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Qualitative-Quantitative Research: A False Dichotomy

The research question initiates any research study. The research question is fundamental, much more fundamental than the paradigm (qualitative or quantitative) to which a researcher feels allegiance. In social and behavioral sciences, qualitative research is usually holistic, uncontrolled, exploratory, and carried out for purposes of understanding meaning. Quantitative research generally uses measured variables to test hypothesized relationships in more controlled situations. In the middle 1980s, the qualitative-quantitative dichotomy was being heavily debated, and discussion of the qualitative-quantitative debate began from that perspective—the primacy of the research question (Benz & Newman, 1986[1]). Subsequently, we built the model of the qualitative-quantitative interactive continuum. We persisted in holding onto the fundamental place of the research question as driving the researcher's decisions until after the first edition of this book was published in 1998. Then our perspective changed. A more scientific driving force, we concluded, is the research *purpose* (Newman, Ridenour, Newman, & DeMarco, 2003). Our threefold thesis in this book is that (1) the research purpose and the research question are the bases from which researchers make research design decisions, (2) validity is the framework through which one can assess the scientific quality of a research design, and (3) consistency among the research purpose, research question, and research methods establishes that validity.

This book describes our stance at a point in time, not final conclusions, which continue to emerge, to grow, and to build from our work as researchers and as teachers. The ideas in this book constitute a work in progress. Because the framework of the qualitative-quantitative interactive continuum presented here has been enlightening to colleagues and students for over twenty-five years, it might have value for contemporary research practitioners who work not only within the current context of frequently debated qualitative-quantitative research

but also under pressure to consider mixed methods—a potential way to think about integrating both paradigms (or sets of methods) within a study.

Chapter 1 includes

- the history of qualitative, quantitative, and mixed methods research
- the typical purposes and outline of qualitative research studies
- the typical purposes and outline of quantitative research studies
- the emergence of mixed methods research
- the five qualities of science in educational research
- why the phrase "quantitative-qualitative research" is a false dichotomy

The Evolution of Three Paradigms

Qualitative and quantitative research methods have philosophical roots in the naturalistic and the positivistic philosophies, respectively. Qualitative researchers generally adopt an individual phenomenological perspective. On the other hand, most quantitative research approaches, regardless of their theoretical differences, tend to emphasize that there is a common reality on which people can agree. The debate between the two paradigms has been characterized as a "war" between very different ways of seeing and experiencing the world (see Tashakkori & Teddlie, 1998, for a summary of the paradigm wars).

For example, from a phenomenological and qualitative perspective, Van Manen (1990) and Geertz (1973) believe that multiple realities exist. Multiple interpretations from different individuals are equally valid. Reality is a social construct. If one functions from this perspective, how one conducts a study and what conclusions one draws from a study are considerably different from those of a researcher coming from a positivist position, which assumes a common objective reality across individuals. The extent to which commitments to these assumptions about reality are exclusive varies among qualitative and quantitative researchers. For instance, Blumer (1980), a phenomenological researcher who emphasizes subjectivity, does not deny that there is a stable reality one must attend to.

The debate between qualitative and quantitative researchers is based upon the differences in assumptions about reality, including whether

or not it is measurable. The debate further rests on different beliefs about how we can best understand what we "know"—whether through objective or subjective methods.

The qualitative, naturalistic approach can be used when observing and interpreting reality with the aim of developing an explanation of what was experienced; an explanation might be considered a "theory." The quantitative approach is usually used when one begins with a theory (or hypothesis) and tests for confirmation or disconfirmation of that hypothesis.

It is important here to set the stage for not only abandoning the dichotomy but also to clarify how advocates of mixed methods have attempted to, in some way, integrate qualitative and quantitative research strategies. To begin, we examine a few of the key events in the evolution that established the qualitative-quantitative debate in the first place and how the potential of mixed methods has more recently come into that discourse. The debate may be but one more phase in the ebb and flow of an ever-changing philosophy of knowledge. To some, mixed methods may be a compromise, a way to integrate the qualitative and the quantitative paradigms. So also discussed in this chapter are the dangers of some applications of mixed methods as a potential panacea, a potential detour away from thoughtful, purposeful, and scientific research designs.

The genesis of the current qualitative-quantitative debate in educational research occurred as far back as 1844, when Auguste Comte claimed that the methods of natural science could be justified in studying social science (1844/1974; see also Vidich & Lyman, 1994). Science, in this view, is the collection and study of facts that can be observed through sensory input. These are the traditional data investigated by natural scientists, such as physicists, chemists, and biologists. According to this view, *true* science is accumulated through the study of phenomena that can be physically sensed, observed, and counted. The "unknowables," as Herbert Spencer described them in his 1910 essay, those things that cannot be sensed but might rely on reason or thought, are banished from scientific investigation. Both Comte and Spencer were positivists.

Interestingly, this "positivism" was a move away from a more speculative, more "unknowable" view, a move away from relying on theological and metaphysical explanations of the world. It was a move

toward what could be "positively" determined (confirmed through sensory data). The philosophy maintained a grip on social science from the late 1800s through the early 1900s.

In the early 1900s, John Dewey, among others, questioned the absolutism of this position, viewing science as not separate and distinct from problem solving. His pragmatism considered science less rigidly than did the positivists. In *The Sources of a Science of Education* (1929), written some time after his initial speculations, he pointed out that practice should be the ground of inquiry. Learning, he claimed, was based largely on practice as the learner interacted with the surrounding world. He appreciated the deeper complexity of what educational and social scientists study. During the same period, a group of scholars who made up what became known as the Vienna Circle met and developed a new philosophy of science, logical positivism. Supporting Comte's positivism, they combined it with the symbolic logic of mathematics. Hypotheses derived using the rigor of mathematics (symbolic) could be combined with fact-gathering (positivism) to test their confirmability (which was eventually modified to *disconfirmability).* Although counter to Dewey's efforts to diffuse the positivistic assumptions, this hypothetico-deductive system was dominant in psychology and sociology in the middle years of the twentieth century. Education, which borrowed traditions of inquiry from these disciplines, was affected as well. The respect for precision in measurement and mathematical systems to test hypotheses and a quest for value-free science solidified this paradigm (Lagemann, 2000).

During the 1940s and 1950s, the quantitative paradigm dominated the social science and the educational research worlds. Behaviorists and organizational theorists utilized empirical fact gathering and hypothesis testing almost exclusively in studying educational and social phenomena. In the 1960s, a subtle shift away from positivism began due to the growing skepticism toward the domination of logical positivism and the evident chasm between human social systems and mathematical logic. New epistemologies began to emerge that acknowledged the value-laden nature of human social interactions. That human beings construct reality for themselves and that knowledge itself is transmitted in social ways were beginning to be asserted. Questions arose about the tenability of applying natural science methodology to complex human dynamics.

In 1962, in *The Structure of Scientific Revolutions,* the most significant work on this issue, Thomas S. Kuhn explored the shifts in science's dominant paradigms. His doctorate in theoretical physics led him to look back into the history of science as he sought to know more about its foundations. He describes how, by randomly exploring the literature, he was exposed to Jean Piaget and, in the late 1950s, to an historical analysis of social science and psychology. Kuhn's study of methodology drove him to leave physics and become a historian of science. He conceptualized the notion of paradigms, "universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners," (1970, p. viii). He proposed that competing paradigms emerge chronologically when the dominant one no longer serves the explanatory needs of the scientific community. Using the context of physics from the perspectives of Isaac Newton and Albert Einstein, Kuhn explained these periods of competition, or scientific revolutions, in the natural sciences. He acknowledged that competing paradigms can possibly coexist on equal footing following such a revolution, or "paradigm shift," although, he cautions, it may be possible only rarely.[2] He proposed that the predominant paradigm affects researchers not only methodologically but also in how they see the world. Kuhn's conceptualization of "paradigm" has been reinterpreted by others, and many definitions are incorporated in the research literature.

