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# MIXED METHODOLOGY

Combining Qualitative  
and Quantitative Approaches

Abbas Tashakkori  
Charles Teddlie

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Campbell, 1979, p. 66). This criticism of monomethods was a follow-up to earlier work by Campbell and Fiske (1959), mentioned in Chapter 1, in which they asserted that there needed to be multiple quantitative methods for assessing psychological traits.

#### DESIGN ISSUES ASSOCIATED WITH MIXED METHOD STUDIES

During the mixed method period (Period II in Table 1.1), there was a gradual development of a number of research designs that incorporated both the quantitative and the qualitative orientations. These approaches were developed in several fields, and they were to a large degree an outgrowth of the popularization of triangulation methods.

##### The Importance of the Concept of Triangulation

The concept of the "triangulation of methods" was the intellectual wedge that eventually broke the methodological hegemony of the monomethod purists. There were a series of steps in this process, including the following:

In 1959, Campbell and Fiske ("writing in the experimental psychology literature) proposed their "multitrait-multimethod matrix," which used more than one quantitative method to measure a psychological trait. They did this to assure that the variance in their research was accounted for by the trait under study, not by the method that was employed (Brewer & Hunter, 1989; Creswell, 1995).

There was a distinction made in Table 1.1 between purely quantitative designs using a single data source and those employing multiple data sources. The work of Campbell and Fiske popularized the use of multiple quantitative techniques in the same study.

In 1978, Denzin applied the term *triangulation* in a book on sociological methods. The original term *triangulation* refers to a surveying/nautical process in which two points (and their angles) are used to determine the unknown distance to a third point. Denzin's concept of triangulation involved combining data sources to study the same social phenomenon. He discussed four basic types of triangulation: *data triangulation* (the use of a variety of data sources in a study), *investigator triangulation* (the use of several different researchers), *theory triangulation* (the use of multiple perspectives to interpret the results of a study), and *methodological triangulation* (the use of multiple methods to study a research problem).

## 3

### Research Design Issues for Mixed Method and Mixed Model Studies

This chapter presents a variety of methodological issues regarding mixed method and mixed model studies and a taxonomy of mixed model studies that serves as the organizational tool for the rest of the volume.

#### The Deficiencies of Monomethods: A Diversity of Imperfection

When pragmatists convincingly postulated the compatibility thesis, the link between paradigm and method was weakened, and there was a gradual acceptance among many behavioral and social scientists of the methodological orientations of others. During this process, critics of the compatibility thesis spoke of the inadequacies of the monomethod designs. For instance, Brewer and Hunter (1989) described monomethod designs as "a diversity of imperfection" in the following quote:

Social science methods should not be treated as mutually exclusive alternatives among which we must choose. . . . Our individual methods may be flawed, but fortunately the flaws are not identical. A diversity of imperfection allows us to combine methods . . . to compensate for their particular faults and imperfections. (pp. 16-17)

Similarly, Cook and Campbell (1979), in a discussion of the threats to the validity of research results, pointed out the shortcomings of monomethods in measuring underlying constructs. These influential quantitative methodologists described *monomethod bias* as one of the threats to the *construct validity of purative (i.e., reputed) causes and effects*. They contended that if a construct was measured using only one method, then it would be difficult to differentiate the construct from its particular monomethod operational definition. Using as an example the measurement of attitudes using paper-and-pencil responses only, they questioned "whether one can test if 'personal private attitude' has been measured alone as opposed to 'paper-and-pencil nonaccountable responses' " (Cook &

In 1979, Jick (writing in the area of administration) discussed triangulation in terms of the weaknesses of one method being offset by the strengths of another. He also discussed *within methods triangulation* (such as multiple quantitative or multiple qualitative approaches) and *across methods triangulation* (involving both quantitative and qualitative approaches).

In an influential qualitative evaluation and research methods book, Patton (1990) described and gave examples of three triangulation methods: reconciling qualitative and quantitative data (across methods), comparing multiple qualitative data sources (within methods), and multiple perspectives from multiple observers (across different analysts of qualitative data). Patton wrote extensively about triangulating multiple qualitative data sources while conducting evaluations of educational or social service programs. Often, this involved the use of both interviewing and observation techniques. The work of Patton and Jick has led to the popularization of the multiple use of qualitative techniques in the same study.

