CHAPTER 3

CHOOSING A MIXED METHODS DESIGN

Research designs are procedures for collecting, analyzing, interpreting, and reporting data in research studies. They represent different models for doing research, and these models have distinct names and procedures associated with them. Research designs are useful, because they help guide the methods decisions that researchers must make during their studies and set the logic by which they make interpretations at the end of their studies. Once the researcher has identified that the research problem calls for a mixed methods approach and reflected on the philosophical and theoretical foundations of the study, the next step is to choose a specific design that best fits the problem and the research questions in the study. What designs are available, and how do researchers decide which one is appropriate for their studies? Mixed methods researchers need to be acquainted with the major types of mixed methods designs and the key decisions behind these designs to adequately consider available options. Each major design has its own history, purpose, considerations, philosophical assumptions, procedures, strengths, challenges, and variants. With an understanding of the basic designs in hand, researchers are equipped to choose and describe the mixed methods design best suited to address a stated problem.

This chapter introduces the basic designs available to the researcher planning to engage in mixed methods research. It will address

- principles for designing a mixed methods study;
- decisions necessary in choosing a mixed methods design;

- characteristics of major mixed methods designs;
- the history, purpose, philosophical assumptions, procedures, strengths, challenges, and variants for each of the major designs; and
- a model for writing about a design in a written report.

● PRINCIPLES FOR DESIGNING A MIXED METHODS STUDY

Designing research studies is a challenging process in both quantitative and qualitative research. This process can become even more of a challenge when the researcher has decided to use a mixed methods approach due to the inherent complexity in mixed methods designs. Although the design and conduct of any two mixed methods studies will never be exactly alike, there are several key principles that researchers consider to help navigate this process: using a fixed and/or emergent design; identifying a design approach to use; matching a design to the study's problem, purpose, and questions; and being explicit about the reason for mixing methods.

Recognize That Mixed Methods Designs Can Be Fixed and/or Emergent

Mixed methods designs may be fixed and/or emergent, and researchers need to be cognizant of the approach that they are using and open to considering the best alternative for their circumstances. **Fixed mixed methods designs** are mixed methods studies where the use of quantitative and qualitative methods is predetermined and planned at the start of the research process, and the procedures are implemented as planned. **Emergent mixed methods designs** are found in mixed methods studies where the use of mixed methods arises due to issues that develop during the process of conducting the research. Emergent mixed methods designs generally occur when a second approach (quantitative or qualitative) is added after the study is underway because one method is found to be inadequate (Morse & Niehaus, 2009). For example, Ras (2009) described how she found the need to add a quantitative component to her qualitative case study of self-imposed curricular change at one elementary school. She addressed emergent concerns with the trustworthiness of her interpretations of what she learned from her participants. In this way, her qualitative case study became a mixed methods study during her process of implementing the research study.

We view these two categories—fixed and emergent—not as a clear dichotomy but as end points along a continuum. Many mixed methods designs actually fall somewhere in the middle with both fixed and emergent aspects to the design. For example, the researcher may plan to conduct a study in two phases from the start, such as beginning with a quantitative phase and then following up with a qualitative phase. The details of the design of the second, qualitative phase, however, may emerge based on the researcher's interpretation of the results from the initial quantitative phase. Therefore, the study becomes an example of combining both fixed and emergent elements.

Due to our focus on planning mixed methods studies and the linear and fixed nature of printed text, our writing may appear to emphasize fixed designs. Keep in mind, however, that we recognize the importance and value of emergent mixed methods approaches. We believe that most of the design elements that we address in this book apply well whether the use of mixed methods is planned from the start and/or emerges due to the needs of a study.

Identify an Approach to Design

In addition to using fixed and emergent mixed methods designs, researchers also use different approaches for designing their mixed methods studies. There are several approaches to design that have been discussed in the literature, and researchers can benefit from considering their personal approach to designing mixed methods studies. These design approaches fall into two categories: typology-based and dynamic.

