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RESEARCH DESIGN

Qualitative, Quantitative, and Mixed Methods Approaches

JOHN W. CRESWELL
UNIVERSITY OF NEBRASKA–LINCOLN

SAGE
Los Angeles • London • New Delhi • Singapore

For information:

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Thousand Oaks, California 91320
E-mail: order@sagepub.com

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Brief Contents

CHAPTER TEN

Mixed Methods Procedures

With the development and perceived legitimacy of both qualitative and quantitative research in the social and human sciences, mixed methods research, employing the combination of quantitative and qualitative approaches, has gained popularity. This popularity is because research methodology continues to evolve and develop, and mixed methods is another step forward, utilizing the strengths of both qualitative and quantitative research. Also, the problems addressed by social and health science researchers are complex, and the use of either quantitative or qualitative approaches by themselves is inadequate to address this complexity. The interdisciplinary nature of research, as well, contributes to the formation of research teams with individuals with diverse methodological interests and approaches. Finally, there is more insight to be gained from the combination of both qualitative and quantitative research than either form by itself. Their combined use provides an expanded understanding of research problems.

This chapter brings together many of the threads introduced in the earlier chapters: It extends the discussion about the philosophical assumptions of a pragmatic philosophy, the combined use of qualitative and quantitative modes of inquiry, and the use of multiple methods introduced in Chapter 1. It also extends the discussion about research problems that incorporate the need both to explore and explain (Chapter 5). It follows a purpose statement and research questions focused on understanding a problem using both qualitative and quantitative methods (Chapters 6 and 7), and it advances the reasons for using multiple forms of data collection and analysis (Chapters 8 and 9).

COMPONENTS OF MIXED METHODS PROCEDURES

Mixed methods research has evolved a set of procedures that proposal developers can use in planning a mixed methods study. In 2003, the *Handbook of*

Mixed Methods in the Social & Behavior Sciences (Tashakkori & Teddlie, 2003) was published, providing the first comprehensive overview of this strategy of inquiry. Now several journals emphasize mixed methods research, such as the *Journal of Mixed Methods Research, Quality and Quantity*, and *Field Methods*, while numerous others actively encourage this form of inquiry (e.g., *International Journal of Social Research Methodology, Qualitative Health Research, Annals of Family Medicine*). Numerous published research studies have incorporated mixed methods research in the social and human sciences in diverse fields such as occupational therapy (Lysack & Krefting, 1994), interpersonal communication (Boneva, Kraut, & Frohlich, 2001), AIDS prevention (Janz et al., 1996), dementia caregiving (Weitzman & Levkoff, 2000), mental health (Rogers, Day, Randall, & Bentall, 2003), and in middle-school science (Houtz, 1995). New books arrive each year solely devoted to mixed methods research (Bryman, 2006; Creswell & Plano Clark, 2007; Greene, 2007; Plano Clark & Creswell, 2008; Tashakkori & Teddlie, 1998).

A checklist of questions for designing a mixed methods study appears in Table 10.1. These components call for advancing the nature of mixed methods research and the type of strategy being proposed for the study. They also include the need for a visual model of this approach, the specific procedures of data collection and analysis, the researcher's role, and the structure for presenting the final report. Following the discussion of each of these components, an example of a procedures section from a mixed methods study is presented to show how to apply these ideas.

THE NATURE OF MIXED METHODS RESEARCH

Because mixed methods research is relatively new in the social and human sciences as a distinct research approach, it is useful to convey a basic definition and description of the approach in a proposal. This might include the following:

- Trace a brief history of its evolution. Several sources identify its inception in psychology and in the multitrait–multimethod matrix of Campbell and Fiske (1959) to interest in converging or triangulating different quantitative and qualitative data sources (Jick, 1979) and on to the development of a distinct methodology of inquiry (see Creswell & Plano Clark, 2007; Tashakkori & Teddlie, 1998).

- Define mixed methods research by incorporating the definition in Chapter 1 that focuses on combining both quantitative and qualitative research and methods in a research study (see a more expanded view of defining mixed methods research in Johnson, Onwuegbuzie, & Turner, 2007). Highlight the reasons why researchers employ a mixed methods design (e.g., to broaden understanding by incorporating both qualitative

Table 10.1 A Checklist of Questions for Designing a Mixed Methods Procedure

_____	Is a basic definition of mixed methods research provided?
_____	Is a reason given for using both quantitative and qualitative approaches (or data)?
_____	Does the reader have a sense for the potential use of a mixed methods design?
_____	Are the criteria identified for choosing a mixed methods strategy?
_____	Is the strategy identified, and are its criteria for selection given?
_____	Is a visual model presented that illustrates the research strategy?
_____	Is the proper notation used in presenting the visual model?
_____	Are procedures of data collection and analysis mentioned as they relate to the model?
_____	Are the sampling strategies for both quantitative and qualitative data collection mentioned? Do they relate to the strategy?
_____	Are specific data analysis procedures indicated? Do they relate to the strategy?
_____	Are the procedures for validating both the quantitative and qualitative data discussed?
_____	Is the narrative structure mentioned, and does it relate to the type of mixed methods strategy being used?

and quantitative research, or to use one approach to better understand, explain, or build on the results from the other approach). Also note that the mixing of the two might be within one study or among several studies in a program of inquiry. Recognize that many different terms are used for this approach, such as *integrating, synthesis, quantitative and qualitative methods, multimethod,* and *mixed methodology,* but that recent writings use the term *mixed methods* (Bryman, 2006; Tashakkori & Teddlie, 2003).

- Briefly discuss the growth of interest in mixed methods research as expressed in books, journal articles, diverse disciplines, and funded projects (see Creswell & Plano Clark, 2007 for a discussion about the many initiatives that contribute to mixed methods today).