In a similar vein, sociologists Brewer and Hunter (1989) suggested that a multimethod approach to research is superior to monomethod research in that it provides grounds for data triangulation. Brewer and Hunter disfavored "composite" methods research composed of "elements borrowed from the basic styles" (p. 80). Although they acknowledged the strengths of composite methods, Brewer and Hunter stated that the basic methods lose some of their strengths when incorporated into competing methodologies. Also, they argued that this methodological eclecticism does not provide enough data for "cross-method comparison." According to these authors, triangulation of distinct methods provides greater opportunities for causal inference.

#### What Has Been Meant by the Term *Mixed Method Designs*?

As indicated in the previous section, authors from multiple fields initially defined mixed method designs under the general heading of method triangulation. As Creswell (1995) has recently noted, mixed method designs now serve purposes beyond triangulation (i.e., defined as the convergence of results). In an extensive literature review, Greene et al. (1989) defined five purposes for using mixed method designs and several design elements that were relevant to the choice of a particular design (see Box 3.1).

The complexity of making design choices in mixed method studies, noted by Greene et al. (1989), reflects the confusion currently surrounding

### BOX 3.1 Five Purposes of Mixed Methods Studies

Greene et al. (1989) reviewed 57 mixed methods studies from the 1980s and listed five purposes for these studies: (a) *triangulation*, or seeking convergence of results; (b) *complementarity*, or examining overlapping and different facets of a phenomenon; (c) *initiation*, or discovering paradoxes, contradictions, fresh perspectives; (d) *development*, or using the methods sequentially, such that results from the first method inform the use of the second method; and (e) *expansion*, or mixed methods adding breadth and scope to a project. Greene et al. (1989) also listed design elements that influence the selection of a particular mixed method design. These design elements encompassed characteristics of methods, the phenomena under investigation, the paradigmatic framework, the relative status of the different methods, and criteria for implementation.

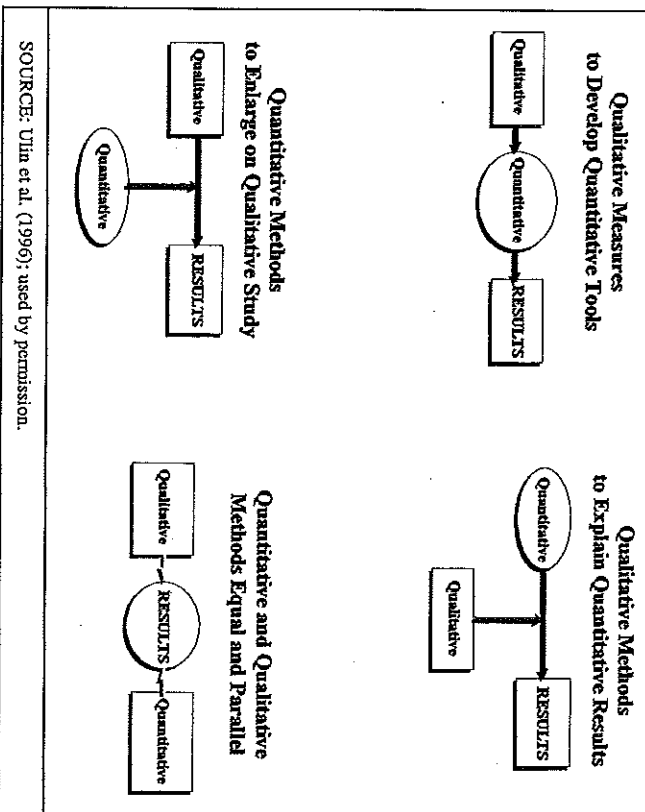
mixed method approaches. As noted in Chapter 1, Datta (1994) concluded that evaluators were using what she called "mixed-up models" because there was no consistent paradigm or theory for mixed method studies. Several authors have made attempts to create taxonomies of mixed method designs, including Creswell (1995), Greene et al. (1989), Morse (1991), and Patton (1990). An example from a multinational study of reproductive health (Ulin, Waszak, & Pfannenschmidt, 1996) is presented in Box 3.2.

We developed a taxonomy for organizing these different types of mixed method designs and presented it in Table 1.1. The remainder of this section will briefly describe each of the following mixed method designs:

- Equivalent status designs: Sequential (QUAN/QUAL and QUAL/QUAN) and Parallel/Simultaneous (QUAN + QUAL and QUAL + QUAN)
- Dominant-less dominant designs: Sequential (QUAN/qual and QUAL/quant) and Parallel/Simultaneous (QUAN + qual and QUAL + quant)
- Designs with multilevel use of approaches

It should be noted that the term *mixed methods* typically refers to both data collection techniques *and* analyses given that the type of data collected is so intertwined with the type of analysis that is used. We unblink data collection and data analysis in the next section of this chapter on mixed model studies.