A **typology-based approach** to mixed methods design emphasizes the classification of useful mixed methods designs and the selection and adaptation of a particular design to a study's purpose and questions. Unquestionably, this design approach has been discussed most extensively in the mixed methods literature, as shown by the amount of effort that has been spent on classifying mixed methods designs. There is a wide range of available classifications of types of mixed methods designs that methodologists have advanced. Creswell, Plano Clark, Gutmann, and Hanson (2003) summarized the range of these classifications in 2003, and we have updated the summary with a list of 15 classifications in Table 3.1. These classifications represent diverse disciplines, including evaluation, health sciences, and education, and span scholarly writings about mixed methods approaches since the late 1980s. They also tend to use different terminology and emphasize different features of mixed methods designs (a topic we will turn our attention to later

Table 3.1 Mixed Methods Design Classifications

Author	Discipline	Mixed Methods Designs
Greene, Caracelli, and Graham (1989)	Evaluation	Initiation Expansion Development Complementarity Triangulation
Patton (1990)	Evaluation	Experimental design, qualitative data, and content analysis Experimental design, qualitative data, and statistical analysis Naturalistic inquiry, qualitative data, and statistical analysis Naturalistic inquiry, quantitative data, and statistical analysis
Morse (1991)	Nursing	Simultaneous triangulation Sequential triangulation
Steckler, McLeroy, Goodman, Bird, and McCormick (1992)	Public health education	Model 1: Qualitative methods to develop quantitative measures Model 2: Qualitative methods to explain quantitative findings Model 3: Quantitative methods to embellish qualitative findings Model 4: Qualitative and quantitative methods used equally and parallel
Greene and Caracelli (1997)	Evaluation	Component designs Triangulation Complementarity Expansion Integrated designs Iterative Embedded or nested Holistic Transformative
Morgan (1998)	Health research	Complementary designs Qualitative preliminary Quantitative preliminary Qualitative follow-up Quantitative follow-up

Author	Discipline	Mixed Methods Designs
Tashakkori and Teddlie (1998)	Educational research	Mixed methods designs Equivalent status (sequential or parallel) Dominant–less dominant (sequential or parallel) Multilevel use Mixed model designs I. Confirmatory, qualitative data, statistical analysis, and inference II. Confirmatory, qualitative data, qualitative analysis, and inference III. Exploratory, quantitative data, statistical analysis, and inference IV. Exploratory, qualitative data, statistical analysis, and inference V. Confirmatory, quantitative data, qualitative analysis, and inference VI. Exploratory, quantitative data, qualitative analysis, and inference VII. Parallel mixed model VIII. Sequential mixed model
Creswell (1999)	Educational policy	Convergence model Sequential model Instrument-building model
Sandelowski (2000)	Nursing	Sequential Concurrent Iterative Sandwich
Creswell, Plano Clark, Gutmann, and Hanson (2003)	Educational research	Sequential explanatory Sequential exploratory Sequential transformative Concurrent triangulation Concurrent nested Concurrent transformative

(Continued)

Table 3.1 (Continued)

Author	Discipline	Mixed Methods Designs
Creswell, Fetters, and Ivankova (2004)	Primary medical care	Instrument design model Triangulation design model Data transformation design model
Tashakkori and Teddlie (2003b)	Social and behavioral research	Multistrand designs Concurrent mixed designs Concurrent mixed methods design Concurrent mixed model design Sequential mixed designs Sequential mixed methods design Sequential mixed model design Multistrand conversion mixed designs Multistrand conversion mixed methods design Multistrand conversion mixed model design Fully integrated mixed model design
Greene (2007)	Evaluation	Component designs Convergence Extension Integrated designs Iteration Blending Nesting or embedding Mixing for reasons of substance or values
Teddlie & Tashakkori (2009)	Educational research	Mixed methods multistrand designs Parallel mixed designs Sequential mixed designs Conversion mixed designs Multilevel mixed designs Fully integrated mixed designs

Author	Discipline	Mixed Methods Designs
Morse and Neihaus (2009)	Nursing	Mixed method simultaneous designs Mixed method sequential designs Complex mixed method designs Qualitatively driven complex mixed method design Quantitatively driven complex mixed method design Multiple method research program

SOURCE: Adapted from Creswell, Plano Clark, et al. (2003, pp. 216–217, Table 8.1) with permission of SAGE Publications, Inc.

in this chapter). The different types and various classifications speak to the evolving nature of mixed methods research and the utility of considering designs as a framework for thinking about mixed methods.