- Note the challenges this form of research poses for the inquirer. These include the need for extensive data collection, the time-intensive nature of analyzing both text and numeric data, and the requirement for the researcher to be familiar with both quantitative and qualitative forms of research.

TYPES OF MIXED METHODS STRATEGIES AND VISUAL MODELS

There have been several typologies for classifying and identifying types of mixed methods strategies that proposal developers might use in their proposed mixed methods study. Creswell and Plano Clark (2007) identify 12 classification systems drawn from the fields of evaluation, nursing, public health, education policy and research, and social and behavioral research. In these classifications, authors use diverse terms for their types of designs, and a substantial amount of overlap exists in the typologies. For purposes of this discussion I will identify and discuss the six types that my colleagues and I advanced in 2003 (Creswell et al., 2003).

Planning Mixed Methods Procedures

It is helpful, however, before discussing the six types, to consider several aspects that influence the design of procedures for a mixed methods study. Four important aspects are timing, weighting, mixing, and theorizing (as shown in Figure 10.1).

Timing

Proposal developers need to consider the **timing** of their qualitative and quantitative data collection, whether it will be in phases (sequentially) or gathered at the same time (concurrently). When the data are collected in phases, either the qualitative or the quantitative data can come first. It depends on the initial intent of the researcher. When qualitative data are collected first, the intent is to explore the topic with participants at sites. Then the researcher expands the understanding through a second phase in which data are collected from a large number of people (typically a sample representative of a population). When data are collected concurrently, both quantitative and qualitative data are gathered at the same time and the implementation is simultaneous. In many projects it may be unworkable to collect data over an expanded time period (e.g., in the health sciences when busy medical personnel have limited time for data collection in the field). In this case, it is more manageable to collect both quantitative and qualitative data at roughly the same time, when the researcher(s) is in the field collecting data, rather than to revisit the field multiple times for data collection.

Weighting

A second factor that goes into designing procedures is the **weight** or priority given to quantitative or qualitative research in a particular study. In some studies, the weight might be equal; in other studies, it might emphasize

Timing	*Weighting*	*Mixing*	*Theorizing*
No Sequence concurrent	Equal	Integrating	Explicit
Sequential-Qualitative first	Qualitative	Connecting	
Sequential-Quantitative first	Quantitative	Embedding	Implicit

Figure 10.1 Aspects to Consider in Planning a Mixed Methods Design

SOURCE: Adapted from Creswell et al. (2003).

one or the other. A priority for one type depends on the interests of the researcher, the audience for the study (e.g., faculty committee, professional association), and what the investigator seeks to emphasize in the study. In practical terms, weight occurs in a mixed methods study through such strategies as whether quantitative or qualitative information is emphasized first, the extent of treatment of one type of data or the other in the project, or the use of primarily an inductive approach (i.e., generating themes in qualitative) or a deductive approach (i.e., testing a theory). Sometimes the researcher intentionally uses one form of data in a supportive role to a larger study, as is found in some experimental trials (see Rogers et al., 2003).

Mixing

Mixing the data (and in a larger sense, mixing the research questions, philosophy, the interpretation) is difficult at best when one considers that qualitative data consists of text and images and quantitative data, numbers. There are two different questions here: *When* does a researcher mix in a mixed methods study? And *how* does mixing occur? The first question is much easier to answer than the second. Mixing of the two types of data might occur at several stages: the data collection, the data analysis, interpretation, or at all three phases. For proposal developers using mixed methods, it is important to discuss and present in a proposal when the mixing will occur.

How the data are mixed has received considerable recent attention (Creswell & Plano Clark, 2007). **Mixing** means either that the qualitative

and quantitative data are actually merged on one end of the continuum, kept separate on the other end of the continuum, or combined in some way between these two extremes. The two data bases might be kept separate but connected; for example, in a two-phase project that begins with a quantitative phase, the analysis of the data and its results can be used to identify participants for qualitative data collection in a follow-up phase. In this situation, the quantitative and qualitative data are connected during the phases of research. **Connected** in mixed methods research means a mixing of the quantitative and qualitative research are connected between a data analysis of the first phase of research and the data collection of the second phase of research. In another study, the researcher might collect both quantitative and qualitative data concurrently and integrate or merge the two databases by transforming the qualitative themes into counts and comparing these counts with descriptive quantitative data. In this case, the mixing consists of **integrating** the two databases by actually merging the quantitative data with the qualitative data. In a final scenario, the researcher might have a primary aim to collect one form of data (say quantitative) and have the other form of data (say qualitative) provide supportive information. Neither integrating the data nor connecting across phases is being utilized. Instead, the researcher is **embedding** a secondary form of data within a larger study having a different form of data as the primary database. The secondary database provides a supporting role in the study.

Theorizing or Transforming Perspectives

A final factor to consider is whether a larger, theoretical perspective guides the entire design. It may be a theory from the social sciences (e.g., adoption theory, leadership theory, attribution theory) or a broad theoretical lens, such as an advocacy/participatory lens (e.g., gender, race, class; see Chapter 3). All researchers bring theories, frameworks and hunches to their inquiries, and these theories may be made explicit in a mixed methods study or be implicit and not mentioned. We will focus here on the use of explicit theories. In mixed methods studies, the theories are found typically in the beginning sections as an orienting lens that shapes the types of questions asked, who participates in the study, how data are collected, and the implications made from the study (typically for change and advocacy). They present an overarching perspective used with all of the mixed methods strategies of inquiry (to be presently discussed). Mertens (2003) provides a good discussion as to how a transforming lens shapes all phases of the research process in mixed methods research.