### BOX 3.2 Illustrations of Different Scenarios for Combining Qualitative and Quantitative Methods



#### Equal Status Mixed Method Designs

In *equal status mixed method designs*, an investigator conducts a study using both the quantitative and the qualitative approaches about equally to understand the phenomenon under study.

Morse (1991), writing within the field of nursing research, contended that the two paradigms cannot be weighted equally in a single study, but our experiences in educational research are different. See Box 3.3 for an example of this type of design.

#### Dominant-Less Dominant Mixed Method Designs

Morse (1991) gave several examples from nursing research of single studies in which one paradigm and its methods are dominant, while a small component of the overall study is drawn from an alternative design. These

### BOX 3.3 An Example of Equal Status Mixed Method Designs

In a study of the marriage patterns in the Shona-speaking peoples of Zimbabwe, Meekers (1994) combined qualitative and quantitative methods of data collection and analysis. Qualitative data collection consisted of ethnographic research done by previous researchers to form definitions for the types of marital unions in this group. Quantitative data collection involved the use of an event-history survey suggested by Udry, Dole, and Gleiter (1992). A metal board containing strips representing events that occurred during the marital process was used in the survey. Respondents were asked to remove strips that they had not experienced, to arrange the remaining strips in the order of occurrence, and then to describe each occurrence. The descriptors were recorded on questionnaires.

Meekers combined the results from the ethnographies and the event-history survey by placing the respondents in the event-history survey in each of the categories found in the ethnographic findings. Three aspects were included in these classifications: the type of marital union, family involvement in the formation of the union, and family control over the couple's behaviors.

The types of unions were analyzed by looking at the percentages of each type within each educational level, area of residence, and age. The degree of family involvement consisted of the percentage of respondents in each of the types of unions who had experienced various events that would be considered to be family involvement. Family control was defined as the percentage of respondents whose onset of sexual intercourse occurred before each of the identified family involvement events. Meekers' results supported the ethnographic findings, indicating that young Shona couples have begun to deviate from the formalities of traditional marriage. However, her study found that the customs have not been totally disregarded. With regard to family control of the union, the study found that the family has little control over the onset of sexual intercourse and childbearing. The study did find that the family still has some control over cohabitation.

are known as *dominant-less dominant mixed method designs*. (See Box 3.4.)

It may be that in fields where one paradigm historically has been dominant (e.g., experimental psychology and quantitative methods, anthropology and qualitative methodology), the dominant-less dominant mixed method designs predominate. For instance, in experimental social psychological research, an informal, often unstructured "postexperimental interview" is usually used to detect awareness of the main hypotheses and

## BOX 3.4

## An Example of a Dominant-Less Dominant Design

Creswell (1995) described a "classic example" of the dominant-less dominant design (QUAN + qual). In his example, an experiment (QUAN) is conducted in which a theory is tested and, during data collection, a short qualitative interview (qual) also occurs. While the information from the interview is useful, it is but a small component of the overall theory-driven experimental design. Creswell concluded that the advantage of this approach is that it "presents a consistent paradigm picture . . . and still gathers limited information to probe in detail one aspect of the study" (p. 177). Returning to the "bystander intervention" experimental study described in Box 2.3, if the researchers had conducted brief open-ended interviews with the subjects concerning their emotional response to the "lady in distress," then this would have been an example of a QUAN + qual study.

to collect data regarding subjective reactions to the study that might have affected the results. This component of these experimental studies are definitely "add-ons" that are in no way as important as the hypothetico-deductive-driven approach for the investigators.

## Sequential Mixed Method Designs

In *sequential mixed method designs*, the researcher conducts a qualitative phase of a study and then a separate quantitative phase, or vice versa. Because the two phases are clearly distinct, this allows the investigator "to present thoroughly the paradigm assumptions behind each phase" (Creswell, 1995, p. 177). Creswell called this design a *two-phase design*. This design is popular with graduate students and novice researchers wishing to use both approaches in their work but not wanting to get into difficulties trying to use the two approaches simultaneously. In the QUAN/QUAL sequence, the investigator starts with a quantitative method and then proceeds with a follow-up qualitative study.