There are also dynamic approaches for thinking about the process of designing a mixed methods study. **Dynamic approaches** to mixed methods design focus on a design process that considers and interrelates multiple components of research design rather than placing emphasis on selecting an appropriate design from an existing typology. Maxwell and Loomis (2003) introduced an interactive, systems-based approach to mixed methods design. They argued that the researcher should weigh five interconnected components when designing a mixed methods study: the study's purposes, conceptual framework, research questions, methods, and validity considerations. Although research questions are at the heart of this process, they discuss how the interrelationships among the components need to be considered throughout the design process.

Hall and Howard (2008) recently described another dynamic approach to mixed methods design, which they called the synergistic approach. They suggested that the synergistic approach provided a way to combine a typological approach with a systemic approach. In a synergistic approach, two or more options interacted so that their combined effect was greater than the sum of the individual parts. Translated into mixed methods, this meant that the sum of quantitative and qualitative research was greater than either approach alone. They defined this approach through a set of core principles: the concept of synergy, the position of equal value, the ideology of difference, and the relationship between the

researcher(s) and the study design. They argued that this approach provided an effective combination of structure and flexibility that helped them consider how epistemology, theory, methods, and analysis could work together within a mixed methods design.

We suggest that researchers, particularly those new to designing and conducting mixed methods studies, consider starting with a typology-based approach to mixed methods design. Typologies provide the researcher with a range of available options to consider that are well defined, facilitate the researcher's use of a solid approach for addressing the research problem, and help the researcher anticipate and resolve challenging issues. That said, we do not advocate that researchers adopt a typology-based design like a cookbook recipe but instead use it as a guiding framework to help inform design choices. As researchers gain more expertise with mixing methods, they are more able to effectively design their studies using a dynamic approach.

Match the Design to the Research Problem, Purpose, and Questions

The different approaches for mixed methods design differ in their emphases but also share many commonalities. In particular, each emphasizes the overall problem, purpose, and research questions that are guiding the study. Research problems and questions that interest researchers arise in many ways, such as from the literature, the researcher's experiences or values, logistical constraints, results that cannot be explained, and stakeholder expectations (Plano Clark & Badiee, in press). No matter how the research questions are generated, scholars writing about mixed methods research uniformly agree that the questions of interest play a central role in the process of designing any mixed methods study. The importance of the research problem and questions is a key principle of mixed methods research design. This perspective stems from the pragmatic foundations for conducting mixed methods research where the notion of "what works" applies well to selecting the methods that "work" best to address a study's problem and questions.

Recall the general research problems related to mixed methods introduced in Chapter 1. These included one data source alone is insufficient, results need to be explained, exploratory results need to be further examined, a study needs to be enhanced through adding a second method, a theoretical stance needs to be advanced through the use of both types of methods, and

a problem needs to be studied through multiple phases of research that include multiple types of methods. Research problems like these not only call for the use of mixed methods but also call for the researcher to use different designs that are able to address the different types of problems. Therefore, researchers should articulate their research problem and questions and consider them carefully so as to choose a design that matches the problem and research questions. As we consider research questions in Chapter 5, we will also discuss how some research questions may be stated or refined to reflect the selected design.

Be Explicit About the Reasons for Mixing Methods

Another key principle of mixed methods design is to identify the reason(s) for mixing quantitative and qualitative methods within the study. Combining methods is challenging and should only be undertaken when there is a specific reason to do so. There are many good discussions of reasons for mixing methods found in the literature to help researchers guide their work. Two prominent frameworks are listed in Table 3.2. The first is the list of five broad reasons for mixing methods identified by Greene, Caracelli, and Graham in their 1989 work. These reasons—triangulation, complementarity, development, initiation, and expansion—are defined in the table. Although they were quite broad and general, this typology of reasons is still frequently used and discussed in the literature. As mixed methods research has continued to evolve in the past 20 years, however, more detailed descriptions of researchers' reasons have emerged. Recently, Bryman (2006) provided a detailed list of reasons based on researchers' practices (see Table 3.2). His list of 16 reasons offered a useful, more detailed examination of researchers' reasons and practices that added to the more general description found in Greene et al.'s (1989) work.

Keep in mind that the reasons listed for mixing methods should be viewed as a general framework from which researchers can weigh alternative choices and use to justify their mixing decisions. In his work, Bryman (2006) noted that many mixed methods studies make use of multiple reasons for mixing methods and that new reasons for mixing may emerge as the study is underway. Being responsive to new insights is an essential aspect of conducting mixed methods research, but we feel is it also important for researchers to design their mixed methods studies with at least one clear reason as to why they are planning to combine methods.