Reaction to Kuhn was disparaging from both camps. The positivists feared he was undermining the dominant empirical world of science, and the postmodernists complained that he failed to destroy it. His controversial book ushered in an era of debate and dialogue about how researchers carry out their work and the assumptions of reality on which they rely. The debate between the empiricists and idealists[3] ultimately affected educational researchers as well.

The quantitative paradigm continued to reign over social science and prevailed in education until the mid-1980s. The strong traditional bias toward quantitative science seems consistent with Americans' preference for observable and countable facts, a sense that hard data are what science "is," a "Western" and technical way of thinking.

Logical positivism was losing supremacy in the 1980s. Concurrent with Kuhn's early notions of paradigms in the 1960s, society was undergoing radical changes. Some began to question the efficacy of

the positivists' tools in explaining human organizational and social phenomena. Educators were acknowledging a more complex social context. Culbertson (1988), pointing to such 1960s' and 1970s' issues as racial integration, poverty, equal opportunity, the place of schools as tools in global economic competition, the Soviet Union's threat to our math and science preeminence, and the need to account for the success and failure of the nation's children, posits that, in this context of increased complexity, some began to search for policy tools beyond the quantitative paradigm. For many key decision makers, quantitative research had not been sufficiently successful in addressing important educational problems.

Recognizing that education served economic, political, and policy ends enhanced the opportunity for scholars interested in the culture of schools to begin to use anthropological strategies in their inquiry. These strategies fueled the interests of feminists, critical theorists, and others who sought to study schools as mediators of power and privilege. Policymakers' interest in the world of classroom practice grew. They increasingly expressed concerns that research and practice were unconnected and that this disconnection was in part due to the use of tightly controlled laboratory-like quantitative assumptions. Some social scientists began to derive theory from practice, rather than the other way around. For example, the 1954 Stanford Conference offered a first formal setting to explore how anthropological research strategies could be applied in schools (Lagemann, 2000).

Graduate programs preparing educational and social science researchers increasingly directed their attention, as did professional journals, toward qualitative research during the 1970s and 1980s. Allotting time and space to what had been considered the "alternative" paradigm led to wide discussions in the journals and at professional meetings. The editors of the *American Educational Research Journal,* for example, announced in 1987 that particular emphasis on qualitative methodology would be forthcoming as they evaluated manuscripts. The legitimacy of qualitative research was strengthened. A plethora of books, articles, and presentations on the trustworthiness of the qualitative paradigm materialized. Some extolled the virtues of qualitative research as the only avenue to "truth," while others claimed that only by holding onto the quantitative traditions can we have confidence in our knowledge base. The debate stimulated many questions: Which is more scientific: the

deductive methods of the logical positivists (quantitative researchers) or the inductive methods of the naturalists (qualitative researchers)? Can the results of qualitative research be generalized as are the results of quantitative research? Can science be value laden (qualitative) or only legitimate if value free (quantitative)? What epistemological assumptions are violated by adopting one paradigm or the other?

Qualitative research methods are those generally subsumed under the headings ethnography, case studies, life history, narrative inquiry, field studies, grounded theory, document studies, naturalistic inquiry, observational studies, interview studies, and descriptive studies. Qualitative research designs in the social sciences stem from traditions in anthropology and sociology, in which the philosophy emphasizes the phenomenological basis of a study, the elaborate description of the "meaning" of phenomena from the perspectives of the people or culture under examination, verstehen. Often in a qualitative design, only one participant, one case, or one unit is the focus of investigation over an extended period of time.

Quantitative research, on the other hand, falls under the category of empirical studies, according to some, or statistical studies, according to others. These designs include the more traditionally dominant (in Western culture) ways in which psychology and behavioral science have carried out investigations. Quantitative modes have been the dominant methods of research in social science. *Quantitative* designs include experimental studies, quasi-experimental studies, pretest-posttest designs, and others (Campbell & Stanley, 1963; Shadish, Cook, & Campbell, 2002), in which control of variables, randomization, and valid and reliable measures are required and in which generalizability from the sample to the population is the aim. Data in quantitative studies are coded according to a priori operational and standardized definitions.[4]

Unlike many academic disciplines, educational research has never evolved into an academic community with common principles and canons of practice (Lagemann, 2000). Serious dialogue about the "science" and "research" of the field was delayed until forced upon researchers by political forces. Social science researchers have always represented diverse perspectives and multiple methods. This diversity of thinking comes from research questions that are generated by a diffuse profile of constituents across economic, political, social, academic, and legal communities. Logic suggests that diverse research questions

about schooling require multiple methods of investigation. The questions of methodology raised in the qualitative and quantitative debate strengthened a multiple-paradigm approach in the 1990s.

According to Lagemann (2000), the need for both "decision-oriented" and "conclusion-oriented" studies was raised in 1969 by Cronbach and Suppes in a landmark meeting of educational thinkers. Their conclusion remains a need today.

> Decision-oriented studies are designed to help decision makers act intelligently; conclusion-oriented inquiries are designed to allow, through the free play of a researcher's imagination, for the discovery of new ideas, the description of previously hidden anomalies, and the investigation of relationships that had not been observed earlier. (Lagemann, 2000, p. 243)

The "war" has been a common metaphor used to characterize the qualitative and quantitative debate (Tashakkori & Teddlie, 1998). The *Educational Researcher*, a monthly publication of the American Educational Research Association (AERA), and the AERA annual meetings were the sites of ongoing debates in the profession (see, for example, Howe, 1985, 1988; Howe & Eisenhart, 1990; Miles & Huberman, 1984; Smith & Heshusius, 1985).

Since the mid-1990s, researchers have increasingly turned to mixed methods, combining qualitative and quantitative methods within a study. However, the discourse on mixed methods has rarely addressed qualitative and quantitative research as a continuum, the model since the 1980s.Tashakkori and Teddlie (1998) tell the story of the evolution of qualitative and quantitative research as the backdrop for mixed methods. Published in 1998, the same year as the first edition of this book, their focus on "pragmatism" ("what works") added substantively to the discourse in very different ways than did our model of a qualitative-quantitative interactive continuum. However, we agreed with Tashakkori and Teddlie, as they urged the dismantling the dichotomy of qualitative and quantitative paradigms.

The currency of qualitative perspectives, however, was politically weakened by federal legislation with the No Child Left Behind Act, 2001. NCLB triggered a debate into the meaning of scientific research in education and held up the randomized trial from medical research as the preferred model (the "gold" standard) for researchers seeking

federal funding for education research. For almost a decade, the ways in which researchers can most appropriately study the dynamics of schooling have come to dominate the national discussion among education policymakers.

Even though mixed methods research has captured the attention of many educational researchers from the printing of our first edition to the current one, novice researchers continue to be prepared for "either-or" world, a dichotomous world of qualitative and quantitative research that might no longer exist. Too many students leave colleges and universities with a monolithic perspective. Either they become well-trained statisticians, or they become cultural anthropologists. If limited to only one or the other, they are equipped with only a narrow perspective and are methodologically weak in being able to ask and study research questions. Second, researchers in education and in the social sciences have not yet constructed a way to ensure protégés' success in utilizing both paradigms. Mixed methods research designs risk becoming the latest panacea if not scientifically applied (Ridenour & Newman, 2004; 2005). The interactive continuum model in this book builds the capacities of future researchers to incorporate a holistic conceptualization of research in their practice: qualitative, quantitative, and mixed methods research designs in ways that meet the criterion of being "scientific."