A dissertation completed by Freeman (reported in Freeman & Teddlie, 1996) is a typical example of a sequential mixed method study. Freeman first tested some a priori hypotheses regarding the differences in survey responses that principals in "improving" schools would give compared with principals in "stable" schools in a constant comparative design with numerical survey responses as the dependent variables. He then conducted

eight case studies with principals in schools that had been identified as "improving" to try to ascertain consistent patterns in the processes whereby their schools become more effective over time.

In the QUAL/QUAN sequence, on the other hand, the investigator starts with qualitative data collection and analysis on a relatively unexplored topic, using the results to design a subsequent quantitative phase of the study. The Meeckers (1994) study that was presented in Box 3.3 might be considered a partial example of this sequence (the QUAN was designed to clarify/replicate other investigators' QUAL). QUAL/QUAN is a common type of sequencing because in most quantitative survey research, the quantitative closed-ended instruments are developed after exploratory qualitative interviews have been analyzed or narrative data have been content analyzed. Carey (1993) presented an example of this type of sequencing (a study by Dressler, 1991). Due to the importance of Carey's comments on the study, we present his summary of the study in Box 3.5.

Of course, this process of sequencing qualitative/quantitative data collection or of using inductive/deductive logic is iterative and can go through several cycles, as described in Figure 2.1 (see Schuyten, 1995; Schuyten & Tashakkori, 1995). Also, other creative combinations of the two approaches are possible. For example, Floyd (1993) divided her sample into two. One group was studied with a QUAL/QUAN sequence. The other was studied with a QUAN/QUAL. Her study is summarized in Box 3.6. The two-phase design is the simplest of the sequential mixed method designs.

## Parallel/Simultaneous Mixed Method Designs

In *parallel/simultaneous mixed method designs*, the quantitative and qualitative data are collected at the same time and analyzed in a complementary manner. While Creswell (1995) contends that quantitative results would not necessarily relate to or confirm qualitative results (and vice versa) in these designs, most studies using this approach generate numerical and narrative data that answer similar questions. For instance, a simple example involves asking teachers to complete a closed-ended survey concerning the degree to which their schools have been restructured, while at the same time interviewing their administrators about the same topic using an interview protocol with an open-ended format. As researchers analyze the numerical teacher data and the narrative administrator data, they would be looking for instances of agreement and disagreement between the two data sources regarding the extent to which the schools are perceived to be restructured. Box 3.7 contains an example of a parallel/

## BOX 3.5

Carey's (1993) Summary of a  
QUAL/QUAN Study by Dressler (1991)

Dressler's (1991) work provides a good example of how rigorous qualitative and quantitative health research methods can be combined. He was interested in the complex interrelationships between economic conditions, life-style, household demographic factors, and social support resources from family, friends, and the community as they affected the development of depression among African-Americans in a southern United States community. Dressler stated that he began data collection using open-ended ethnographic interviews (pp. 72-73). This generated information on community perceptions of stresses and other social conditions. Results from this phase were used to inform the construction of more structured and quantifiable survey instruments. After administering the quantitative surveys, he conducted a second round of qualitative data collection to obtain life histories and illustrative case studies useful for providing an interpretive context for the quantitative results. These different types of data allowed Dressler to construct a variety of quantitative scales, employ regression and correlation statistical methods, and provide as well a set of eight detailed illustrative case studies. All these methods and types of data were used in addressing Dressler's questions regarding the conditions affecting depression in a community.

He views the ethnographic case studies as a means to "simultaneously confirm what was observed in the statistical analysis of the survey data, suggest new avenues for investigation, and provide insight into the discourse of stress" among African-American community residents (p. 279).

SOURCE: Carey (1993).

simultaneous mixed method design conducted by Timberlake (1994) concerning homeless children.

