thought such as critical theory or poststructuralism to design theory) have waned in some contexts, while the hands-on exploration of digital technologies and prototype fabrication has become a significant emphasis in many settings.

In the academic context specifically, the number of doctoral programs in architecture has increased and now figures at close to 30 programs in North America

alone; many schools have likewise initiated or expanded research-based master's programs and/or research studio options.[1] Worldwide, countless other research-oriented programs in architectural and environmental design fields are available to students. Not surprisingly, given the expansion of doctoral programs, the proportion of faculty with PhDs has now risen to over 25% in U.S. architecture programs.[2]

In the realm of practice, the shifting tides of the economy as well as the competitive pressures among professional fields have led many firms to reshape the contours of their practices. Many have incorporated or expanded new realms of services (from distinct specialty niches to expansion into design/build) or sought to enhance collaborative relations with other professional specialists.[3] Many of these initiatives entail an enhanced role for research in professional practice.

Taken together, the recent evolution of the research enterprise in academic and professional settings has, at least from our vantage point, led to an increasing convergence among the constituent audiences for this book. So, although the various audiences are addressed separately in the following paragraphs, we see many overlaps and intersections among them. Certainly, over the course of a lifetime career in architecture or allied field, most people will find themselves in every audience category listed below.

1.1.1   *Students in Doctoral and MSc Programs*

Compared to many other disciplinary and professional fields, architectural research encompasses a relatively wider diversity of substantive foci and methodological choices. Even within academic research programs where there is a more narrowly defined research agenda, students will be well served by an appreciation of how their research specialty is situated within the full spectrum of architectural research, as well as within the entire multidisciplinary research enterprise. To this end, one of the aims of this book is to bring the most engaging and fruitful principles from the robust interdisciplinary discourse on methods to the architectural and design context.

1.1.2   *Faculty Scholars and Researchers*

For at least 40 years now, an increasing number of architectural faculty have chosen research and scholarship, rather than practice, as their academic mission. For faculty who are already well versed in research, this book may either provide a "refresher" text in methodological issues or perhaps expand their horizons beyond the research methods they are most familiar with. For faculty who are new to research, this book aims to serve as a broad introduction to the conceptual framework underlying the research design process.

1.1.3   *Master's and Upper-Level Bachelor's Students*

At some point(s) in their academic program, most, if not all, architecture students will be challenged to undertake some sort of research, whether it be a thesis project, research studio, or a subject area course. And as future professionals, students will need to develop the ability to critically review and understand the basic research foundation of all manner of architectural products and processes. Our intention is to provide a fundamental understanding about the multiplicity of research processes and standards that underlie research in architecture and allied fields.

1.1.4   *Architectural and Design Practitioners*

Although it may not yet be the norm, many firms have in recent years either developed or expanded their research capabilities, and some have established a distinct research arm or division. In some market areas, many client organizations now expect architects to be able to demonstrate capabilities in specific research-based practices, for example, "evidence-based design" (EBD) in the health care field.[4] Regardless of the scale or specialty niche of the practice, most designers will likely conduct some exploratory investigations or more focused inquiry—research, in other words—in the course of a design project. While certainly more limited than a typical research project in academia, the practitioner will still need to spend some time structuring and organizing the inquiry. This book provides the practitioner with a basic guide to thinking through how best to find the answers to the questions that arise throughout a design project.

1.1.5   *All Together Now*

Given the evolving convergence among the diverse readership outlined above, we have found the diagram in Figure 1.1 particularly useful. Overall, the diagram suggests the complementary nature of research and design. While we argue that design and research are relatively distinct domains of activity, they nevertheless share many comparable and similar qualities.

This particular diagram suggests the relative proportion of these two activities on the range of contexts in design and practice. The left-hand third of the diagram suggests that professional program students and practitioners are likely to emphasize design-related activities, while employing research less frequently and more episodically. The middle third of the diagram suggests that students in research master's programs, practitioners in consulting roles, and/or firms specializing in more focused areas of practice are likely to experience a more equal balance of activities. Finally, the right-hand segment of the diagram represents the context in

BArch/MArch	MS	PhD
DESIGN		RESEARCH
Practitioners	Consultants Specialist Firms	Faculty Scholars Research Scientists

Figure 1.1 The complementary nature of research and design.

which doctoral students, many research-oriented faculty, and research lab practitioners are more likely to find themselves. For them, the research activity is likely to dominate, even while the research questions may well flow directly from architectural design questions.

In sum, our goal is for each reader to find this book to be a valuable resource for whatever type and quantity of research activity she or he pursues. Our firm belief is that whatever our individual contributions to architectural research may be, ultimately these efforts will not only complement each other but will also substantially further the long-term vitality of the architectural field.