The *dichotomy* of qualitative and quantitative research is a false one. Although not an ontological construct, the dichotomy does serve a purpose. It allows separation of the ideas embraced within each paradigm. We slice the dichotomy thin to examine it and make the case in this chapter that the dichotomy does not exist in the scientific research realm.

Qualitative versus Quantitative: A False Dichotomy

All behavioral research is made up of a combination of qualitative and quantitative constructs. In this book, the notion of the qualitative-quantitative research continuum, as opposed to a dichotomy, is explored on scientific grounds. We believe that conceptualizing the dichotomy (using separate and distinct categories of *qualitative* and *quantitative* research) is not a productive way to think about research. The dichotomy is not consistent with a coherent philosophy of science. Rather than a dichotomy, it is a continuum and, as such, a coherent

tool for making decisions about designing a study. A secondary theme is equally important: the interactive continuum is the best of the three models of mixed methods both for evaluating published research and for planning research. For example, what are known as qualitative methods can be beginning points, rich in-depth descriptions of a culture. This foundational strategy can be followed by quantitative methods to test hypothesized relationships within that culture. The sequence might be reversed. Hypothesized relationships about variables in the culture might be followed by rich in-depth descriptions in first-person accounts of those relationships.

A standard is needed to measure whether the qualitative, the quantitative, or a mixed methods continuum that includes both methodologies is the most appropriate process of designing a study to reach a level of truth. The standard of science gives an appropriate set of criteria.

Science: A Foundation for Research Design

The purpose of science is to explain natural phenomena. Science has many definitions but science, at its most basic level, is a way of knowing about the world, a way to get at "truth." On the other hand, there are various kinds of "truth," says Medawar (1984). This 1960 Nobel-prize–winning scientist in physiology and medicine writes of spiritual and religious truth as well as poetic truth (p. 4) and the fact of "scientific" truth—the result of the systematic processes of the scientist at work. He states that there is "no finally conclusive certainty beyond the reach of criticism. There is no substantive goal; there is a direction only, that which leads toward ultima Thule, the asymptote of the scientist's endeavors, the 'truth.'" (p. 5).[5] In other words, science has a heuristic purpose to generate knowledge. It is the heuristic value of research (and of science) that is seen as one of its most valuable contributions to behavioral research. Well-known paleontologist Mark Norell (2005) claims that there is no truth in science, "only the answers you have at the time," the self-correcting quality.

Other definitions render science a body of systematic knowledge. While there remain other ways of knowing about the world (e.g., literature, poetry, spirituality, and emotion), science is a highly respected way of knowing because the label *science* leads one to assume that the body of knowledge has been accumulated through, first of all, a systematic approach to collecting and analyzing the evidence. Not only is data

collection systematic but also the reasoning of the researcher, and the planning by the researcher is systematic, organized, and logical. Krathwohl (2004) used the term *chain of reasoning* to capture the logic of the researcher. The term clearly connotes this systematic quality. *Systematic* implies that science is built through processes that are structured and sequential, planned and coherent (Rosenthal & Rosnow, 1991). The "science" in a specific field consists of an accumulation of knowledge in that field. The process of building that body of knowledge is the process of science, a process that conforms to systematic rather than haphazard procedures. Years ago, Lee S. Shulman (1987) characterized good educational research as "disciplined inquiry."

To be imbued with the label *scientific*, an endeavor must meet five criteria:

- It must be *systematic* in its processes and thinking. The study needs to be formal, systematic, organized, and prescribed.
- It must be *verifiable*. In other words, results of studies are testable. The truth value of scientific findings can be borne out by further testing by other researchers. Verifiability leads to the following characteristic.
- It must be *replicable*. Studies can potentially be replicated because of the basic systematic processes that science requires. Replicability is what a scientific body of knowledge accumulates through repeated tests of hypotheses or theories; the resultant knowledge is scientifically strengthened. With replication, findings can be confirmed and reconfirmed. Replicability imbues science with the next quality.
- It must be *self-correcting*. This implies that findings from replicated studies can overturn prior findings. Hypotheses may be discarded in favor of new hypotheses. According to Krathwohl (2004), "All scientific knowledge is held with a tinge of uncertainty—just enough that it could be replaced should more valid knowledge come to light. Knowledge that is replicated and reconfirmed is held with considerable certainty—enough that we act on it as though it were unquestionably true" (p. 51).
- It must *explain*. This characteristic, explanation of natural and human phenomena, is the traditional purpose of science, concern with examining variable relationships. Explanation, of course, is

> the role played by theories—the requisite foundation of many scientific studies. Many scientific researchers not only target variable relationships but *causal* relationships, which embody the strongest aspirations of many researchers studying teaching and learning. It is these studies that are valued most highly by many researchers. For example, those seeking to raise student achievement and school success investigate the possible causes of such success.

We have purposely used the word *traditional* in this discussion so far. Science and all that the term *science* connotes have been almost exclusively linked to traditional positivist and quantitative research. So far, these descriptors are heavily weighted toward the deductive, objective, measurement-oriented world of the quantitative researcher. Qualitative research lies outside that realm, according to most of its adherents, at least insofar as it has not been aligned with science. But, we have been at a point of questioning that dichotomy (quantitative-qualitative, which parallels science and nonscience). We want to raise the question of how mixing qualitative and quantitative methods can fit within these scientific qualities.

Arguably, these five scientific qualities—systematic processes and thinking, potential verifiability, potential replicability, self-correction, and explanation—play a potential role in *all* educational research—perhaps even completely across the qualitative-quantitative continuum. Broadening how we think about research from a qualitative-quantitative dichotomy to a continuum that encompasses mixed methods raises this question: How do we accommodate the traditionally scientific and the traditionally nonscientific in ways that allow us to be coherent, consistent, and, indeed, completely scientific? Addressing this question encompasses the remainder of this book. Admittedly, the highly regarded status of science does not place science in a superior epistemological position. Ways of knowing other than science may be superior in some circumstances, depending on the need to know, the purpose of needing to know, and the context of the need to know (Bauer, 1992; Medawar, 1984).

The Nature of Both Science and Research in Education

Accommodating qualitative and quantitative research under a holistic umbrella of science might be achieved through not only a set of epistemological assumptions but also a set of procedural steps in designing

a research study. Research and science are related endeavors. Research constitutes the process through which a scientific body of knowledge is accumulated. Research encompasses the activities of researchers as they carry out studies of phenomena in a particular field, for instance, in education. Research serves heuristic purposes in building a scientific knowledge base; new knowledge suggests possibilities for more questions and even newer knowledge. In education, the paradigms of quantitative, qualitative, and mixed methods research serve researchers' inquiry needs. Each of these paradigms needs to be briefly defined and put into context.[6]

Both positivism and naturalism, both empiricism and idealism, (i.e., both quantitative and qualitative research) are valuable to accumulating a knowledge base in education. Both contribute to the knowledge base. How could they not? Questions of interest about teaching and learning run the gamut from questions of cause and effect to questions of meaning. The science of education needs both perspectives to become a complete and coherent knowledge base, a scientific knowledge base.