Alternative Strategies and Visual Models

These four factors—timing, weight, mixing, and theorizing—help to shape the procedures of a mixed methods study. Although these do not

exhaust all the possibilities, there are six major strategies for inquirers to choose from in designing a research proposal; they are adapted from Creswell et al. (2003). A proposal would contain a description of the strategy and a visual model of it, as well as basic procedures that the investigator will use in implementing the strategy. Each strategy is briefly described and illustrated in Figures 10.2 and 10.3. The words *qualitative* and *quantitative* have been shortened in the figures to read "qual" and "quan," respectively (see the discussion following the figures).

These mixed methods strategies can be described using notation that has developed in the mixed methods field. **Mixed methods notation** provides shorthand labels and symbols that convey important aspects of mixed methods research, and it provides a way that mixed methods researchers can easily communicate their procedures. The following notation is adapted from Morse (1991), Tashakkori and Teddlie (1998), and Creswell and Plano Clark (2007) who suggest the following:

- A "+" indicates a simultaneous or concurrent form of data collection, with both quantitative and qualitative data collected at same time.
- A "→" indicates a sequential form of data collection, with one form (e.g., qualitative data) building on the other (e.g., quantitative data).

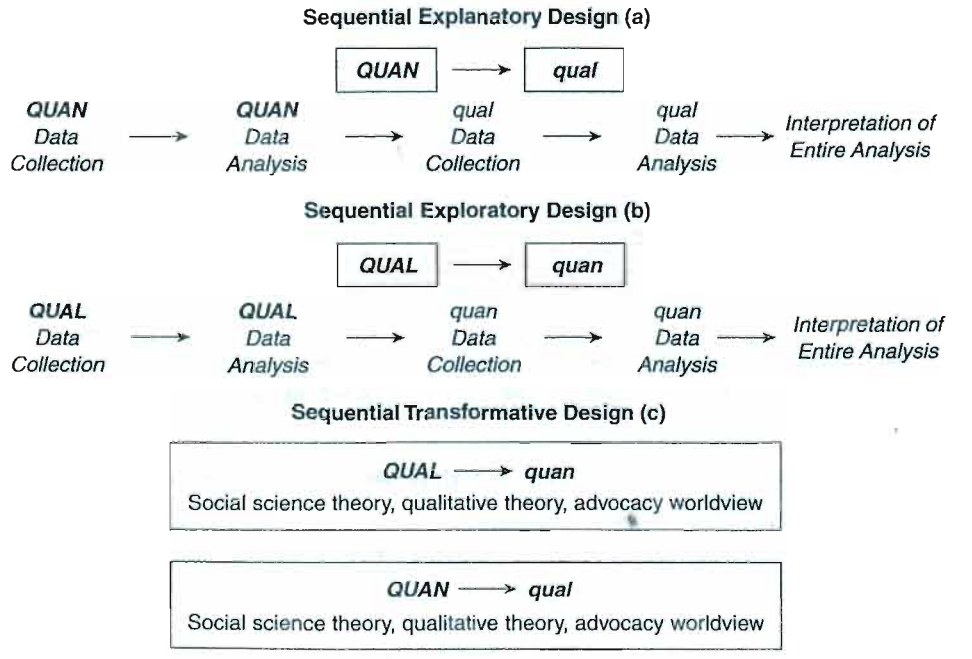

Figure 10.2 Sequential Designs

SOURCE: Adapted from Creswell et al. (2003).

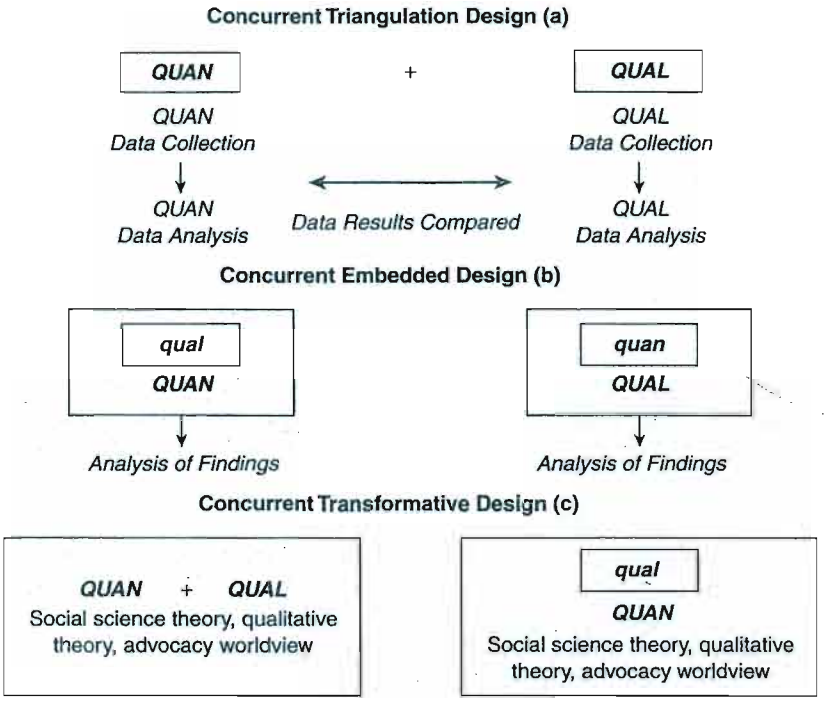

Figure 10.3 Concurrent Designs

SOURCE: Adapted from Creswell et al. (2003).

- Capitalization indicates a weight or priority on the quantitative or qualitative data, analysis, and interpretation in the study. In a mixed methods study, the qualitative and quantitative data may be equally emphasized, or one may be more emphasized than the other. Capitalization indicates that an approach or method is emphasized.
- "Quan" and "Qual" stand for *quantitative* and *qualitative*, respectively, and they use the same number of letters to indicate equality between the forms of data.
- A QUAN/qual notation indicates that the qualitative methods are embedded within a quantitative design.
- Boxes highlight the quantitative and qualitative data collection and analysis.