1.2 WHAT IS ARCHITECTURAL RESEARCH?

In one sense, architectural research has been conducted throughout the history of architecture. The development of particular structural forms or building materials over the centuries is the outcome of trial-and-error experimentation, systematic observation, and application of such building principles to other building projects. Take, for example, the development of the flying buttress, the first visible external examples of which are attributed to the nave of Notre Dame de Paris.[5] A combination of archaeological reconstruction and structural analysis conducted by authors William Clark and Robert Mark demonstrates the technical validity of what they conclude to be the original buttress design (see Figure 1.2). However, the authors argue that structural stress points resulting from that design, in conjunction with associated maintenance requirements, seem to have led to the major documented alterations to the buttress system early in the 13th century. More generally, continued modifications and systematic observations in subsequent cathedral projects led to further innovations, and so on. Parallel
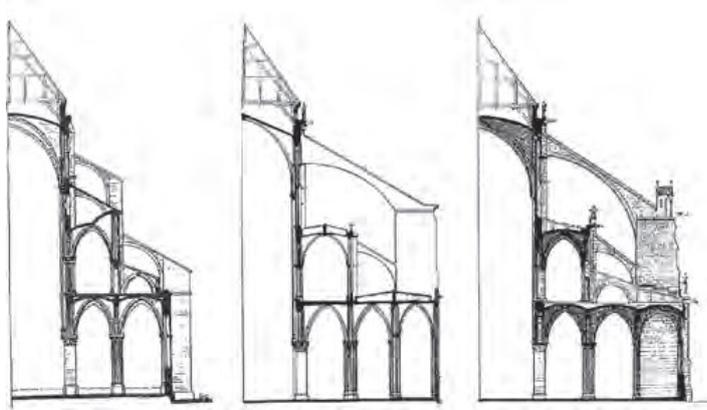
Figure 1.2 Flying buttress. (Left to right) After Sanders and Clark; Clark, after Leconte; Clark, after Chaine. Courtesy of William W. Clark.

developments in all manner of materials and structural innovation can be cited throughout the history of the field.

However, the conduct of architectural research outside the confines of specific building projects is a much more recent phenomenon. Although climate, product development, and building systems design seem to have been a focal point of research in the 1950s, the research enterprise in architecture emerged more broadly across a range of topic areas—including sociobehavioral issues, design methods, and energy conservation—in the 1960s and early 1970s.[6] It was during this period that funding from an array of federal agencies, from the National Science Foundation to the National Endowment for the Arts, became more widely available; university programs provided internal support for architecture faculty to pursue research topics; doctoral programs in architecture began to emerge in greater numbers; architecture-affiliated organizations such as the American Institute of Architects and the Association of Collegiate Schools of Architecture sponsored joint ventures to promote research; a few major architectural firms developed research-oriented divisions; and the professional journals began to publish evaluation studies and/or offer research award programs.

Over the past three decades, this great variety of research activity has continued, but often in a more varied way. Many areas of research have experienced an ebb and flow of funding and interest. Energy conservation, for example, was a dominant feature of much technical research in the 1970s due to the energy crisis, but received much less attention in the 1980s. From the 1990s onward, however, interest in and funding for research in sustainability has reintroduced many of the earlier issues, but now framed within a relatively new conceptual model.

Similar fluctuations in the scope of other substantive topics, the significance of particular theoretical influences, rapid advances in building technologies, innovations in design processes, and so on mean that architectural research will continue to encompass a breathtaking range of research endeavors. That is certainly all to the good, but it also means that mastering the range of research concepts and tools to address such a diversity of research questions is all the more challenging *and* rewarding.

One obvious starting point is simply to consider a basic definition of research. In one of the earliest compendiums on architectural research, author James Snyder provides a commonly accepted definition of research; it is "systematic inquiry directed toward the creation of knowledge."[7] Two elements of this definition are significant. First, the inquiry is systematic in some way. Although one might unconsciously acquire important information simply by strolling down the street observing the array of buildings in view, the notion of a systematic inquiry suggests that there is a conscious demarcation of how particular information is culled from the rest of our experience, how it is categorized, analyzed, and presented.

Most important, however, the term systematic is *not* conceived exclusively in terms of the classic notion of a "scientific experiment," a format of inquiry that is often appropriate to the task, but nevertheless regarded by critics in some fields as being too reductionist. While it is certainly true that structuring a study around precisely defined variables is reductionist, it is just as true that culling or coding key themes from an in-depth interview or historical archives is also reductionist. The truth is that *all* research is reductionist in some form or other. For research to be research, it necessarily involves reducing lived experience or observed phenomena to chunks of information that are noted and categorized in some way. The difference between a lab experiment, a qualitative study of a particular setting, or historical narrative is a consequence of choosing one strategy for reduction over another.