Table 3.2 Two Typologies of Reasons for Mixing Methods

Greene, Caracelli, and Graham (1989) [1]	Bryman (2006) [2]
• **Triangulation** seeks convergence, corroboration, and correspondence of results from the different methods. • **Complementarity** seeks elaboration, enhancement, illustration, and clarification of the results from one method with the results from the other method. • **Development** seeks to use the results from one method to help develop or inform the other method, where development is broadly construed to include sampling and implementation, as well as measurement decisions. • **Initiation** seeks the discovery of paradox and contradiction, new perspectives of frameworks, the recasting of questions or results from one method with questions or results from the other method. • **Expansion** seeks to extend the breadth and range of inquiry by using different methods for different inquiry components.	• **Triangulation or greater validity** refers to the traditional view that quantitative and qualitative research might be combined to triangulate findings in order that they may be mutually corroborated. • **Offset** refers to the suggestion that the research methods associated with both quantitative and qualitative research have their own strengths and weaknesses so that combining them allows the researcher to offset their weaknesses to draw on the strengths of both. • **Completeness** refers to the notion that the researcher can bring together a more comprehensive account of the area of inquiry in which he or she is interested if both quantitative and qualitative research are employed. • **Process** refers to when quantitative research provides an account of structures in social life but qualitative research provides sense of process. • **Different research questions** refers to the argument that quantitative and qualitative research can each answer different research questions. • **Explanation** refers to when one is used to help explain findings generated by the other. • **Unexpected results** refers to the suggestion that quantitative and qualitative research can be fruitfully combined when one generates surprising results that can be understood by employing the other. • **Instrument development** refers to contexts in which qualitative research is employed to develop questionnaire and scale items—for example, so that better wording or more comprehensive closed answers can be generated. • **Sampling** refers to situations in which one approach is used to facilitate the sampling of respondents or cases. • **Credibility** refers to suggestions that employing both approaches enhances the integrity of findings. • **Context** refers to cases in which the combination is rationalized in terms of qualitative research providing contextual understanding coupled with either generalizable, externally valid findings or broad relationships among variables uncovered through a survey.

Greene, Caracelli, and Graham (1989) [1]	Bryman (2006) [2]
	• **Illustration** refers to the use of qualitative data to illustrate quantitative findings, often referred to as putting "meat on the bones" of "dry" quantitative findings. • **Utility or improving the usefulness of findings** refers to a suggestion, which is more likely to be prominent among articles with an applied focus, that combining the two approaches will be more useful to practitioners and others. • **Confirm and discover** refers to using qualitative data to generate hypotheses and using quantitative research to test them within a single project. • **Diversity of views** includes two slightly different rationales—namely, combining researchers' and participants' perspectives through quantitative and qualitative research respectively and uncovering relationships between variables through quantitative research while also revealing meanings among research participants through qualitative research. • **Enhancement or building upon quantitative and qualitative findings** entails a reference to making more of or augmenting either quantitative or qualitative findings by gathering data using a qualitative or quantitative research approach.

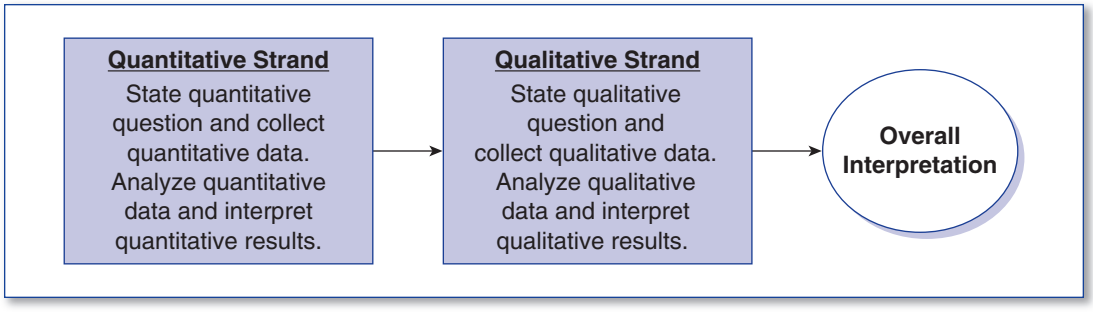
[1]Reprinted from *Educational Evaluation and Policy Analysis*, Vol. 11, Issue 3, p. 259, 1989, with permission of SAGE Publications, Inc.