In addition, incorporated into each figure are specific data collection, analysis, and interpretation procedures to help the reader understand the more specific procedures used. In this way, a figure has at least two elements: the general procedure of mixed methods being used and the more specific procedures of data collection, analysis, and interpretation.

Sequential Explanatory Strategy

The **sequential explanatory strategy** is a popular strategy for mixed methods design that often appeals to researchers with strong quantitative leanings. It is characterized by the collection and analysis of quantitative data in a first phase of research followed by the collection and analysis of qualitative data in a second phase that builds on the results of the initial quantitative results. Weight typically is given to the quantitative data, and the mixing of the data occurs when the initial quantitative results *informs* the secondary qualitative data collection. Thus, the two forms of data are separate but connected. An explicit theory may or may not inform the overall procedure. The steps of this strategy are pictured in Figure 10.2a.

A sequential explanatory design is typically used to explain and interpret quantitative results by collecting and analyzing follow-up qualitative data. It can be especially useful when unexpected results arise from a quantitative study (Morse, 1991). In this case, the qualitative data collection that follows can be used to examine these surprising results in more detail. This strategy may or may not have a specific theoretical perspective. The straightforward nature of this design is one of its main strengths. It is easy to implement because the steps fall into clear, separate stages. In addition, this design feature makes it easy to describe and to report. The main weakness of this design is the length of time involved in data collection, with the two separate phases. This is especially a drawback if the two phases are given equal priority.

Sequential Exploratory Strategy

This next strategy is similar to the explanatory sequential approach except that the phases are reversed. The **sequential exploratory strategy** involves a first phase of qualitative data collection and analysis, followed by a second phase of quantitative data collection and analysis that *builds* on the results of the first qualitative phase. Weight is generally placed on the first phase, and the data are mixed through being connected between the qualitative data analysis and the quantitative data collection. The design may or may not be implemented within an explicit theoretical perspective (see Figure 10.2b).

At the most basic level, the purpose of this strategy is to use quantitative data and results to assist in the interpretation of qualitative findings. Unlike the sequential explanatory approach, which is better suited to explaining and interpreting relationships, the primary focus of this model is to initially explore a phenomenon. Morgan (1998) suggested that this design is appropriate to use when testing elements of an emergent theory resulting from the qualitative phase and that it can also be used to generalize qualitative findings to different samples. Similarly, Morse (1991) cited one purpose for selecting this approach: to determine the distribution of a

phenomenon within a chosen population. Finally, the sequential exploratory strategy is often discussed as the procedure of choice when a researcher needs to develop an instrument because existing instruments are inadequate or not available. Using a three-phase approach, the researcher first gathers qualitative data and analyzes it (Phase 1), and uses the analysis to development an instrument (Phase 2) that is subsequently administered to a sample of a population (Phase 3; Creswell & Plano Clark, 2007).

The sequential exploratory strategy has many of the same advantages as the sequential explanatory model. Its two-phase approach (qualitative research followed by quantitative research) makes it easy to implement and straightforward to describe and report. It is useful to a researcher who wants to explore a phenomenon but also wants to expand on the qualitative findings. This model is especially advantageous when a researcher is building a new instrument. In addition, this model could make a largely qualitative study more palatable to an adviser, committee, or research community well versed in quantitative research and that may be unfamiliar with the qualitative approaches. As with the sequential explanatory approach, the sequential exploratory model requires a substantial length of time to complete both data collection phases, which can be a drawback for some research situations. In addition, the researcher has to make some key decisions about which findings from the initial qualitative phase will be focused on in the subsequent quantitative phase (e.g., one theme, comparisons among groups, multiple themes).

Sequential Transformative Strategy

This final sequential approach has two distinct data collection phases, one following the other as in the first two strategies described (see Figure 10.2c). The **sequential transformative strategy** is a two-phase project with a theoretical lens (e.g., gender, race, social science theory) overlaying the sequential procedures. It too has an initial phase (either quantitative or qualitative) followed by a second phase (either qualitative or quantitative) that builds on the earlier phase. The theoretical lens is introduced in the introduction to a proposal, shapes a directional research question aimed at exploring a problem (e.g., inequality, discrimination, injustice), creates sensitivity to collecting data from marginalized or underrepresented groups, and ends with a call for action. In this design the researcher may use either method in the first phase of research, and the weight can be given to either or distributed evenly to both phases. The mixing is connected as in all sequential designs. Unlike the sequential exploratory and explanatory approaches, the sequential transformative model has a theoretical perspective to guide the study. The aim of this theoretical perspective, whether it be a conceptual framework, a specific ideology, or advocacy, is more important in guiding the study than the use of methods alone.

The purpose of a sequential transformative strategy is to best serve the theoretical perspective of the researcher. By using two phases, a sequential transformative researcher may be able to give voice to diverse perspectives, to better advocate for participants, or to better understand a phenomenon or process that is changing as a result of being studied.

The sequential transformative model shares the methodological strengths and weaknesses of the other two sequential approaches. Its use of distinct phases facilitates its implementation, description, and sharing of results, although it also requires the time to complete two data collection phases. More important, this design places mixed methods research within a transformative framework. Therefore, this strategy may be more appealing and acceptable to those researchers already using a transformative framework within one distinct methodology, such as qualitative research. Unfortunately, because little has been written to date on this approach, one weakness is that there is little guidance on how to use the transformative vision to guide the methods. Likewise, as with all sequential strategies, key decisions need to be made about what findings in the first phase will be the focus of the second phase.