Both quantitative and qualitative research must be able to fit within science in education if both methodologies serve to constitute the knowledge base in education. On the one hand, quantitative research in education rests on certain positivistic assumptions of reality—what traditionally has been categorized as the *scientific way of knowing about schools*. Knowledge about reality is assumed to be objective, separate and distinct from one who studies it; knowledge is deductively reasoned and generalizable; knowledge of reality is lawful, value free, and context free because reality is stable and knowable. Researchers approach the study of this reality through attempts to control settings and through theory testing, assuming a philosophy of empiricism. On the other hand, qualitative research rests on naturalistic and idealistic assumptions of reality—what traditionally has been categorized as the *nonscientific way of knowing about schools*. Knowledge about reality for qualitative researchers is built on an understanding of reality as holistic, dynamic, and irreducible to its particulars. Knowledge about reality is accrued subjectively, in natural settings that are value laden and context bound and that generate findings more difficult to generalize. Researchers approach the study of this reality through holistic means and a discovery orientation that builds theory rather than tests theory.

A counterexample to this theory is offered by Fontana and Frey (2005). They provide several types of interviews in the context of a qualitative research paradigm, posing that a structured interview to determine the facts of a situation (how many people oppose a nuclear-power facility in their neighborhood) can provide empirical data in the form of frequency counts that can be correlated with selected demographic variables. In this situation, "we can quantify and code the responses and can use mathematical models to explain our findings . . . we can speak in the formal language of scientific rigor and verifiability of findings" (p. 722). This example fails as an argument that qualitative research is *also* scientific; it succeeds in justifying that philosophical purposes and research situations dictate methods of data collection and analysis. The use of the interview in this situation is one better categorized, philosophically, as a quantitative study. We base our categories of qualitative and quantitative research on the bases of what purposes they serve rather than the nature of the data collected. Quantitative research is not necessarily defined by numerical data, and qualitative research is not necessarily defined by textual data.

Mixed methods research has offered a powerful new paradigm (Tashakkori & Teddlie, 2003). The danger is that some researchers might assume that after constructing domains of meaning from a qualitative study, they can code those themes as variables, test them empirically, and claim that they are using mixed methods. Unfortunately (or fortunately), it is not that simple for those procedures to rise to the level of science. The findings of qualitative studies (e.g., domains of meaning) and the findings of quantitative studies (e.g., probabilistic decisions about hypotheses) have different epistemological assumptions. Mixed methods are extremely valuable but cannot be a panacea (Ridenour & Newman, 2004).

This book contributes to the current discourse on qualitative, quantitative, and mixed methods research and assumptions underlying social science research by

- depicting an overall model of qualitative-quantitative interactive continuum that fits within one category of the currently accepted mixed methods paradigms
- suggesting ways to assess quality of published research

- providing a strong scientific context through principles based on consistency
- placing validity at the center of design decisions

Chapter 2 elaborates on the notion of the interactive continuum. In chapter 3, we discuss the central role of validity, review research methods, and address the strengths and weaknesses of quantitative, qualitative, and mixed methods research. Chapter 4 discusses ways of enhancing the validity of quantitative, qualitative, and mixed methods research, emphasizing qualitative research. Chapter 5 looks at four research studies—showing ways to analyze the consistency among the research questions, the methods, and the results. Chapter 6 contains a discussion of beginning principles of research practice, a preliminary set of tools that are a work in progress. These principles include questions to assess whether the research methods are consistent with research purposes and research questions.

All research in education stands on basic underlying epistemological assumptions. This is true for quantitative methods as well as qualitative methods. To the extent that these assumptions withstand the scrutiny of scientific inquiry, the methods can be supported, taught to novice researchers, and used professionally and ethically without reservation. Since the mid-1980s when quality in all educational professions came under public review, it has become particularly crucial to delineate the foundational bases of educational research. This book discusses such foundations.

2

The Qualitative-Quantitative Research Continuum

Until the 1970s, any discussion of research methods presented them as dichotomized categories, either quantitative or qualitative. The two paradigms had been assumed to be polar opposites and, among some researchers, even separate and distinct scientific absolutes. Despite the strong historical roots of this dichotomy, an appreciation for mixed methods research has grown over the past two decades (Creswell, 2005; Frechtling & Sharp, 1997; Greene & Caracelli, 1997; Mertens, 2003; Reichardt & Rallis, 1994; Spicer, 2005; Tashakkori & Teddlie, 1998, 2003). Claims and counterclaims about the appropriateness of the two paradigms have been the genesis for a mixed methods approach to research. We assume research is conducted on a scientific foundation and that science is holistic. Because we assume it is holistic, we conceptualize science more broadly and in a less-compartmentalized way than those adhering solely to one or the other of the qualitative, quantitative, or mixed paradigms.

Knowledge about the world is gained in multiple ways. For example, an orderly, systematic investigation of objective reality may be combined with experiential and intuitive ways of knowing. Even though this spectrum is broad, science, to be called science, requires a fundamental set of systematic rules of procedure. Karl Popper (1962), in his earlier views, claimed that only those hypotheses that can lead to claims of falsifiability are scientific. That path, associated with quantitative research or the empiricists, may be too narrow. That science requires qualities of falsifiability as well as verifiability may not by themselves be sufficient. If they were, that view would exclude the metaphysical, the speculative, the existential, and the heuristic as legitimate ways of knowing. Diesing (1991) claimed that it would be better to admit all kinds of statements, both verifiable and falsifiable, into the realm of potential scientific investigation. We would go further and include the premise of the naturalists: the constructed reality that one interprets

based on experience is included in what can be considered scientific. As a picture of lived reality, that knowledge, too, can be examined in scientific ways. Science is not only defined conceptually, it also embodies a set of rules of procedure.

This chapter presents a conceptualization of research methods as existing on an interactive continuum rather than as a qualitative-quantitative dichotomy. Included are discussions of scientific inquiry, the purpose of research, the kinds of questions that are typically posed, and our fundamental assumption that each research question is derived from a purpose and that the research question and purpose together dictate the research method. We argue that thinking through qualitative and quantitative assumptions is always involved to at least some degree in every research study (Tashakkori & Teddlie, 2003). We embrace a notion of mixed methods that resists dichotomizing qualitative and quantitative research and accepts them, rather, as places on an interactive continuum, situated as they relate to "theory."

Chapter 2 includes description of

- the central roles of the research purpose and the research question in designing a research study
- the place of "theory" in qualitative and quantitative research
- the link between postpositivism and the qualitative-quantitative interactive continuum
- three categories of mixed methods research
- two conceptual models of the qualitative-quantitative interactive continuum: one that explains the philosophy and one that explains the sequence of methodological decisions

Science as a Set of Systematic Procedures

Science consists of systematic and organized processes (as opposed to random or haphazard processes), and it allows acquisition of knowledge toward truth in a variety of ways. We assume no singular epistemology. We do assume a singular *process* to think through the research design decisions. No one method to acquire knowledge is superior. With these rules (and their underlying assumptions serving as standards), one can define ways of making decisions about research. One can have confidence in the findings that result. Researchers must ultimately

determine whether the qualitative, the quantitative, neither, both, or a continuum including both methodologies is most effective in fulfilling the purpose of the study and addressing the research question. A systematic approach to addressing research problems is necessary no matter which ideology or epistemology one holds.

First, the researcher must begin with the nature of the research question in concert with the research purpose. Both may be considered iteratively; that is, the research purpose may generate the research question; the research question may lead to refinement of research purpose. The research question must be addressed in the context of the purpose of the study (Newman, Ridenour, Newman, and DeMarco, 2003). Why the study is being conducted, the purpose, must be clearly understood so that the research design and the methods will serve the intended needs of the researcher and his/her audiences. Without a clear purpose or set of purposes, implications of the results will be difficult to render.

Secondly, identifying the evidence needed to address the question needs to be identified as well as the underlying epistemological assumptions of that needed evidence. In other words, to address the research question and to fulfill the research purpose, what epistemological stance must be taken: a particularistic or holistic stance? An inductive or deductive stance? An objective or subjective stance? What epistemological assumptions am I, the researcher, adopting in this research study?