[2]Reprinted from *Qualitative Research*, Vol. 6, Issue 1, pp. 105–107, 2006, with permission of SAGE Publications, Inc.

KEY DECISIONS IN CHOOSING A MIXED METHODS DESIGN

Building on the four principles previously discussed, researchers are in a position to make important choices that define the mixed methods design used in a study. These decisions address the different ways that the quantitative and qualitative strands of the study relate to each other. A **strand** is a component of a study that encompasses the basic process of conducting quantitative or qualitative research: posing a question, collecting data, analyzing data, and interpreting results based on that data (Teddlie & Tashakkori, 2009). Mixed methods studies meeting our definition of mixed methods research include at least one quantitative strand and one qualitative strand. For example, Figure 3.1 depicts a

Figure 3.1 Example of Quantitative and Qualitative Strands in a Mixed Methods Study



mixed methods study where the researcher starts with a quantitative strand and then conducts a qualitative strand. As shown in this figure, we will often portray strands as boxes in the figures of this text.

There are four key decisions involved in choosing an appropriate mixed methods design to use in a study. The decisions are (1) the level of interaction between the strands, (2) the relative priority of the strands, (3) the timing of the strands, and (4) the procedures for mixing the strands. We examine each of these decisions along with the available options.

Determine the Level of Interaction Between the Quantitative and Qualitative Strands

An important decision in mixed methods research is the level of interaction between the quantitative and qualitative strands in the study. The **level of interaction** is the extent to which the two strands are kept independent or interact with each other. Greene (2007) argued that this decision is the "most salient and critical" (p. 120) for designing a mixed methods study, and she noted two general options for a relationship: independent and interactive.

- An **independent** level of interaction occurs when the quantitative and qualitative strands are implemented so that they are independent from the other—that is, the two strands are distinct and the researcher keeps the quantitative and qualitative research questions, data collection, and data analysis separate. When the study is independent, the researcher only mixes the two strands when drawing conclusions during the overall interpretation at the end of the study.

- An **interactive** level of interaction occurs when a direct interaction exists between the quantitative and qualitative strands of the study. Through this direct interaction, the two methods are mixed before the final interpretation. This interaction can occur at different points in the research process and in many different ways. For example, the design and conduct of one strand may depend on the results from the other strand, the data from one strand may be converted into the other type and then the different data sets are analyzed together, or one strand may be implemented within a framework based on the other strand type.

Determine the Priority of the Quantitative and Qualitative Strands

Researchers also make decisions (implicitly or explicitly) about the relative importance of the quantitative and qualitative strands within the design. **Priority** refers to the relative importance or weighting of the quantitative and qualitative methods for answering the study's questions. There are three possible weighting options for a mixed methods design:

- The two methods may have an **equal priority** so that both play an equally important role in addressing the research problem.
- The study may utilize a **quantitative priority** where a greater emphasis is placed on the quantitative methods and the qualitative methods are used in a secondary role.
- The study may utilize a **qualitative priority** where a greater emphasis is placed on the qualitative methods and the quantitative methods are used in a secondary role.

Determine the Timing of the Quantitative and Qualitative Strands

Researchers also make decisions regarding the timing of the two strands. **Timing** (also referred to as pacing and implementation) refers to the temporal relationship between the quantitative and qualitative strands within a study. Timing is often discussed in relation to the time the data sets are collected, but most importantly, it describes the order in which the researchers use the results from the two sets of data within a study—that is, timing relates to the entire quantitative and qualitative strands, not just data collection. Timing

within mixed methods designs can be classified in three ways: concurrent, sequential, or multiphase combination.

- **Concurrent timing** occurs when the researcher implements both the quantitative and qualitative strands during a single phase of the research study.
- **Sequential timing** occurs when the researcher implements the strands in two distinct phases, with the collection and analysis of one type of data occurring after the collection and analysis of the other type. A researcher using sequential timing may choose to start by either collecting and analyzing quantitative data first or collecting and analyzing qualitative data first.
- **Multiphase combination timing** occurs when the researcher implements multiple phases that include sequential and/or concurrent timing over a program of study. Examples of multiphase combination timing include studies conducted over three or more phases as well as those that combine both concurrent and sequential elements within one mixed methods program.