Second, the notion of knowledge creation is frequently cited as characteristic of the research endeavor. To many readers this may seem to imply something on the scale of grand theories of various sciences, akin to Einstein's theory of relativity or geological theories of plate tectonics. Although such theories certainly encapsulate new knowledge, we do not mean to suggest that such theories are the only model of knowledge creation. Rather, we would argue that new knowledge can also emerge through the relatively small increments of knowledge attained through a variety of means, including assessing the outcome of integrating two previously distinct functional building types; materials testing through a series of built projects; or evaluating the success of particular building forms in communicating intended meanings in the public realm.

Finally, though much architectural research may well focus on the physical outcomes of design—from the scale of building components to neighborhood and urban design—research on the processes of design and the practices of architectural firms is just as vital. This is all the more true as a consequence of the use of computer technology in multiple phases of the design process. Also, significant changes across a variety of professions in response to global economic trends make research on the structure and scope of architectural practice key to the future of the profession.

1.3   A CONCEPTUAL FRAMEWORK FOR SITUATING METHODOLOGY IN RESEARCH: STRATEGY AND TACTICS

Having established parameters for defining architectural research, and research in general, the challenge of clarifying "methods" becomes central. In his classic book, *The Conduct of Inquiry*, Abraham Kaplan defines methods as the study of the process, rather than the product, of inquiry.[8] More specifically, he argues for using the term *methodology* for "mid-range" aspects of the research process that are common to a broad range of disciplines. Thus, he is seeking to articulate the processes of inquiry that are simultaneously more *general* than specific techniques of interviewing, archival searches, or data collection and analysis, while also being more *specific* than broad epistemological perspectives that entail assumptions about the general nature of knowledge or being.

Following Kaplan's lead, we use the term *methods* or *methodology* to focus on research processes which are common across the entire range of architectural research, including content areas from the technical to the humanities, and from the most applied to the most theoretical. Figure 1.3 represents a nested set of four frames that describe the conceptual framework in which the level of methodology, or research design, is situated. The outermost framework represents the system of inquiry (sometimes labeled a paradigm or worldview), which entails broad assumptions about the nature of reality, knowledge, and being. For example, the belief system called postpositivism assumes that there is an objective reality that can be experienced and measured. Postpositivism and other systems of inquiry are discussed in considerable detail in Chapter 3.

The next frame represents what we call a "school of thought," a broad theoretical perspective that has significantly influenced multiple disciplines. For example, critical theory and phenomenology operate at this level; and each has significantly influenced the conduct of research in architecture, as well as many other disciplines. These and other schools of thought will be considered and analyzed in Chapter 3
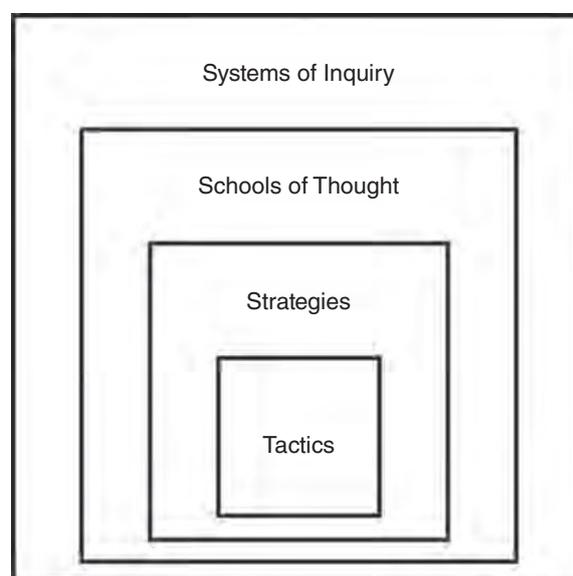
Figure 1.3   The methodological practices of strategies and tactics are framed by broader systems of inquiry and schools of thought.

as well. The adoption of a particular school of thought is likely to influence how research questions are framed, and often imply the use of specific modes of analysis.

Although it is entirely possible to design a research study without aligning it with a particular school of thought, every piece of research is inevitably framed by a system of inquiry, whether explicitly stated or not. Everyone who conducts research is making assumptions about the nature of the world and how knowledge is generated.

Moving on to the relationship between the "mid-range" of methodology and the more specific level of techniques, we have adopted the semantic distinction between *strategy* and *tactics.* This is a common—though not universal distinction—adopted by other authors writing about research methods.[9] Loosely derived from its military origins, the term *strategy* is defined as "the skillful management and planning of anything."[10] This contrasts with the more detailed level of tactics, defined as "any skillful move." In the military sense of these words, *strategy* refers to a nation's overall war plans, whereas *tactics* refers to the disposition of armed forces in combat.[11] In the context of our discussion of research, a strategy refers to the overall research plan or structure of the research study. In contrast, the tactics refer to a more detailed deployment of specific techniques, such as data collection devices, response formats, archival treatment, analytical procedures, and so on.