Third, decisions about research design and the nature of evidence follow. Results of these deliberations will lead to determining whether the evidence is or is not quantified, according to the design of the study. In other words, the decision about what evidence to collect as well as what to do with that evidence after it is collected should be dictated by the research question and purpose. Fourth, decisions about the source of evidence, the setting, the timing, the measures or lack of measures, and analysis of evidence are made. Fifth, plans for communicating results to audiences in order to fulfill the research purposes are made.

This systematic set of steps is discussed later in this book in more detail, but here they are presented to show that considering science to be holistic and heuristic does not permit researchers to proceed haphazardly. The qualitative-quantitative dichotomy no longer exists. The decisions about methods are based on a holistic spectrum of possibili-

ties, are inclusive, and follow naturally from the research question and purpose. For example, Miller and Lieberman (1988) characterize a "new synthesis" in education. In their review of studies of school improvement, they acknowledge the different sets of assumptions underlying qualitative and quantitative studies but describe studies that combine the technological perspective of the quantitative with the cultural perspective of the qualitative.

The paradigm of positivism (quantitative research) continues to dominate social and behavioral science. It is steeped in historical tradition. For one thing, the training of research methodologists in social science and education has been heavily weighted on the side of quantitative research designs and statistics. The challenge from qualitative adherents over the past thirty years has not been successful in overthrowing that dominance but has led to the debates between the advocates of quantitative research and the advocates of qualitative research.

Instead of an us-them dichotomy, however, the scientific tradition can be strengthened when science is both positivistic and naturalistic in its assumptions. Two fundamental epistemological requirements are made of the researcher: one must clearly and openly acknowledge one's assumptions about what counts as knowledge and maintain consistency in the links between those assumptions and the methods derived from them. We argue that this consistency makes the research scientific. As clarified in chapter 5, it is the consistency among the research question, purpose, and methods that ensures a study is scientific, not the choice of one paradigm or the other.

Qualitative Research Conceptualized

In the third edition of their qualitative research handbook, Denzin and Lincoln (2005) acknowledge that the term *qualitative research* means different things to different people. They offer what they call a "generic definition."

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves

> an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them. (p. 3)

Qualitative data have been defined by Patton (1990) as "detailed descriptions of situations, events, people, interactions, observed behaviors, direct quotations from people about their experiences, attitudes, beliefs, and thoughts and excerpts or entire passages from documents, correspondence, records, and case histories" (p. 22). Denzin and Lincoln (2005) go much further: qualitative research is not restricted to a set of methods or the nature of the evidence:

> Nor does qualitative research have a distinct set of methods or practices . . . Qualitative researchers use semiotics, narrative, content, discourse, archival and phonemic analysis, even statistics, tables, graphs, and numbers. . . . [and also use] ethnomethodology, phenomenology, hermeneutics, feminism, rhizomatics, deconstructionism, ethnography, interviewing, psychoanalysis, cultural studies, survey research, and participant observation, among others. (p. 7)

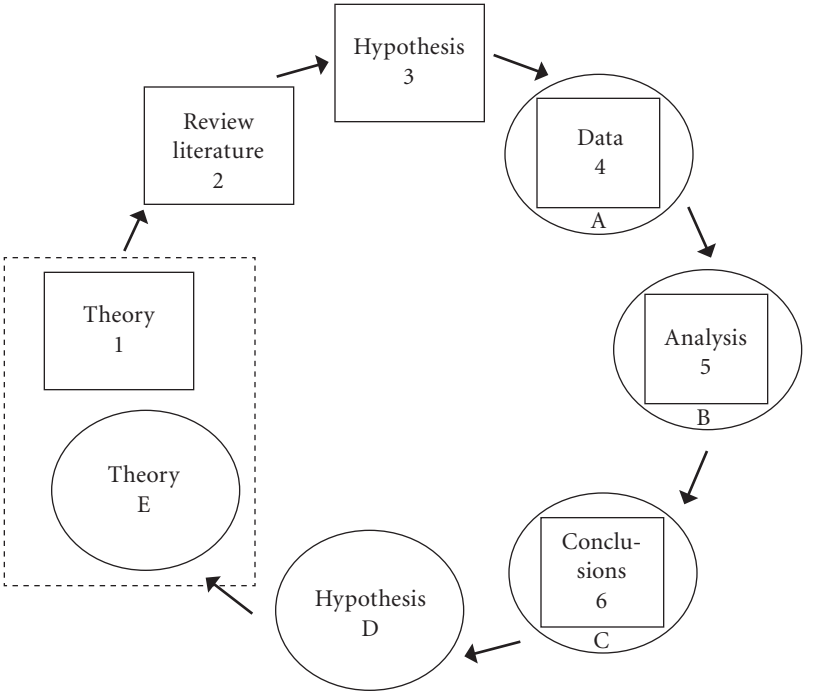
Unlike some researchers who characterize qualitative research as evidenced by words and quantitative research as evidenced by numbers, Denzin and Lincoln differentiate the two paradigms based on assumptions of reality. That foundation also serves as the basis for the model of mixed methods that we promote here: the qualitative-quantitative interactive continuum.

In contemporary research literature, writers have ascribed many meanings to the word *theory* that take it beyond its traditional scientific meaning. We contrast two meanings of the word here to clarify how we are using the concept in the mixed methods interactive continuum. We use the word *theory* in this discussion in the sense that Popper (1959) conceptualized it. A theory is a scientific explanation of phenomena that is made up of testable hypotheses. Only hypotheses that are falsifiable fall into the category of scientific theories. Science requires that a hypothesis be constructed in such a way that if it is false, it can be eliminated. Hypotheses that are stated in ways that preclude being eliminated if they do not hold up to contradictory data are unscientific hypotheses. Figure 1 shows that quantitative researchers frequently

begin with theory, a scientific (falsifiable) explanation of relationships among variables that the researcher wishes to test. In that same figure, we suggest that some qualitative researchers might construct an explanation (theory) in their findings, a set of hypotheses that are scientific. For example, Glaser and Strauss (1967) base their qualitative approaches on this notion of theory—falsifiability, explanation, and prediction. This relationship between qualitative and quantitative research is at the core: quantitative research as theory testing and qualitative research as theory building.

However, the word *theory* has a different meaning in some qualitative-research literature. Theory is used to refer to a perspective or world view that includes the personal assumptions and insights one has about the world and his/her place in it. Because the qualitative researcher is often cast as the "instrument" of data collection and analysis (e.g., Patton, 1990, p. 56), that researcher's assumptions and insights about the world and about the data impinge on those data processes and are "part of the data" (Patton, 1990, p. 58). Examples of such perspectives (sometimes referred to as "theoretical" frameworks or "paradigms") might include critical theory, feminism, Marxism, and queer theory (Denzin & Lincoln, 2005, p. 24). The use of the word *theory* to mean a personal perspective on the world is not the way we use the word *theory* in the interactive continuum.

A qualitative researcher using grounded theory builds theory from the data. Theory is therefore grounded in the data rather than being abstract or tentative, according to the pioneers, Glaser & Strauss (1967). Compared to a researcher who fulfills his/her purpose by testing hypotheses, a grounded theorist approach avoids issues of data collection and is applied as a data-analysis technique. Instead of coming from the conceptual level to the empirical level, one would begin at the empirical level (data analysis) and end at the conceptual level (theory construction). According to Charmaz (2000), more recent attacks on grounded theory come from critics' claims that its methods are consistent with positivism and empiricism. For example, two frequent criticisms are the assumption that data are "objective" and that reality can be captured and recorded (Charmaz, 2000). A proponent of this method as a strong qualitative strategy, however, Charmaz maintains that grounded theory offers "a set of flexible strategies, not rigid prescriptions" (p. 513).