Determine Where and How to Mix the Quantitative and Qualitative Strands

Finally, researchers need to decide the approach for mixing the two approaches within their mixed methods designs. **Mixing** is the explicit interrelating of the study's quantitative and qualitative strands and has been referred to as combining and integrating—that is, it is the process by which the researcher implements the independent or interactive relationship of a mixed methods study. Two concepts are useful for understanding when and how mixing occurs: the point of interface and mixing strategies. The **point of interface**, also known as the stage of integration, is a point within the process of research where the quantitative and qualitative strands are mixed (Morse & Niehaus, 2009). We conceptualize mixing occurring at four possible points during a study's research process: interpretation, data analysis, data collection, and design. Researchers employ mixing strategies that directly relate to these points of interface. These mixing strategies are (1) merging the two data sets, (2) connecting from the analysis of one set of data to the collection of a second set of data, (3) embedding of one form of data within a larger design or procedure, and (4) using a framework (theoretical or program) to bind together the data sets.

- **Mixing during interpretation** occurs when the quantitative and qualitative strands are mixed during the final step of the research process after

the researcher has collected and analyzed both sets of data. It involves the researcher drawing conclusions or inferences that reflect what was learned from the combination of results from the two strands of the study, such as by comparing or synthesizing the results in a discussion. All mixed methods designs should reflect on what was learned by the combination of methods in the final interpretation. For mixed methods designs that keep the two strands independent, this is the only point in the research process where mixing occurs.

- **Mixing during data analysis** occurs when the quantitative and qualitative strands are mixed during the stage of the research process when the researcher is analyzing the two sets of data. First, the researcher quantitatively analyzes the data from the quantitative strand and qualitatively analyzes the data from the qualitative strand. Then, using an interactive strategy of **merging**, the researcher explicitly brings the two sets of results together through a combined analysis. For example, the researcher further analyzes the quantitative and qualitative results by relating them to each other in a matrix that facilitates comparisons and interpretations. Another merging approach involves transforming one result type into the other type of data and merging through additional analyses of the transformed data.

- **Mixing during data collection** occurs when the quantitative and qualitative strands are mixed during the stage of the research process when the researcher collects a second set of data. The researcher mixes by using a strategy of **connecting** where the results of one strand build to the collection of the other type of data. For example, the researcher may obtain quantitative results that lead to the subsequent collection of qualitative data in a second strand. A researcher can also obtain qualitative results that build to the subsequent collection of quantitative data. The mixing occurs in the way that the two strands are connected. This connection occurs by using the results of the first strand to shape the collection of data in the second strand by specifying research questions, selecting participants, and developing data collection protocols or instruments.

- **Mixing at the level of design** occurs when the quantitative and qualitative strands are mixed during the larger design stage of the research process. Mixing at the design level can involve mixing within a traditional quantitative or qualitative research design, an emancipatory theory, a substantive social science theory, or an overall program objective (Greene, 2007). Building from these ideas, we find researchers using three strategies for mixing at the design level: embedded mixing, theoretical framework-based mixing, and program objective framework-based mixing. When using an embedded mixing strategy, the researcher embeds quantitative and qualitative methods within a design

associated with one of these two methods. For example, the researcher may embed a supplemental qualitative strand within a larger quantitative (e.g., experimental) design or embed a quantitative strand within a larger qualitative (e.g., narrative) design. The embedded nature occurs at the design level, in that the embedded method is conducted specifically to fit the context of the larger quantitative or qualitative design framework. When **mixing within a theoretical framework**, the researcher mixes quantitative and qualitative strands within a transformative framework (e.g., feminism) or a substantive framework (e.g., a social science theory) that guides the overall design. In this case, the two methods are mixed within a theoretical perspective. When **mixing within a program-objective framework**, the researcher mixes quantitative and qualitative strands within an overall program objective that guides the joining of multiple projects or studies in a multiphase project.

A persuasive and strong mixed methods design addresses the decisions of level of integration, priority, timing, and mixing. The many design typologies that were presented in Table 3.1, along with the wide array of decision options available to researchers presented in this section, illustrate the complexity and variety inherent in the conduct of mixed methods research. While there are potentially a limitless number of unique combinations, from our work with researchers across disciplines and based on reading hundreds of mixed methods studies, we have found that there is a relatively small set of combinations that are used most frequently in practice. Therefore, we next present a typology of major mixed methods designs that conveys the basic designs used as well as tries to encapsulate the richness available to mixed methods researchers.