Thus, we have defined a conceptual model of concentric frames. At the broadest level, the system of inquiry (often linked to a school of thought) frames—but does not predetermine—our choice among a range of methodologies, or strategies. Within any system of inquiry, there are multiple choices of research strategies. Similarly, the choice of research methodology then frames—but does not predetermine—the choice of tactics. Again, multiple tactics are possible within any research strategy. However, there should be coherence and continuity among the four frames of system of inquiry, school of thought (if employed), strategy, and tactics.

We emphasize the conceptual model of the nested framework throughout this book because we firmly believe that it provides a starting point for researchers at all levels of experience, but especially for novice researchers, in refining the conceptual clarity of their inquiry. Indeed, it is not at all uncommon to hear a discussion of research design in which the speaker might remark about his or her choice between using an experimental design and a survey; we would argue that this is mixing up strategy (experiment) with tactics (survey, which is a technique for data collection). Similarly, if someone claims to be doing a phenomenological study, that may accurately reflect the school of thought that frames the research question, but it says nothing about the strategy, the actual plan or organization of the study.

Another term we will frequently use as synonymous with strategy is *research design.* In colloquial terminology, a research design is "an action plan for getting from here to there,"[12] where *here* describes the investigator's research question(s), and *there* describes the results or knowledge derived from the research. In between the here and the there is a set of steps and procedures that may range from being highly prescribed to being emergent as the research proceeds.

More to the point, the term *research design* is one that is particularly appropriate for a readership trained in architecture and/or other design disciplines. In architecture, we often speak of a "parti" in describing the formal organizing concept of a design scheme. Similarly, we often refer to a variety of formal "types"—such as a courtyard form or 9-square plan—that specifies generic spatial relationships (see Figure 1.4). The important point is this: Just as a courtyard plan can be used for such varied purposes as college dorms, houses, museums, or office buildings, a given research design can be employed for a variety of topic areas of architectural research, from thermal comfort studies to analyses of aesthetic theories.

This focus on the formal structure of research designs across a variety of topic areas is also consistent with our goal of providing an integrative framework for architectural research. A common tendency in architecture has been to divide "knowledge" into domains associated with particular subdisciplines. As a consequence, insights derived from research in energy-efficient technologies cannot
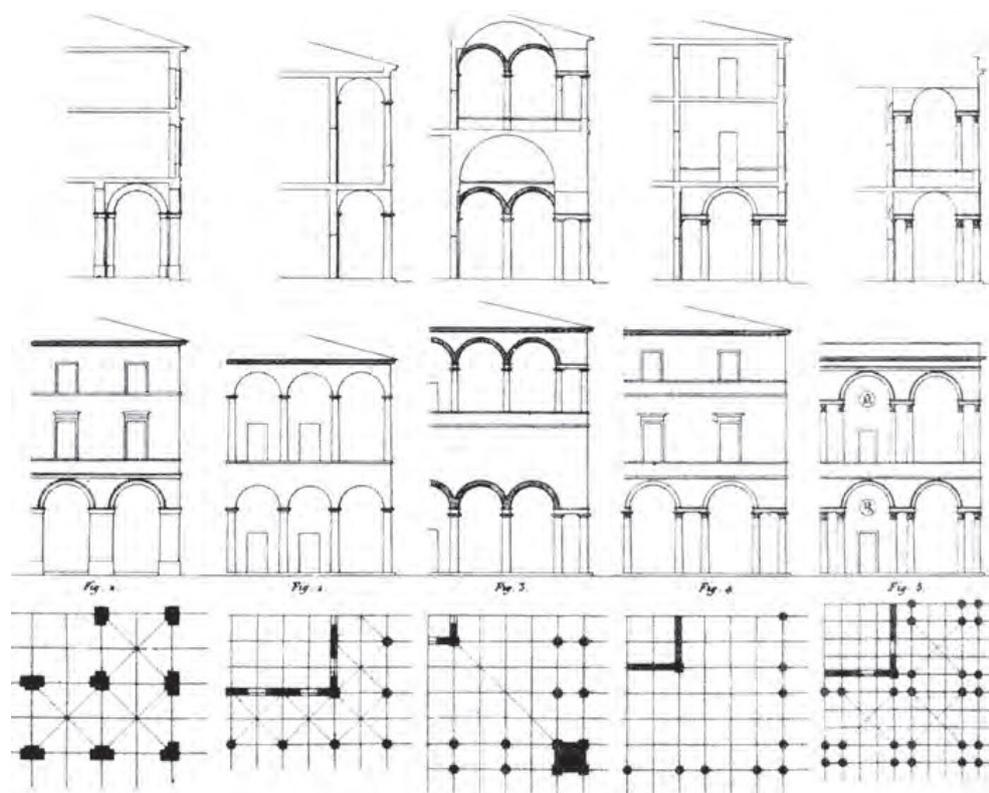
Figure 1.4   The notion of research design as a "type" is analogous to Jean-Nicolas-Louis Durand's development of formal types in architecture.