Conceptually, in *this* model, the theory is neither at the beginning nor at the end—but the square (the quantitative) and the circle (the qualitative) overlap and continue the cycle, closing the qualitative-quantitative gap. Neither the squares nor the circles make a whole. (See definition of "theory" on page 20.)

QUANTITATIVE	QUALITATIVE	QUALITATIVE-QUANTITATIVE
1-2-3-4-5-6	A-B-C-D-E	
• theory testing	• theory building	• holistic
• deductive	• inductive	• closes the gap
• begins with theory	• ends with theory	• completes the cycle

Figure 1. The qualitative-quantitative continuum of educational research methodology conceptualized

Inductive reasoning and deductive reasoning are both subsumed under scientific inquiry, yet they characterize a distinction between purely qualitative and purely quantitative methods. Patton (1990) states the separation even more strongly: "The cardinal principle of qualitative analysis is that causal relationships and theoretical statements be clearly emergent from and grounded in the phenomena studied. The theory emerges from the data; it is not imposed on the data" (p. 278).

Quantitative Research Conceptualized

Quantitative research is frequently referred to as *hypothesis-testing research* (Johnson & Christensen, 2004; Krathwohl, 2004). Investigating the effects of a treatment or an intervention is typical of this paradigm. For example, using deductive logic, studies begin with statements of theory from which research hypotheses are derived. Then an experimental design is established in which the variable in question (the dependent variable) is measured while controlling for the effects of selected independent variables. Randomly selecting participants for the study is desirable to reduce error and to cancel bias. The sample of participants is selected to represent a defined population. After the pretest measures are made, the treatment conducted, and posttest measures made, a statistical analysis reveals findings about the treatment's effects, that is, whether or not the results are likely due to sampling error alone. To support repeatability of the findings, one experiment usually is conducted, and statistical techniques are used to determine the probability of the same differences occurring over and over again. These tests of statistical significance result in findings that confirm or disconfirm the original hypothesis. Theory revision or enhancement follows. This would be a true experiment. These procedures are deductive in nature, contributing to the scientific knowledge base by theory testing. This is the nature of quantitative methodology. Because true experimental designs require tightly controlled conditions, the richness and depth of meaning for participants are usually sacrificed. As a validity concern, this may be a limitation of quantitative design.

Replication is the key to science; a single study generally cannot add to the knowledge base. Newman, McNeil, and Fraas (2004) assert that attention to the issue of statistical significance has been overblown in the literature; the more important concern is that the data are replicable.

To enhance the scientific quality, researchers should include an estimate of replicability in their research reports.

Mixed Methods Research Conceptualized

Mixed methods is the third paradigm. Again, our purpose here is to raise questions about how education research is now and can continue to be scientific. We also are attempting to argue that validity or trustworthiness is the lens through which standards of practice for mixed methods research might be developed. In this section, we conclude that mixed methods research designs might ultimately be built on postpositivist assumptions.

Our qualitative-quantitative interactive continuum and the procedural steps in this model are closest to Denzin and Lincoln's notion of postpositivism (2000), which they describe, among other things, as an attempt to accommodate a classical Campbell and Stanley (1963) approach[1] within both quantitative and qualitative research (p. 14). What Denzin and Lincoln refer to as a "modified dualist" understanding of qualitative and quantitative research we can accept as at the core of what is a holistic paradigm, a continuum that allows multiple methods (or single methods) to be selected based on the purposes of each research study.

Denzin (1994) describes the four responses that have been made to the legitimation crisis, the crisis that questioned how qualitative research can be evaluated. First, the positivists apply the same four criteria to qualitative research as to quantitative research: "internal validity, external validity, reliability and objectivity" (p. 297). Second, the postpositivists believe a separate set of criteria needs to be developed for qualitative research. Denzin characterizes those who fall in this group as often creating a set of criteria that parallels that of the positivists but is adjusted to naturalistic research. Third, the postmodernists claim that there can be no criteria for judging qualitative research. Fourth, according to Denzin, the critical poststructuralists believe that new criteria, *completely different from* those of *both* the positivists and the postpositivists, need to be developed. It is with this last group, the critical poststructuralists, that Denzin aligned himself in the 1994 volume.

Within Denzin's structure, our position aligns with his second category, postpositivism, because we believe a different set of criteria

should be applied to assess qualitative research. The criteria established by Lincoln and Guba (1985) differ from those established for quantitative research, but they are philosophically derived from them. Denzin (1994) describes the legitimation crisis as the concern for the validity of qualitative research, with the postpositivists calling for a set of rules of procedures to establish validity.

> A text's authority, for the postpositivist, is established through recourse to a set of rules that refer to a reality outside the texts. These rules reference knowledge, its production and representation. . . . Without validity (authority) there is no truth, and without truth there can be no trust in a text's claim to validity (legitimation). (p. 29)

Postpositivism was the impetus for mixed methods research, according to Tashakkori and Teddlie (1998). Postpositivists blur the lines separating positivist and naturalist philosophies. Postpositivism replaced positivism—an epistemology that failed to withstand a barrage of skepticism for a variety of reasons (Phillips & Barbules, 2000), for example, the inconsistency across many of its underlying assumptions. Positivists assume there is an ultimate knowable reality, but that is inconsistent with the assumption that researchers can know only the reality that is observed and counted (Phillips & Barbules, 2000).

Postpositivists concluded that a "disinterested scientist" was also untenable. Postpositivists, according to Tashakkori and Teddlie (1998), believe that the personal values of researchers influence the object of their study. They also contend that facts are always value laden and that one constructs meaning from the reality of one's own experience. Tashakkori and Teddlie (1998) claim that these tenets of postpositivism are "shared by" both qualitative and quantitative researchers (p. 8), a conceptual break with what was previously understood, that is, that these are tenets of the naturalist, typically associated with qualitative research alone.

Postpositivism is possibly less stable and bounded than other epistemologies, according to Phillips and Barbules (2000).

> The new approach of postpositivism was born in an intellectual climate . . . an "orientation," not unified "school of thought," for

> there are many issues on which postpositivists disagree. But they are united in believing that human knowledge is not based on unchallengeable, rock-solid foundation—it is *conjectural* [italics in the original]. We have grounds, or warrants, for asserting the beliefs, or conjectures we hold as scientists, often very good grounds, but these grounds are not indubitable . . . warrants for accepting these things can be withdrawn in the light of further investigation. (p. 25–26)

This last phrase—"warrants . . . can be withdrawn in light of further investigation"—seems to be consistent with the self-correcting nature of science. Replication and confirmation build a scientific knowledge base. Because postpositivism is "nonfoundational," that is, knowledge has no solid foundations, the researcher works with the best warrants he/she has at the time. One could then argue that qualitative and quantitative research paradigms are compatible. This compatibility has encouraged the paradigm of pragmatism, according to Howe (1988), a point of view many have adopted.

Categories of Mixed Methods

All studies that apply to both qualitative and quantitative methods are not necessarily alike; they are not all in the same category. Mixed method studies are categorized into the nonintegrative, the simultaneous attempt, and the interactive continuum. From reviewing scores of studies and studying the designs of many mixed methods advocates, we constructed these categories for explanatory purposes; this nomenclature helps explain the value—specifically, the *scientific* value—of mixed methods. These categories are helpful in examining the possibility of principles of using mixed methods. They do not form a continuum, but we have structured them along a conceptual dimension, that is, a quasi-continuum of mixed methods designs ranging from those weaker conceptually to those stronger conceptually. One might construe the continuum scientifically as well. In other words, those mixed methods designs that are conceptually weaker are also scientifically weaker. Concomitantly, those designs that are conceptually stronger are also stronger in approaching the scientific benchmarks (systematic, verifiable, potentially replicable, self-correcting, and intended to explain phenomena).