Concurrent Triangulation Strategy

The **concurrent triangulation** approach is probably the most familiar of the six major mixed methods models (see Figure 10.3a). In a concurrent triangulation approach, the researcher collects both quantitative and qualitative data concurrently and then compares the two databases to determine if there is convergence, differences, or some combination. Some authors refer to this comparison as *confirmation, disconfirmation, cross-validation,* or *corroboration* (Greene, Caracelli, & Graham, 1989; Morgan, 1998; Steckler, McLeroy, Goodman, Bird, & McCormick, 1992). This model generally uses separate quantitative and qualitative methods as a means to offset the weaknesses inherent within one method with the strengths of the other (or conversely, the strength of one adds to the strength of the other). In this approach, the quantitative and qualitative data collection is concurrent, happening in one phase of the research study. Ideally, the weight is equal between the two methods, but often in practice, priority may be given to one or the other. The mixing during this approach, usually found in an interpretation or discussion section, is to actually merge the data (i.e., transform one type of data to the other type of data so that they can easily be compared) or integrate or compare the results of two databases side by side in a discussion. This side-by-side integration is often seen in published mixed methods studies in which a discussion section first provides quantitative statistical results followed by qualitative quotes that support or disconfirm the quantitative results.

This traditional mixed methods model is advantageous because it is familiar to most researchers and can result in well-validated and substantiated

findings. I find that most researchers when they first consider mixed methods employ this model of gathering both quantitative and qualitative data and comparing the two data sources. In addition, the concurrent data collection results in a shorter data collection time period as compared to one of the sequential approaches because both the qualitative and quantitative data are gathered at one time at the research site.

This model also has a number of limitations. It requires great effort and expertise to adequately study a phenomenon with two separate methods. It also can be difficult to compare the results of two analyses using data of different forms. In addition, a researcher may be unclear how to resolve discrepancies that arise in comparing the results, although procedures are emerging in the literature, such as conducting additional data collection to resolve the discrepancy, revisiting the original database, gaining new insight from the disparity of the data, or developing a new project that addresses the discrepancy (Creswell & Plano Clark, 2007).

Concurrent Embedded Strategy

Like the concurrent triangulation approach, the **concurrent embedded** strategy of mixed methods can be identified by its use of one data collection phase, during which both quantitative and qualitative data are collected simultaneously (see Figure 10.3b). Unlike the traditional triangulation model, a concurrent embedded approach has a primary method that guides the project and a secondary database that provides a supporting role in the procedures. Given less priority, the secondary method (quantitative or qualitative) is embedded, or nested, within the predominant method (qualitative or quantitative). This embedding may mean that the secondary method addresses a different question than the primary method (e.g., in an experiment, the quantitative data addresses the outcomes expected from the treatments while the qualitative data explores the processes experienced by individuals in the treatment groups) or seeks information at a different level of analysis (the analogy to hierarchical analysis in quantitative research is helpful in conceptualizing these levels—see Tashakkori and Teddlie, 1998). The mixing of the data from the two methods is often to integrate the information and compare one data source with the other, typically accomplished in a discussion section of a study. However, the data may also not be compared but reside side by side as two different pictures that provide an overall composite assessment of the problem. This would be the case when the researcher uses this approach to assess different research questions or different levels in an organization. Similar to the other approaches, an explicit theoretical perspective can be used in this model, typically to inform the primary method.

The concurrent embedded model may be used to serve a variety of purposes. Often, this model is used so that a researcher can gain broader perspectives as a result of using the different methods as opposed to using the

predominant method alone. For example, Morse (1991) noted that a primarily qualitative design could embed some quantitative data to enrich the description of the sample participants. Likewise, she described how qualitative data could be used to describe an aspect of a quantitative study that cannot be quantified. In addition, a concurrent embedded model may be employed when a researcher chooses to utilize different methods to study different groups or levels. For example, if an organization is being studied, employees could be studied quantitatively, managers could be interviewed qualitatively, entire divisions could be analyzed with quantitative data, and so forth. Tashakkori and Teddlie (1998) described this approach as a multilevel design. Finally, one method could be used within a framework of the other method, such as if a researcher designed and conducted an experiment to examine treatment outcomes but used case study methodology to study how participants in the study experienced the treatment procedures.

This mixed methods model is attractive for several reasons. A researcher is able to collect the two types of data simultaneously, during a single data collection phase. It provides a study with the advantages of both quantitative and qualitative data. In addition, by using the two different methods in this fashion, a researcher can gain perspectives from the different types of data or from different levels within the study.

There are also limitations to consider when choosing this approach. The data need to be transformed in some way so that they can be integrated within the analysis phase of the research. In addition, if the two databases are compared, discrepancies may occur that need to be resolved. Because the two methods are unequal in their priority, this approach also results in unequal evidence within a study, which may be a disadvantage when interpreting the final results.

Concurrent Transformative Strategy

As with the sequential transformative model, the **concurrent transformative** approach is guided by the researcher's use of a specific theoretical perspective as well as the concurrent collection of both quantitative and qualitative data (see Figure 10.3c). This perspective can be based on ideologies such as critical theory, advocacy, participatory research, or a conceptual or theoretical framework. This perspective is reflected in the purpose or research questions of the study. It is the driving force behind all methodological choices, such as defining the problem, identifying the design and data sources, analyzing, interpreting, and reporting results. The choice of a concurrent model, whether it is triangulation or embedded design, is made to facilitate this perspective. For example, the design may have one method embedded in the other so that diverse participants are given a voice in the change process of an organization. It may involve a triangulation of quantitative and qualitative data to best converge information to provide evidence for an inequality of policies in an organization.

Thus, the concurrent transformative model may take on the design features of either a triangulation or an embedded approach (the two types of data are collected at the same time during one data collection phase and may have equal or unequal priority). The mixing of the data would be through merging, connecting, or embedding the data. Because the concurrent transformative model shares features with the triangulation and embedded approaches, it also shares their specific strengths and weaknesses. However, this model has the added advantage of positioning mixed methods research within a transformative framework, which may make it especially appealing to those qualitative or quantitative researchers already using a transformative framework to guide their inquiry.