easily be integrated with insights drawn from aesthetic analyses of exemplar buildings.[13] Yet, we believe that much innovative and needed research in architecture will require integration across such apparently discrete topic areas. By organizing this book in terms of common research designs or strategies, it will be more clearly possible to focus on the commonalities of architectural research across a variety of topic areas and subdisciplinary foci.

In the subsequent chapters of the book, we will address, in turn, each of seven major research strategies, or designs. We have purposefully chosen substantively neutral terms for these research strategies. The intention is to be descriptive of the *structure* of the strategy, and to eschew any assumptions about the subject matter of the research. Readers who scan the table of contents will not see chapter titles containing the familiar terms *theory/criticism research, human behavior research,* or *sustainability research.* Indeed, we hope that this will encourage all of us to think *out of the box.*

Finally, any one book can never be all things to all people. We have intentionally emphasized the level of methodology, or research design, because we believe it is at that level that readers will be most able to appreciate the vast diversity of possibilities in conducting architectural research. Throughout the book we provide examples of how various tactics have been deployed in a broad range of subject areas. Nevertheless, for readers who want to know the ins and outs of survey design, or the best simulation programs for particular technical analyses, we advise readers to begin by reviewing some of the references already cited in our book, supplemented by a search for the abundant literature on all manner of specific tactics.

1.4   WHAT'S NEW IN THE NEW EDITION?

At the beginning of the chapter, we alluded to some of the major shifts over the past decade in the contours of architectural education, practice, and research. In the context of architectural research, in particular, the ebb and flow, substantive emphases, and innovative methodological trends have led us to introduce this second edition of *Architectural Research Methods.* Over the time since the first edition was published we have taken note of comments and suggestions from students and colleagues, in person and often by word of mouth.

While the overall organization of the book remains quite similar, we have made a significant number of changes in the following respects:

- In Part I, we have resequenced, reorganized, rewritten, and added new content to the entire set of five chapters.
- In recognition of the heightened level of discussion on the relationship of design and research, we have expanded on our analysis of this issue, devoting the entirety of Chapter 2 to this topic.
- The many steps in the development of an effective research design are now much more explicitly discussed in two chapters: one on identifying one's research purpose, and another that links the literature review with the pivotal role of the research question.
- Depending on the particular chapter, we have updated varying proportions of the research exemplars we have cited. For example, the chapter on simulation is chock-full of updated exemplars to illustrate several threads of advancement, including increased modeling capabilities, the blurring of modalities in the design process, and the increasing use of 3D and 4D in design concept development.
- In the research strategy chapters that reflect fewer dramatic shifts in either substantive topics or methodology, we have updated a number of citations, but we

have also decided to retain examples of *classic* research studies that are significant in the research tradition of the field. Other studies we have retained in the new edition because they enable us to make a very particular point about the methodological or theoretical issue we aim to illustrate.

- In the visual presentation of the material, we have not only included photos and drawings to reflect newly introduced research exemplars, but we have also redrawn and added new diagrams to clarify theoretical concepts and research processes.

We hope these changes and additions in this second edition serve to enhance the clarity of the material and illuminate the important developments in various domains of architectural research of the most interest to readers.

1.5   THE BOOK AHEAD

1.5.1   *Part I: The Domain of Architectural Research*

Chapter 2 addresses the recurring debate, and the subject of many recent articles and conference sessions, on the relationship of design to research. We analyze the ways in which the two domains of activity are distinct from each other, but likewise share many similar and comparable attributes. From this foundation, we consider the respective roles of research and design in the academic context, with particular attention to recent proposals for how to assess the equivalency of their intellectual and/or creative contribution.

Chapter 3 begins an exploration of commonalities across research strategies by addressing two foundational issues, which apply to research, in general. First, we discuss the range of paradigms—or systems of inquiry—that serve as the epistemological basis for any research study. Within this discussion we consider several frameworks for clarifying the relations between these systems of inquiry. Second, we then examine the similarities and differences in criteria for assessing research quality associated with different schools of thought. Discussion of the specific criteria is framed through a variety of exemplar research studies.