Nonintegrative

In the nonintegrative type, qualitative research is carried out, followed by the use of quantitative methods, or the other way around, without having either method informing the other. The two methods are used independently without integrating them or linking them to common purposes. This may be the type most frequently cited in the literature.

Simultaneous Attempt

In the simultaneous attempt type, the researcher attempts to carry out qualitative and quantitative methods simultaneously and both with the same purpose(s). This generates virtually insurmountable epistemological problems because underlying assumptions of qualitative and quantitative research studies are very different. For instance, quantitative research assumes some type of objective reality from which one can generalize from a sample to a population with some estimate of confidence in doing so; whereas, in qualitative methods, no objective reality is assumed. Reality is unique for each individual. One cannot generalize from a sample to a population with any estimate of confidence, nor should one be interested in doing so. Qualitative and quantitative assumptions are incongruent with one another. Conflicting assumptions cannot be held at the same time in interpreting the same data for a common purpose.

Interactive Continuum

The interactive continuum is the third category, based on the qualitative-quantitative interactive continuum. This is the one with which we are most comfortable (Newman & Benz, 1998). This category of mixed methods is different from the first two in a number of ways. The first two categories dichotomize quantitative and qualitative methods, while this third conceptualization rejects the dichotomy and relies on a continuum in which research may be predominantly qualitative or predominantly quantitative. We prefer to characterize this type of mixed methods as holistic because this term diminishes the notion of a dichotomy. In this third type, the methods are driven by the research questions linked to the purpose(s). Identifying the research question and the research purpose (or, because there may be more than just one, the questions and purposes) is accomplished through an iterative process. The researcher

moves from the question to the purpose and back through both iteratively to exhaust all possible questions and possible purposes. Once all potential purposes are identified and all potential research questions linked to those purposes are articulated, the researcher designs the strategies for collecting and analyzing evidence. That evidence must be defended as consistent with the purposes and questions. That evidence may rest epistemologically within the qualitative and/or the quantitative paradigm. The focus of the researcher is predominantly on the research purpose and the research question (Newman et al., 2003). The design (whether qualitative, quantitative, or mixed methods) is a consequence of the more important focus on purpose and question. The paradigm decision is a logical conclusion, not a starting place. The choice of paradigm or paradigms is a result of thoughtfully reflecting on (and, ultimately, clarifying) the purpose and the question. This sequence strengthens the conceptual clarity of the research study.

When novice education researchers learn first and foremost to focus on their research purposes and their research questions (and *not* only on the methods), they are much more likely to avoid conceptual confusion in their research.

When considering methods from both ends of the continuum (qualitative and quantitative) and their scientific base (their basis in what we call *knowing repeatable facts),* different assumptions are apparent. The concept of a continuum is a more comprehensive schema. Evidence of such a continuum is demonstrated by an increasing number of researchers who apply multiple methods to their research and by the increased popularity of multimethod approaches in sociological research[2] (Tashakkori & Teddlie, 2003). Despite the debate, these ideas are not new, but they are now more strongly emphasized. More than thirty years ago, Mouly (1970) alluded to multiple-perspective research as

> the essence of the modern scientific method. . . . Although, in practice, the process involves a back-and-forth motion from induction to deduction, in its simplest form, it consists of working inductively from experience to hypotheses, which are elaborated deductively from implications on the basis of which they can be tested. (p. 31)

If we accept the premise that scientific knowledge is based upon verification, the contributions of findings derived from a qualitative (inductive) or quantitative (deductive) perspective can be assessed. It

then becomes clear how each approach adds to the body of knowledge by building on the findings derived from the other approach. This is the premise of the interactive continuum. A schema that depicts the philosophies of this continuum appears in figure 1.

The place of theory in both philosophies is shown to overlap. This is where the concept of the continuum is most clear. For the qualitative researcher, the motivating purpose is often *theory building;* while for the quantitative researcher, the intent is often *theory testing.* Neither the qualitative research approach nor the quantitative research approach encompasses the whole of research. Both are needed to conceptualize research holistically.

The schematic in figure 1 cannot symbolize all qualitative and quantitative studies, but what it can symbolize is a conceptualization or way of thinking about some kinds of qualitative and quantitative studies. In general, the qualitative researcher follows the sequence shown in the circles and labeled with letters A through E). At circle A, data are collected, interpreted, absorbed, and experienced. At circle B, the data are analyzed; and at circle C, conclusions are drawn. From those conclusions, a hypothesis is created (circle D). This hypothesis can be used to develop theory (circle E), the goal of the qualitative research question in some instances.

Quantitative research begins with theory (square 1). From theory, prior research is reviewed (square 2); and from the theoretical frameworks, a hypothesis is generated (square 3). This hypothesis leads to data collection and the strategy needed to test it (square 4). The data are analyzed according to the hypotheses (square 5), and conclusions are drawn (square 6). These conclusions confirm or conflict with the theory (square 1), thereby completing the cycle.

The qualitative-quantitative continuum is strengthened scientifically by its self-correcting feedback loops. In every research study, the continuum can be symbolically conceptualized as an organizing tool, a chain of reasoning for researchers to make links between and among their research purposes, questions, and methods.

When one conceptualizes research in this way and uses the built-in feedback mechanism, positive things happen that are less likely to occur in a strictly qualitative or a strictly quantitative study. For example, data may be more parsimonious in a quantitative study if the research question has emerged from a participant observation, historical review,

or series of interviews. These qualitative foundations of a quantitative study enhance its validity. These empirical materials may, for example, become forces driving the data-collection instruments or identifying the sample to be selected.

Although probably no single representation or schematic diagram can easily explain the concept of the qualitative-quantitative interactive continuum, figure 2 presents the model conceptually and summarizes the interrelationships between qualitative and quantitative methods as approaches to scientific inquiry. It is important that the reader understand that this is a simplification of a concept that has an infinite number of combinations. As shown on figure 2 all research endeavors probably start out with a purpose and a topic of interest. Researchers are obligated to justify why this topic and this purpose is of value. Studies need to be justified as serving one or more than one purpose. A typology of research purposes can serve as a tool for researchers to identify the purpose or purposes of their investigations (Newman et al., 2003). For example, some researchers are interested in testing the impact of an innovative treatment; other researchers are interested in exploring some unknown phenomenon; still others are interested in delving deeply into the causes of some historical event. Sometimes, this speculation becomes formally structured and takes on the qualities of a theory. However, it can remain loose and informal, based on phenomenological experiences and assumptions. Generally, once the speculation stage is reached, the next step, in both qualitative and quantitative research, is to do a review of the literature. However, there are certain qualitative researchers who believe that one should not enter the research with preconceived notions, that the data should be free from the bias of the researcher's prior knowledge and expectations. Consequently, a literature review is not desirable. Two examples from the literature demonstrate this view.