## Studies With Multilevel Use of Approaches

Multilevel research is common in both the quantitative and the qualitative traditions. These are studies in which data from more than one level of organizations or groups are used to reach more comprehensive inferences regarding behaviors and/or events. In educational research, for example, data that are collected at student level are linked to teacher attributes and school characteristics. Instead of "averaging" student-level

## BOX 3.6

## A Further Example of Sequential Mixed Designs

Floyd (1993) used both qualitative and quantitative methods to explore four questions: (a) Which sleep concerns were reported by adults? (b) Were these reported concerns related to age and gender? (c) Did the ordering of qualitative or quantitative methods affect the findings? (d) Did the two methods result in similar or different findings? Quota and purposeful sampling were used to create a sample containing men and women across three age categories. Qualitative data collection consisted of semi-structured interviews. Quantitative data collection consisted of the completion of a set of self-report questionnaires. One questionnaire, the "Sleep Bothers Questionnaire," developed by the investigator, provided two types of scores: a frequency of sleep concerns score and an intensity of sleep concerns score.

Within the age and gender groups, the subjects were randomly divided in half—one half to experience the qualitative interview first and the other half to experience the quantitative questionnaires first. Qualitative analysis involved Leininger's (1985) steps to thematic and pattern analysis. Four themes were found. Quantitative analyses involved statistical procedures, which included *t*-tests, ANOVA, and correlations. With regard to the first research question, the results showed that the sleep concerns of healthy older adults included health factors, changes in sleep patterns, and environmental factors. Qualitative analysis showed that the sleep concerns that were related to age were environmental factors and changes in sleep patterns, both of which decreased with age. The quantitative analysis did not show any concerns to be correlated with age. Both analyses indicated gender differences: Males and females were bothered by different aspects of sleep.

The sequence of the two methods affected the findings when the questionnaire was administered before the interview. The language used by the respondent in the interview was affected by the questionnaire. Some of the findings of the two methods were similar, but many were different. The combination of the two approaches identified questions and/or areas that need to be researched further that would not have been made evident by the use of just one method.

variables to obtain classroom-level data, both the student- and the classroom-level data are analyzed *simultaneously*, using complex models. A quantitative example of such research is the application of multilevel modeling (i.e., Hierarchical Linear Modeling or HLM) by Bryk and Raudenbush (1992).

**BOX 3.7**  
**An Example of a Parallel/  
 Simultaneous Mixed Design**

Timberlake (1994) used both qualitative and quantitative approaches to data collection and analysis in a single study of homeless children. Conceptually, although the research was substantially grounded in previous theory regarding the role of self-concepts in coping (deductive), it was also open to the development of a new conceptualization (inductive) regarding the role of these constructs in the homeless children. A major objective of the study was to find the role of the "personal meaning of the homeless situation to each child."

Data were collected through interviews with homeless children and their mothers as well as questionnaires completed by their teachers. The teachers' questionnaire included a previously validated inventory (Psychological Functioning Inventory) used to measure children's adjustment.

Data analysis consisted of both qualitative and quantitative methods. Quantitative analysis included calculation of statistical indicators as well as tests of significance between well-adjusted and other children. Qualitative analyses included the development of a 3 x 2 grid based on children's meaning of homelessness. One dimension consisted of three levels of "substantive preoccupation" (separation/loss, caretaking/nurturance, and security/protection). The other dimension represented two levels of "action orientation" (passive complaints and restoration). Also, three modes of coping with homelessness were identified in the statements, each comprising several subcomponents. Successful and unsuccessful students, as classified on the basis of teacher responses, were compared on the number of coping descriptors.

Statistical comparison (*t*-test) revealed significant differences between the two groups. The article ends with detailed verbal descriptions of children's family, academic, and personal lives as well as a "profile of non-academically successful children."

It is also possible to do multilevel research in which data are collected quantitatively at one level and qualitatively at another. An example of such research would be conducting a survey of 1,400 students in three high schools while interviewing the three principals in detail and extensively observing the three schools for social-psychological dynamics. The school-level qualitative data can be used to make the student-level data more meaningful and understandable, and vice versa. Obviously, the two approaches can be used simultaneously or sequentially.

**DESIGN ISSUES ASSOCIATED  
 WITH MIXED MODEL STUDIES**

A major goal of this book is to present a different orientation toward combining the quantitative and qualitative approaches, which we call mixed model studies. These designs were briefly described in Table 1.1; the following section gives more detailed information on the taxonomy of these designs. Chapters 7 and 8 give extended examples of these mixed model designs, which involve mixing the quantitative and qualitative approaches in different phases of the research process.