In Chapter 4, we consider the range of purposes for a research study as a starting point in research design. These include contextual purposes, as well as the substantive research purposes—whether geared toward theoretical development or practical application.

In Chapter 5, we discuss the essential, iterative process by which a literature review informs the process of realizing the research question(s), and vice versa. We also underscore the role of the research question(s) as a pivot point in the development of the eventual research design.

1.5.2   Part II: Strategies for Architectural Research

Before describing the particular foci of each of the next seven chapters (6 through 12), we describe here their common organizational structure. After a short introduction, we begin with several exemplars of the strategy being examined. In the main body of the chapter, we will discuss the basic characteristics of the strategy, citing further examples of architectural research. With the contours of the strategy clearly in mind, we will discuss some of the common tactics for information gathering and analysis employed within such a strategy. Along the way, we will describe some examples of recent and current research being conducted by students, faculty, and practitioners. A general discussion of the strengths and weaknesses of the strategy concludes each chapter.

Figure 1.5 represents a conceptual model for clarifying the relationship among the several research strategies; as such it also serves as the basis for sequencing the remaining chapters in the book. The basic diagrammatic form is a cylinder.
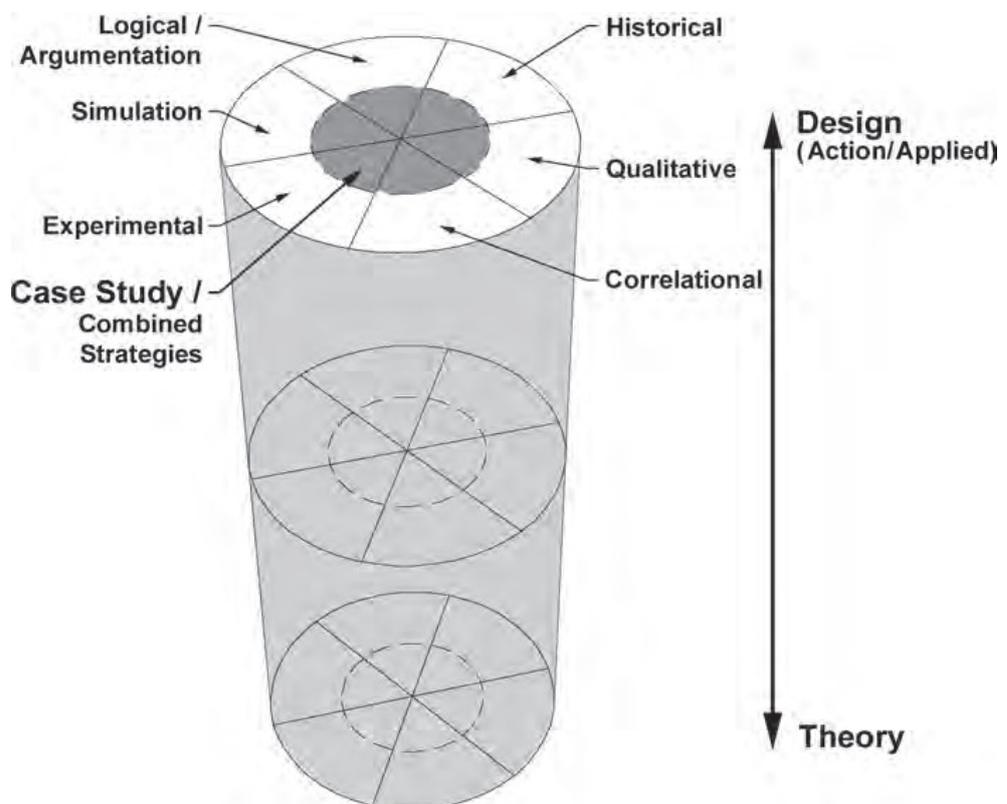

Figure 1.5   A conceptual framework for research methods.

The circular element is defined by pie-shaped wedges, one for each of the six main research strategies. At the center of the circle, there is a "core" that represents case studies and/or combined strategies. The periphery of the circle represents the more distinct and focused exemplars of each particular strategy.

Next, the vertical dimension of the cylinder represents the purpose or outcome of research, defined by the dimension from theory to design (or application). As we have already mentioned, architectural research may be undertaken for different purposes and in different contexts. Sometimes a study of a theoretical concept serves as the initiation of or the outcome of research. Other times, research, particularly in the context of practice, is likely to be initiated with a particular application as the intended outcome.

Finally, a critical feature of the diagram is the sequence of the research strategies within the circle. In the order represented here, each strategy is neighbored by others with common traits. Starting in a clockwise direction with the historical strategy, the diagrammed sequence reflects the chapter order of this book.