Choosing a Mixed Methods Strategy

Proposal developers need to convey the specific strategy for mixed methods data collection they plan to use. Further, they need to advance a visual figure that presents the procedures they plan to use. Figures 10.2 and 10.3 provide some useful models for guidance. Here are some **research tips** about how to select a mixed methods strategy:

- Use the information in Figure 10.1 to assess the aspects that you will be working with in your mixed methods procedures, and then identify one of the six approaches discussed in this chapter as the primary design for your proposed study. Provide a working definition for this design, along with a visual model and a rationale as to why it is a useful design for you to us.

- Consider the amount of time you have to collect data. Concurrent approaches are less time consuming because both qualitative and quantitative data are collected at the same time in the same visit to the field.

- Remember that the collection and analysis of both quantitative and qualitative data is a rigorous, time-consuming process. When time is a problem, I encourage students to think about an embedded model of design. This model emphasizes a major primary form of data collection (e.g., surveys), and it can include a minor secondary form of data collection (e.g., a few interviews with some of the participants who completed the surveys). The fact that both forms of data are not equal in size and rigor enables the study to be reduced in scope and manageable for the time and resources available.

- Consider using the explanatory sequential approach. It is a favorite of many students, especially those who have little experience with qualitative research and substantial background in quantitative research. In this approach, an initial quantitative data collection is followed by a secondary qualitative data collection to follow up the quantitative results.

- Study published articles that use different approaches and determine which one makes the most sense to you. Creswell and Plano Clark (2007) include four complete journal articles so that readers can examine the detail of studies employing different forms of designs.

- Find a published mixed methods journal article that uses your design and introduce it to your adviser and faculty committee so that they have a working model for the approach you plan to use in your study. Since we are at the early stage of adopting mixed methods research in many fields, a published example of research in your field will help to create both legitimacy for mixed methods research and the idea that it is a feasible approach to research for graduate committees or other audiences.

DATA COLLECTION PROCEDURES

Although the visual model and the discussion about the specific strategies in a proposal provide a picture of the procedures, it is helpful to discuss the specific types of data to be collected. It is also important to identify the sampling strategies and the approaches used to establish validity of the data.

- Identify and be specific about the type of data—both quantitative and qualitative—that will be collected during the proposed study. Refer to Table 1.3, which shows both quantitative and qualitative data. Data differs in terms of open-ended versus closed-ended responses. Some forms of data, such as interviews and observations, can be either quantitative or qualitative depending on how open (qualitative) or closed (quantitative) the response options might be in an interview or a checklist for an observation. Although reducing information to numbers is the approach used in quantitative research, it is also used in qualitative research.

- Recognize that quantitative data often involve random sampling, so that each individual has an equal probability of being selected, and the sample can be generalized to the larger population. In qualitative data collection, purposeful sampling is used so that individuals are selected because they have experienced the central phenomenon. Rigorous sampling procedures need to be conveyed in a proposal for the quantitative and qualitative data collection. In addition, Teddlie and Yu (2007) have developed a typology of five types of mixed methods sampling which relates sampling to the strategies for mixed methods that I have discussed:
  - Basic strategies that involve combining quantitative and qualitative sampling (e.g., stratified purposeful sampling, purposive random sampling)
  - Sequential sampling, in which the sampling from the first phase or strand informs the second phase or strand

- Concurrent sampling, in which quantitative probability and qualitative purposeful sampling are combined as independent sampling procedures or jointly (e.g., a survey with both closed-ended and open-ended responses)
- Multilevel sampling, in which sampling occurs in two or more levels or units of analysis
- Sampling using any combination of the foregoing strategies

● Include detailed procedures in your visual model. For example, in a sequential explanatory model, the general procedures are higher on the page and the detailed procedures below them, as shown in Figure 10.2a. However, the figure can be detailed even further. For example, a discussion of this approach might include describing the use of survey data collection followed by both descriptive and inferential data analysis in the first phase. Then qualitative observations and coding and thematic analysis within an ethnographic design might be mentioned for the second phase.

DATA ANALYSIS AND VALIDATION PROCEDURES

Data analysis in mixed methods research relates to the type of research strategy chosen for the procedures. Thus, in a proposal, the procedures need to be identified within the design. However, analysis occurs both within the quantitative (descriptive and inferential numeric analysis) and the qualitative (description and thematic text or image analysis) approach and often between the two approaches. For example, some of the more popular mixed methods data analysis approaches are the following (see Caracelli & Greene, 1993; Creswell & Plano Clark, 2007; Tashakkori & Teddlie, 1998):

● Data transformation: In the concurrent strategies, a researcher may quantify the qualitative data. This involves creating codes and themes qualitatively, then counting the number of times they occur in the text data (or possibly the extent of talk about a code or theme by counting lines or sentences). This quantification of qualitative data then enables a researcher to compare quantitative results with the qualitative data. Alternatively, an inquirer may qualify quantitative data. For instance, in a factor analysis of data from a scale on an instrument, the researcher may create factors or themes that then can be compared with themes from the qualitative database.

● Explore outliers: In a sequential model, an analysis of quantitative data in the first phase can yield extreme or outlier cases. Follow-up qualitative interviews with these outlier cases can provide insight about why they diverged from the quantitative sample.

- Instrument development: In a sequential approach, obtain themes and specific statements from participants in an initial qualitative data collection. In the next phase, use these statements as specific items and the themes for scales to create a survey instrument that is grounded in the views of the participants. A third, final phase might be to validate the instrument with a large sample representative of a population.

- Examine multiple levels: In a concurrent embedded model, conduct a survey at one level (e.g., with families) to gather quantitative results about a sample. At the same time, collect qualitative interviews (e.g., with individuals) to explore the phenomenon with specific individuals in the families.