**The Overreliance on Method Alone:  
 Beyond Mixing at the Method Level Only**

Throughout the history of science in the United States, there has been an emphasis on methodological considerations (e.g., Bannister, 1987; House, 1994; Ross, 1991). This methodological fixation was partially responsible for the paradigm wars and for their denouement through the use of mixed *methods* designs in the 1960s through the 1980s. House (1994) summarized this fixation with methodology as follows:

Early in their development, the American social sciences shied away from certain issues of content because of strong political, social, and ideological pressures. Instead, they focused on methodology as a way to get to value-free, politics-free, and trouble-free findings that were consistent with an implacable belief in American exceptionalism. . . . The position gave rise to a virulent scientism, a fixation on methods as the center of social research. . . . Overemphasis on method led to definition by opposition: If one method was quantitative, the other was qualitative; if one was objective, the other was subjective. (pp. 19-20)

When the paradigm wars, which were largely about methods, were resolved, it was perhaps inevitable that the resolution would also be primarily methodological. The new mixed method designs again focused on methodology, with less attention being given to other research stages, such as problem formulation and the inference processes associated with drawing conclusions from study results. While this was the case in general, a few authors (e.g., Brewer & Hunter, 1989; Creswell, 1995; Patton, 1990; Sechrest & Sidani, 1995) have discussed combining the two paradigms in

several phases of the research process, not just the methodology. In their book on what they call "multimethod research," Brewer and Hunter discussed applying their multimethod approach to all stages of research, including the formulation of the problem, the building and testing of theory, sampling, measurement, data collection/analysis, and reporting.

Similarly, Creswell (1995) described "mixed-methodology designs" in which the investigator would mix aspects of the two paradigms at several stages of the research process. He discussed how this mixing might happen in writing an introduction, using literature and theory, writing a purpose statement and hypotheses or research questions, describing the methods, and describing the results. Creswell (1995) concluded,

This approach adds complexity to a design and uses the advantages of both the qualitative and the quantitative paradigms. Moreover, the overall design perhaps best mirrors the research process of working back and forth between inductive and deductive models of thinking in a research study. (p. 178)

Thus mixing the QUAN and QUAL approaches throughout several phases of a study more accurately reflects the research cycle, which involves switching iteratively between deductive and inductive reasoning, as described in Figure 2.1.

#### Mixed Model Studies: An Alternative to Mixed Method Designs

As noted in Chapter 1, our use of the term *mixed "model" studies* indicates that these studies go beyond the mixing of methodology to include other stages of the research process. To mix methods only is too limiting; the qualitative-quantitative distinction cuts across more than "method." Also, careful reading of much of the recent literature in the social and behavioral sciences indicates that researchers are already mixing paradigms across several stages of their studies, even if there is no well-developed taxonomy for the types of designs that they are using.

#### The Patton Pure and Mixed Form Studies

In the following discussion of mixed model studies, we mix aspects of the qualitative and quantitative paradigms across three major stages of the research process. The mixing of paradigms across these three particular stages was first suggested by Patton (1990) in his discussion of what he

called "mixed form" design. Our conceptualization of the three stages of the research process extends Patton's original model.

Patton (1990) referred to what he called "methodological mixes" using the following three components: (a) design (naturalistic inquiry or experimental), (b) measurement (qualitative data or quantitative data), (c) analysis (content or statistical). By combining these three dimensions, Patton generated six different ( $2 \times 2 \times 2$ ) designs: a purely qualitative approach, a purely quantitative approach, and four "mixed form" variations. His conceptualization of these combinations is presented in Box 3.8.

#### *Determination of the Three Dimensions for Classifying Mixed Model Studies*

We like this approach of Patton's because it is very practical: First, how do I frame my research study and questions. Second, what kind of data do I collect. Third, how do I analyze and make sense of that data? These are the kinds of questions that we are asked most often in our methodology classes and in our consultation on dissertation committees.

We expand the three dimensions of Patton's as follows:

1. The Patton design dimension (naturalistic inquiry versus experimental design) is expanded to a "type of investigation" dimension (relabeled *exploratory investigations versus confirmatory investigations*). This alternative dimension is based on the distinction between studies with a priori hypotheses (confirmatory investigations) and those without a priori hypotheses (exploratory investigations).