Chapter 6 explores the nature of the historical research strategy, which typically draws upon evidence derived from archival or artifactual sources, largely because the research question focuses on a setting or circumstance from the past (see Figure 1.6). In addition, because historical research frequently entails analyses of artifacts or circumstances over time, a narrative form is often employed.

Chapter 7 introduces qualitative research design. Like the historical strategy, qualitative research seeks to understand settings and phenomena in a holistic and full-bodied way (see Figure 1.7). But, whereas historical research seeks discovery through archival and artifactual material from the past, qualitative research typically focuses on social and cultural circumstances that are contemporaneous.
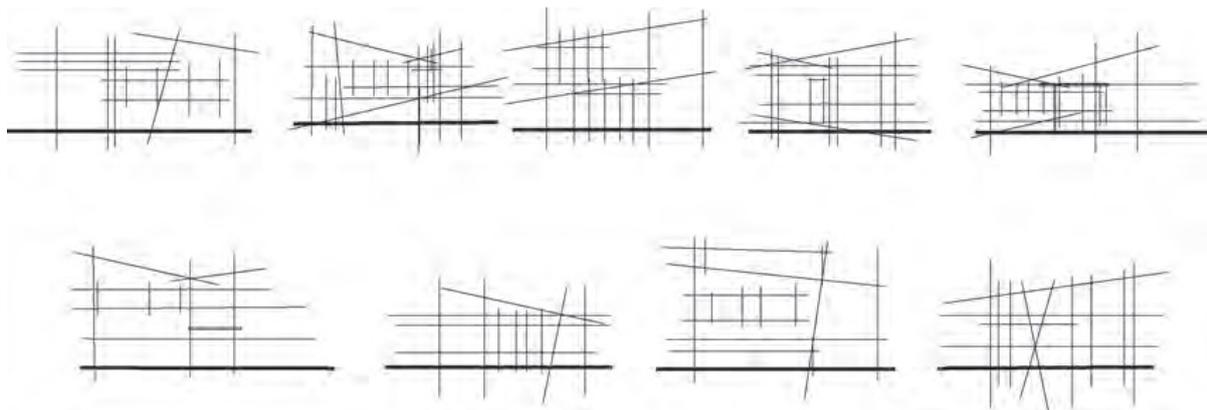

Figure 1.6   A compositional analysis of Popular Modernist housing in Brazil. Drawing courtesy of Fernando Lara.
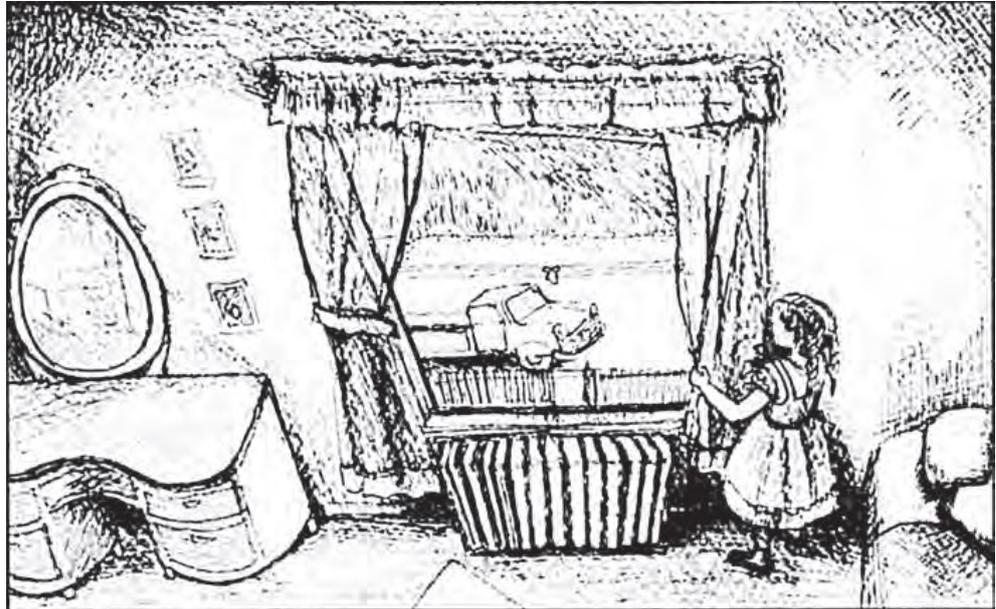
Figure 1.7   The bedroom window as a place of reverie and withdrawal. From Clare Cooper Marcus, excerpted from *House as a Mirror of Self*, copyright © 1995 by Clare Cooper Marcus, by permission of Conari Press.

Next, in Chapter 8, we move on to the correlational strategy. The signature characteristic of this research design is that specified variables of interest are observed or measured in a particular setting or circumstance. Correlational research, similar to the qualitative strategy, focuses on naturally occurring circumstances, but it makes use of more quantitative data.