- Create a matrix: When comparing data in a concurrent type of approach, combine information from both the quantitative and qualitative data collection into a matrix. The horizontal axis of this matrix could be a quantitative categorical variable (e.g., type of provider—nurse, physician, and medical assistant) and the vertical axis would be the qualitative data (e.g., five themes about caring relationships between providers and patients). Information in the cells could be either quotes from the qualitative data, counts of the number of codes from the qualitative data, or some combination. In this way, the matrix would present an analysis of the combined qualitative and quantitative data. Qualitative computer software programs provide matrix output capabilities for the mixed methods researcher (see Chapter 9).

Another aspect of data analysis in mixed methods research to describe in a proposal is the series of steps taken to check the validity of both the quantitative data and the accuracy of the qualitative findings. Writers on mixed methods advocate for the use of validity procedures for both the quantitative and qualitative phases of the study (Tashakkori & Teddlie, 1998). The proposal writer discusses the validity and reliability of the scores from past uses of instruments employed in the study. In addition, potential threats to internal validity for experiments and surveys are noted (see Chapter 8). For the qualitative data, the strategies that will be used to check the accuracy of the findings need to be mentioned (see Chapter 9). These may include triangulating data sources, member checking, detailed description, or other approaches.

An emerging field of study is to consider how validity might be different for mixed methods studies than for a quantitative or a qualitative study. Writers have begun to develop a bilingual nomenclature for mixed methods research and have called validity *legitimation* (Onwuegbuzie & Johnson, 2006, p. 55). The legitimation of the mixed methods study relates to many phases of the research process, from philosophical issues (e.g., are the philosophical positions blended into a usable form?) to inferences drawn (e.g., yield high-quality inferences) and to the value of the

study for consumers (see Onwuegbuzie & Johnson, 2006). For individuals writing a mixed methods research proposal, consider the types of validity associated with the quantitative component (see Chapter 8), validity related to the qualitative strand (see Chapter 9), and any validity issues that might arise that relate to the mixed methods approach. Validity issues in mixed methods research may relate to the types of strategies discussed in this chapter. These may relate to sample selection, sample size, follow up on contradictory results, bias in data collection, inadequate procedures, or the use of conflicting research questions (see Creswell & Plano Clark, 2007 for a discussion of these ideas).

REPORT PRESENTATION STRUCTURE

The structure for the report, like the data analysis, follows the type of strategy chosen for the proposed study. Because mixed methods studies may not be familiar to audiences, it is helpful to provide some guidance as to how to structure the final report.

- For a sequential study, mixed methods researchers typically organize the report of procedures into quantitative data collection and quantitative data analysis followed by qualitative data and collection and analysis. Then, in the conclusions or interpretation phase of the study, the researcher comments on how the qualitative findings helped to elaborate on or extend the quantitative results. Alternatively, the qualitative data collection and analysis could come first, followed by the quantitative data collection and analysis. In either structure, the writer typically presents the project as two distinct phases, with separate headings for each phase.

- In a concurrent study, the quantitative and qualitative data collection may be presented in separate sections, but the analysis and interpretation combines the two forms of data to seek convergence or similarities among the results. The structure of this type of mixed methods study does not make a clear distinction between the quantitative and qualitative phases.

- In a transformative study, the structure typically involves advancing the advocacy issue in the beginning and then using either the sequential or concurrent structure as a means of organizing the content. In the end, a separate section may advance an agenda for change or reform that has developed as a result of the research.

EXAMPLES OF MIXED METHODS PROCEDURES

Illustrations follow of mixed methods studies that use both the sequential and concurrent strategies and procedures.

Example 10.1 *A Sequential Strategy of Inquiry*

Kushman (1992) studied two types of teacher workplace commitment—organizational commitment and commitment to student learning—in 63 urban elementary and middle schools. He posed a two-phase explanatory sequential mixed methods study, as presented in the purpose statement:

> The central premise of this study was that organizational commitment and commitment to student learning address distinct but equally important teacher attitudes for an organizationally effective school, an idea that has some support in the literature but requires further empirical validation. . . . Phase 1 was a quantitative study that looked at statistical relationships between teacher commitment and organizational antecedents and outcomes in elementary and middle schools. Following this macrolevel analysis, Phase 2 looked within specific schools, using qualitative/case study methods to better understand the dynamics of teacher commitment.
>
> (Kushman, 1992, p. 13)

This purpose statement illustrates the combination of a purpose with the rationale for mixing ("to better understand") as well as the specific types of data collected during the study. The introduction focused on the need to examine organizational commitment and commitment to student learning, leading to a priority for the quantitative approach. This priority was further illustrated in sections defining organizational commitment and commitment to student learning and the use of extensive literature to document these two concepts. A conceptual framework then followed, complete with a visual model, and research questions were posed to explore relationships. This provided a theoretical lead for the quantitative phase of the study (Morse, 1991). The implementation was QUAN→qual in this two-phase study. The author presented results in two phases, with the first—the quantitative results—displaying and discussing correlations, regressions, and two-way ANOVAs. Then the case study results were presented in terms of themes and subthemes supported by quotations. The mixing of the quantitative results and qualitative findings occurred in the final discussion, in which the researcher highlighted the quantitative results and the complexities that surfaced from the qualitative results. The author did not use a theoretical perspective as a lens in the study.

Example 10.2 *A Concurrent Strategy of Inquiry*

In 1993, Hossler and Vesper conducted a study examining the factors associated with parental savings for children attending higher education campuses.