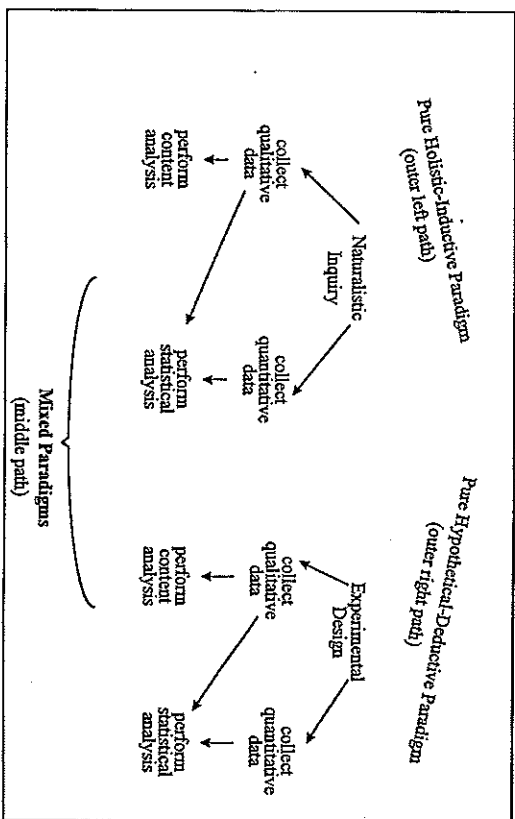
As noted in a previous section, the distinction between natural settings and controlled settings is a continuum, not a dichotomy, in terms of issues such as the control of extraneous variables and error variance. The presence or absence of hypotheses is a dichotomous dimension that distinguishes between studies at different phases in the investigation of a phenomenon, with exploratory studies occurring before confirmatory studies.

This first dimension includes the formulation of the research question, or hypothesis. In exploratory investigations, the purpose of the study is typically stated in terms of research questions. In confirmatory investigations, there is at least one research hypothesis in which a prediction of results is made a priori.

2. The Patton measurement dimension (qualitative versus quantitative data collection) is expanded to include *qualitative data collection*



BOX 3.8



and operations versus quantitative data collection and operations. This second dimension concerns the form of the data, and we think the narrative-number contrast is good for the purposes of an easily understood dichotomy (Miles & Huberman, 1994), although some authors have objected to its simplicity (e.g., Hammersley, 1992). (Chapter 6 contains an extended discussion of how narrative and numerical data can be converted into the other form.)

The relabeling of this dimension has been done for purposes of clarification: There are distinct research operations accompanying both quantitative and qualitative data collection. These include different measurement techniques, different methods for establishing the reliability and validity of results, different sampling procedures, and so on. These research operations will be discussed in Chapters 4 and 5.

3. The Patton analysis dimension (content versus statistical analysis) is expanded to include *qualitative analysis and inference versus statistical analysis and inference*. This third dimension is different from

Patton's dimension in two ways: Qualitative analysis has been substituted for content analysis, and inference processes have been added.

*Qualitative analysis* was substituted for *content analysis* because the former term is more inclusive and has been used in a variety of influential texts (e.g., Denzin & Lincoln, 1994; Miles & Huberman, 1994; Wolcott, 1994), while the latter is often identified with the field of communication (e.g., Berelson, 1952). Inference processes were added to this dimension because they are intertwined with analysis issues and because it was our intention to expand this taxonomy beyond methodological and analytical issues. An examination of the conclusion section of a published "quantitative" article or dissertation will show you that the authors make generalizations and interpretations beyond their obtained results. Each investigator has a choice of strictly staying within the limits of his or her findings or expanding the scope of conclusions through inference.

These three expanded dimensions are representative of the nine steps in the chain of reasoning for research described by Krathwohl (1993) and Gall et al. (1996).

The *exploratory investigations versus confirmatory investigations* dimension may include steps one through three: conclusions from previous research studies; explanation, rationale, theory, or point of view; and questions, hypotheses, predictions, models.

The *qualitative data collection and operations versus quantitative data collection and operations* dimension includes steps four and five: design or structure of the study and gathering the data.

The *qualitative analysis and inference versus statistical analysis and inference* dimension may include steps six through nine: summarizing the data, determining the significance of the results, conclusions, and beginning of the next study.

While the Krathwohl (1993) stages refer to quantitative research studies, the steps can, for the most part, also be applied to qualitative and mixed studies. Our intention in expanding these three dimensions beyond research methods (design, measurement, analysis) was to discuss the qualitative-quantitative dimension across other stages of the research process. The taxonomy based on these dimensions contains mixed model studies that go beyond the mixing of methodology to include other stages of the research process.

These three dimensions may also be referred to as stages of the research process: stage one, including the point of view of the investigators and the

research questions or hypotheses; stage two, including design issues and data collection; and stage three, including data analysis and conclusions.