Frederick Erickson (as quoted in Goetz & LeCompte, 1984) describes one group of advocates for ethnographic studies who enter the field purposefully assuming a naïveté, while others merely suspend their preconceptions. L. M. Smith (1967) describes how one assumes ignorance in terms of the foreshadowed problem. Like Erickson, some qualitative researchers believe the study can begin without prior knowledge; one deliberately avoids learning anything about the topic or setting. However, it is obvious that this is impossible to achieve due

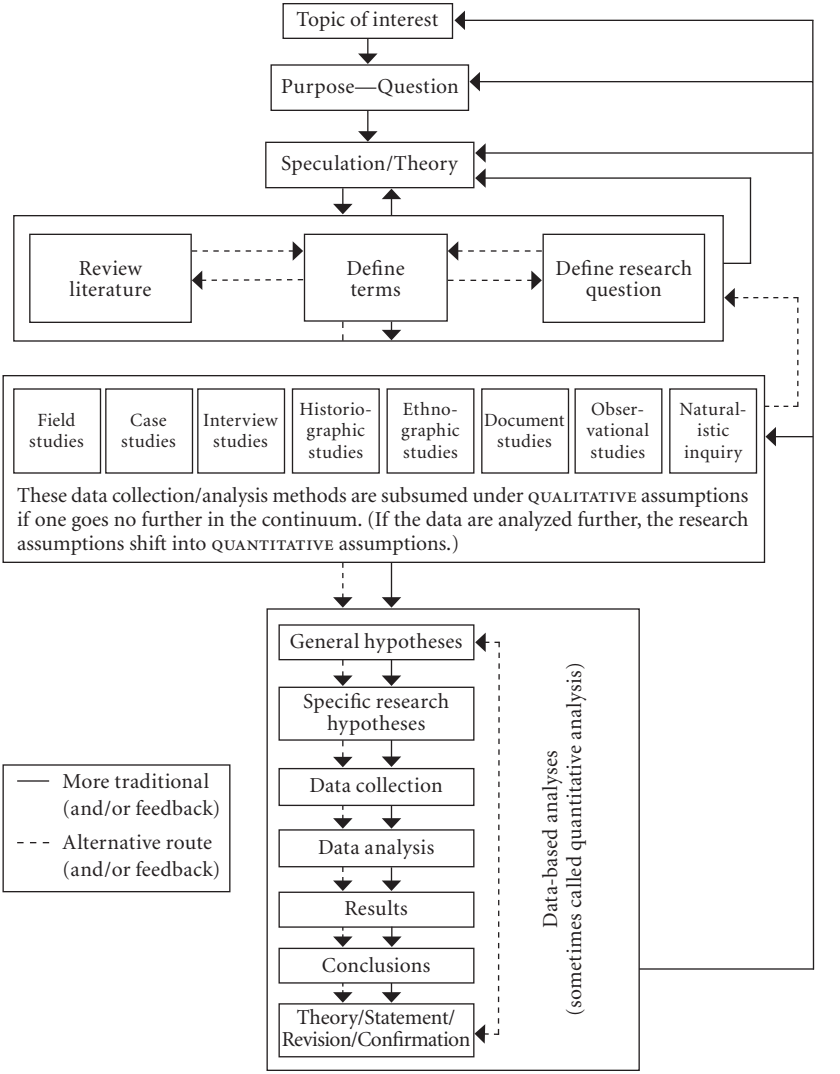


Figure 2. Qualitative-quantitative mixed methods research as an interactive continuum

to the research purpose one must establish. Therefore, Smith might claim the problem can be one that is foreshadowed at least; in other words, a working hypothesis about what might be "out there" in the field drives the research question. This problem keeps the researcher on the track of the most cogent data. While one is in the field, the research question guides what one attends to; this strategy has become common for qualitative researchers. We see this concept of foreshadowing as not entirely different from the notion among empiricists of *working hypotheses*, defined as those relational statements derived from descriptive research, theory, or personal experiences (Rosenthal & Rosnow, 1991; see also Ary, Jacobs, & Razavieh, 1990).

We argue, however, that one always has preexpectations and that it is important for researchers to be aware of their own biases. If aware of these biases, the researcher might more likely control for bias in the data-collection stage. This is the rationale for the schematic structure presented here. At the same time, the reader must understand that this diagram is an attempt to conceptually represent the qualitative *and* the quantitative strategies within systematic scientific inquiry. The decision of method rests on the research question's purpose and assumptions, which guide the research method—*not* vice versa. The method should not dictate whether the research is qualitative or quantitative; the reader should not interpret figure 2 as implying that it does.

The review of the literature can be related directly to the topic, to the historical background or chronology of events and studies surrounding the topic, or to the applications and usefulness of the topic. Often the literature review, definitions of terms, and the research question are interdependent. One is an outgrowth of the others or, depending on how much information the researcher has at the beginning, one tends to change the others. This interdependence of these three elements and speculation and theory is represented by dotted lines in figure 2.

The next box in figure 2 depicts the qualitative methods. It is difficult to represent these methods accurately as discrete entities because overlap almost always occurs. One study strategy (e.g., case study) may use another study strategy (e.g., focus groups) within its framework as well as within its data-collection procedures. For example, if an investigator uses an ethnographic strategy, the collected information might be coded numerically and analyzed statistically in a hypothesis. However, an underlying assumption of the ethnographic method is

that one cannot generalize; the researcher cannot begin with a purpose toward generalizability of findings and then carry out the research methods in ways that disallow generalizability.

In quantitative research, a researcher seems to directly proceed from reviewing and defining to developing hypotheses and collecting data. This is represented in figure 2 by the dotted line descending from the "review-literature–define-terms–define-research-question" box that bypasses the qualitative-strategies box into the quantitative-methods box. In quantitative analysis, this bypassing is called the *derivation of hypotheses.* These derivations may be more appropriately considered qualitative analyses in simplified form. The researcher examines the literature and, based upon this process, derives theoretical expectations, which become the derived hypotheses. The solid line going from the "review literature–define terms–define research question" box to the qualitative-strategies box and its feedback loop is what some individuals will identify as qualitative analysis in its entirety. Other researchers would suggest that one go from that feedback to the quantitative methods box and use it before appropriate and scientific conclusions could or should be made from qualitative data. As one can see, the qualitative analysis with its feedback loops can easily modify the types of research questions that will be asked in quantitative analysis; and the quantitative-analysis results and its feedback can change what will be asked qualitatively. Therefore, this model is not only a continuum from qualitative to quantitative but interactive.

In a paper given at American Educational Research Association twenty years ago, we presented an example of the need to study the world holistically, an example that is relevant today (Benz and Newman, 1986). Over several semesters, an on-campus late-afternoon seminar received consistently low mean ratings from student teachers. It was not until telephone interviews were conducted that it was revealed that the content of the seminar was highly valued, and the professors' feedback was sorely needed, but the time the seminar met was most disturbing to the students because the time conflicted with some of their school responsibilities. Numerical ratings alone masked the real value of the seminar, but by adding the interviews, a more holistic understanding was possible. Student teachers' quantitative ratings of their experiences on questionnaires (quantitative research) were followed by interpretive analyses of their personal experiences (qualitative research).

One needs to identify qualitative and/or quantitative research according to the purpose of the study and the question being asked. If one wishes to terminate the discourse in the scientific process within the qualitative-analysis box of this schema, then the research is qualitative. One goes no further in the diagram. If one utilizes the strategies in the quantitative-analysis sequence, the research is quantitative.

In the diagram, one can see the feedback loops that facilitate theory revision, see where theory fits in both methods, and, to some extent, understand why theory is never proven absolutely. It is always subject to modifications as new data enter the system. This approach fits and is applicable to conceptualization in both qualitative and quantitative research. Examples of research critiques presented in chapter 5 demonstrate how one study might productively lead to other investigations.

In the last twenty-five years or so, proponents of both approaches have assumed that one or the other paradigm would eventually "win."[3] Advocates of mixed methods approaches vary from those who maintain that both sets of epistemological assumptions can be held simultaneously to those who argue that research methods can be entirely divorced from concerns for epistemology.[4] The real issue is improving the quality of research. The focus of the rest of this book is the application of the continuum model in concrete ways to help researchers conduct their own and evaluate their own and others' research.