(Continued)

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Using longitudinal data collected from students and parents over a 3-year period, the authors examined factors most strongly associated with parental savings for postsecondary education. Their results found that parental support, educational expectations, and knowledge of college costs were important factors. Most important, for our purposes, the authors collected information from parents and students on 182 surveys and from 56 interviews. Their purpose indicated an interest in triangulating the findings:

> In an effort to shed light on parental saving, this article examines parental saving behaviors. Using student and parent data from a longitudinal study employing multiple surveys over a three-year period, logistic regression was used to identify the factors most strongly associated with parental saving for postsecondary education. In addition, insights gained from the interviews of a small sub-sample of students and parents who were interviewed five times during the three-year period are used to further examine parental savings.
>
> (Hossler & Vesper, 1993, p. 141)

The actual data was collected from 182 student and parent participants from surveys over a 4-year period of time and from 56 students and their parents in interviews. From the purpose statement, we can see that they collected data concurrently as an implementation strategy. They provide extensive discussion of the quantitative analysis of the survey data, including a discussion about the measurement of variables and the details of the logistic regression data analysis. They also mention the limitations of the quantitative analysis and specific *t*-test and regression results. In contrast, they devote one page to the qualitative data analysis and note briefly the themes that occurred in the discussion. The weight in this mixed methods study was assigned to quantitative data collection and analysis, and the notation for the study would be QUAN + qual. The mixing of the two data sources occurred in a section titled "Discussion of Survey and Interview Results" (p. 155), at the interpretation stage of the research process. In this section, they compared the importance of the factors explaining parental savings for the quantitative results, on one hand, with the findings from the interview data on the other. Similar to Example 10.1, no theoretical lens guided the study, although the article began with the literature on econometric studies and research on college choice and ended with an "Augmented Model of Parental Savings." Thus, we might characterize the use of theory in this study as inductive (as in qualitative inquiry), drawn from the literature (as in quantitative research), and ultimately as generated during the process of research.

Example 10.3 *A Transformative Strategy of Inquiry*

A feminist lens was used in a transformative triangulation mixed methods study by Bhopal (2000). She was interested in examining whether theories of patriarchy apply to South Asian women (from India, Pakistan and Bangladesh) living in East London. Since these women often have arranged marriages and are given dowries, she assumed that forms of patriarchy exist for them that do not exist for White women in Britain. Her overall aim was to "build up a detailed knowledge of women's lives, their feelings towards their own roles and what they actually did in the home, their attitudes towards arranged marriages, dowries, domestic labour and domestic finance" (p. 70). She studied 60 women using qualitative and quantitative methods,

> (to) investigate the varying significance of difference through which women experienced patriarchy . . . and to present accurate information regarding the number of women who experienced different forms of patriarchy and test for the strength of associations between different influences of patriarchy.
>
> (Bhopal, 2000, p. 68)

She found that education had a significant impact upon the women's lives. Moreover, her discussion presented how feminist methodologies informed her study. She discussed how she addressed women's lives in their own terms, using the language and categories in which women express themselves. Her research did not just involve women, it was *for* women. Her research also involved putting herself into the process of production in which she made explicit her reasoning procedures and was self-reflexive about her own perceptions and biases. In this way, her mixed methods study helped to expose the lives of women and have a transformative effect in which the "women benefited from the research project" (p. 76).

The intent of the author was to provide a voice for women and to give a more powerful voice to gender inequality. The quantitative data provided the generalized patterns of participation while the qualitative data provided the personal narratives of women. The timing of the study was to first collect survey data and then interview women to follow up and understand their participation in more depth (an explanatory sequential design). The weight of the qualitative and quantitative components was equal, with the thought that both contribute to understanding the research problem. The mixing was through connecting the results from the quantitative survey and exploring these in more depth in the qualitative phase. Because feminist theory was discussed throughout the article with a focus on equality and giving voice to women, the study employed an explicit theoretical feminist lens.

SUMMARY

In designing the procedures for a mixed methods study, begin by conveying the nature of mixed methods research. This includes tracing its history, defining it, and mentioning its applications in many fields of research. Then, state and employ four criteria to select an appropriate mixed methods strategy. Indicate the timing strategy for data collection (concurrent or sequential). Also state weight or priority given to the quantitative or qualitative approach, such as equal weight, or a priority to quantitative or qualitative data. Mention how the data will be mixed, such as through merging the data, connecting the data from one phase to another, or embedding a secondary source of data into a larger, primary source. Finally, identify whether a theoretical lens or framework will guide the study, such as a theory from the social sciences or a lens from an advocacy perspective (e.g., feminism, racial perspective).

Six strategies are organized around whether the data are collected sequentially (explanatory and exploratory), concurrently (triangulation and nested), or with a transformative lens (sequential or concurrent). Each model has strengths and weaknesses, although the sequential approach is the easiest to implement. Choice of strategy also can be presented in a figure in the research proposal. Then, specific procedures can be related to the figure to help the reader understand the flow of activities in a project. These include the types of quantitative and qualitative data to be collected as well as the procedures for data analysis. Typically, data analysis involves data transformation, exploring outliers, examining multiple levels, or creating matrices that combine the quantitative results and the qualitative findings. Validity procedures also need to be explicitly described. The final written report, because it may be unfamiliar to audiences, can also be described in a proposal. Each of the three types of strategies—sequential, concurrent, and transformative—has a different structural approach to writing a mixed methods study.

WRITING EXERCISES

Writing Exercises

1. Design a combined qualitative and quantitative study that employs two phases sequentially. Discuss and provide a rationale for why the phases are ordered in the sequence you propose.

2. Design a combined qualitative and quantitative study that gives priority to qualitative data collection and less priority to quantitative data collection. Discuss the approach to be taken in writing the introduction, the purpose statement, the research questions, and the specific forms of data collection.

3. Develop a visual figure and specific procedures that illustrate the use of a theoretical lens, such as a feminist perspective. Use the procedures of either a sequential or concurrent model for conducting the study. Use appropriate notation in the figure.