**A Taxonomy of Mixed Model Studies  
(Single Application Within Stage of Study)**

We now present a logically exhaustive taxonomy of simple mixed model studies based upon the aforementioned three dichotomous dimensions, or stages. These simple designs involve single applications within a particular stage of research. These simple designs can be built upon to create more complex mixed model studies that will have multiple applications (quantitative and qualitative) within particular stages of the research process.

The classifications are based on the aforementioned three dimensions, or stages, of the research process: (a) the type of investigation (*exploratory or confirmatory investigation*) dimension, or stage, of the research process; (b) the type of data collection and operations (*qualitative or quantitative data collection and operations*) dimension, or stage, of the research process; and (c) the type of analysis and inference (*qualitative versus statistical analysis and inference*) dimension, or stage, of the research process.

A  $2 \times 2 \times 2$  cross-classification of these dimensions leads to eight types of models for conducting research, which is similar to the Patton (1990) classification scheme for research designs. Similarly, two of the eight resulting types of studies are the traditional qualitative and traditional quantitative models. The other six categories are mixed model studies, combining components of the qualitative-quantitative distinction across different stages of the research process. (See Table 3.1 for an illustration of this classification scheme.)

These six mixed model studies are discussed in detail in Chapters 7 and 8:

1. Type I and Type II mixed model studies are confirmatory investigations (note Types I and II designs in Table 3.1).
2. Type III and Type IV mixed model studies are exploratory investigations (note Types III and IV designs in Table 3.1).
3. Rare mixed model studies (Type V and Type VI) are not very common because they involve the qualitative analysis of quantitative data. These mixed model studies will also be discussed in Chapters 7 and 8. Chapter 6 includes a description of *qualitizing*, or the conversion of quantitative data into qualitative data (or numbers into words).
4. Type VII and VIII mixed model studies are more complex types and are discussed in the final section of this chapter and also in Chapter 8.

**Table 3.1**  
Classification of Methods According to the Three Dimensions of Confirmatory/Exploratory Investigation, Quantitative/Qualitative Operations, and Statistical/Qualitative Data Analysis and Inference

<i>Confirmatory Investigation</i>				<i>Exploratory Investigation</i>			
<i>Quantitative Data/Operations</i>		<i>Qualitative Data/Operations</i>		<i>Quantitative Data/Operations</i>		<i>Qualitative Data/Operations</i>	
<i>Statistical Analysis &amp; Inference</i>	<i>Qualitative Analysis &amp; Inference</i>	<i>Statistical Analysis &amp; Inference</i>	<i>Qualitative Analysis &amp; Inference</i>	<i>Statistical Analysis &amp; Inference</i>	<i>Qualitative Analysis &amp; Inference</i>	<i>Statistical Analysis &amp; Inference</i>	<i>Qualitative Analysis &amp; Inference</i>
Pure Quan	Mixed Type V (Rare)	Mixed Type I	Mixed Type II	Mixed Type III	Mixed Type VI (Rare)	Mixed Type IV	Pure Qual
Chapters 2, 7	Chapter 7	Chapter 7	Chapter 7	Chapter 7	Chapter 7	Chapter 7	Chapters 2, 7

NOTE: More complex combinations are also discussed in Chapter 8. They are divided into two categories: *parallel mixed model designs* (Type VII) and *sequential mixed model designs* (Type VIII).

### Two General Types of Mixed Model Studies

As noted in Chapter 1, mixed model studies may be of two general types: those that have single applications of approaches, or those that have multiple applications of approaches, within stage of research. Designs with multiple applications are discussed in Chapter 8 and are divided into *parallel mixed model designs* (Type VII) and *sequential mixed model designs* (Type VIII).

These multiple applications are truly mixed studies because they include both the qualitative and the quantitative orientations within the planning of the study, within the data collection stage, or within the data analysis and inference processes. Examples include the following:

- You can mix both research hypotheses (indicating a confirmatory study) and very general research questions (indicating an exploratory study) when planning a research project.
- You can mix the collection of both qualitative (ethnographic interviews, nonstructured observations) and quantitative (structured interview protocols, observational rating scales) data sources when conducting a study.
- You can mix the analysis and interpretation of qualitative and quantitative data sources in an iterative fashion designed to expand the meaning of the numerical results using the narrative results, or vice versa.