In Chapter 9, we explore the nature of the experimental strategy, the research design that is the most completely codified in the research methods literature. Experimental research shares with the correlational design the use of measurable variables, but with a requirement for a treatment controlled by the researcher. For many researchers it stands as the preeminent standard for empirical research because of its precise manipulation of variables (often in a lab setting), with the goal of attributing causality.

Chapter 10 introduces the simulation strategy, which likewise involves control and manipulation of the simulated elements, but it can eliminate the need for empirical testing characteristic of experimental research. The essential characteristic of this research design is that some aspect of the physical environment is recreated in one of a variety of modes, from highly abstract computer simulations to a full-scale, real-life mock-up.

Chapter 11 addresses logical argumentation; it is a strategy that shares with simulation an emphasis on abstraction, but it also entails a self-contained system of logical order. In that regard, it is most similar to the philosophical or mathematical framing of closed systems. Although one uses words or sentences and the other numbers, both represent relatively pure forms of logical argumentation.

And so we come full circle; historical research depends on a constructed logic of interpretation, but that interpretation is based on documents and artifactual evidence, and typically entails a narrative structure.

Finally, in Chapter 12, we find both mixed research and case studies at the core of the cylinder. Although both are ubiquitous as research strategies in architecture, they are of necessity last in our sequence; to employ these overlapping strategies to good purpose requires a working knowledge of the many strategies that are considered in the previous chapters. Increasingly, it appears that researchers across many disciplines are seeking ways to marshal the benefits of two or more research designs. In a similar vein, many other scholars are gravitating toward case study research, a strategy in which a particular setting or circumstance is investigated holistically using a variety of data collection and analysis tactics.

The value of this diagram is as an aid for the researcher in clarifying the nature and structure of his/her proposed study. Just as a schematic diagram or parti in design can serve as a touchstone for the architect throughout the design process, a heuristic device such as this can help the researcher to *define* and *sustain* the essential quality of his/her research design. In principle, we can "locate" on the diagram any research project that you might envision; we invite you to do just that as you begin to explore the possibilities of research design for whatever inquiry you wish to undertake.

NOTES

1. According to the Association of Collegiate Schools of Architecture "Online Guide to Architecture Schools," http://acsa-arch.org/schools/guide-to-architectural-education. Accessed June 28, 2012.
2. "Documents," National Architectural Accreditation Board, www.naab.org/documents/home_origin.aspx?path=Public+Documents\Accreditation. Accessed June 12, 2012.
3. Clifford Pearson, "How to Succeed with Expanded Services," *Architectural Record* (January 1998): 50–55; H. McCann, "Even in a Drought It's Possible to Thrive," *Architect* (February 2010): 18–19; E. Keegan, "First Things First," *Architect* (June 2010): 25–26.
4. Hamilton D. Kirk, "The Four Levels of Evidence-Based Practice," Healthcare Design 3(4), (2003): 18-26.

5. William Clark and Robert Mark, "The First Flying Buttresses: A New Reconstruction of the Nave of Notre Dame de Paris," *Art Bulletin* 66(1) (1984): 47–65.

6. Roger Schluntz, "Design + Energy: Results of a National Student Design Competition," in James Snyder (ed.), *Architectural Research* (New York: Van Nostrand Reinhold, 1984), 39.

7. James Snyder, *Architectural Research* (New York: Van Nostrand, 1984).

8. Abraham Kaplan, *The Conduct of Inquiry* (San Francisco: Chandler, 1964).

9. Groat was first introduced to this vocabulary early in her research career by David Canter, then of the University of Surrey. Although the strategy/tactics distinction is not universally used by research methodologists, a number of authors do make use of it as well (e.g., Denzin and Lincoln, *Handbook of Qualitative Research* (Thousand Oaks, CA: Sage Publications, 1998); Mertens, *Research Methods in Education and Psychology: Integrating Diversity with Quantitative, Qualitative, and Mixed Methods* (Thousand Oaks, CA: Sage Publications, 2010).

10. C. L. Barnhart, *The World Book Dictionary* (Chicago: World Book, 1995).

11. Ibid., 2069.

12. Robert K. Yin, *Case Study Research* (Thousand Oaks, CA: Sage, 1984), 19.

13. Julia Robinson, "Architectural Research: Incorporating Myth and Science," *Journal of Architectural Education* 44(1) (1990): 20–32. See also Michael Joroff and Stanley Morse, "A Proposed Framework for the Emerging Field of Architectural Research," in James Snyder (ed.), *Architectural Research* (New York: Van Nostrand Reinhold, 1984), 15–28.