● THE MAJOR MIXED METHODS DESIGNS

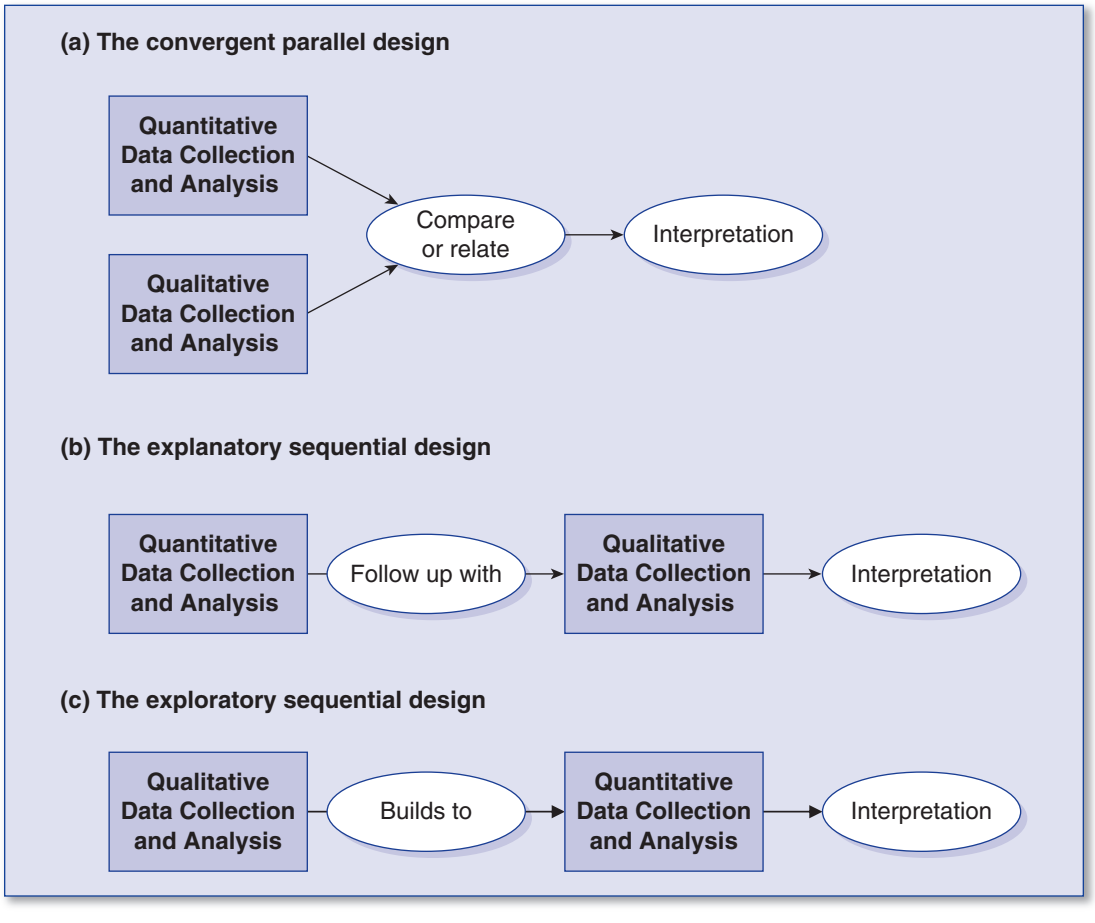
A mixed methods researcher thinks through these decision points and selects a design that reflects interaction, priority, timing, and mixing. As we will show, the various design options vary on these decision points. We include here the design options that are most commonly used in practice, and we advance a parsimonious and functional classification. Thus, we recommend six major mixed methods designs that provide a useful framework for researchers working to design their own studies. We urge researchers to carefully select a design that best matches the research problem and reasons for mixing in order to make the study manageable and simple to implement and describe. In addition, by selecting a typology-based design, the researcher is provided with a framework and logic to guide the implementation of the research methods to ensure that the resulting design is rigorous, persuasive, and of high quality.

The four basic mixed methods designs are the convergent parallel design, the explanatory sequential design, the exploratory sequential design, and the embedded design. In addition, our list of major designs includes two examples of designs that bring multiple design elements together: the transformative design and the multiphase design.

Prototypes of the Major Designs

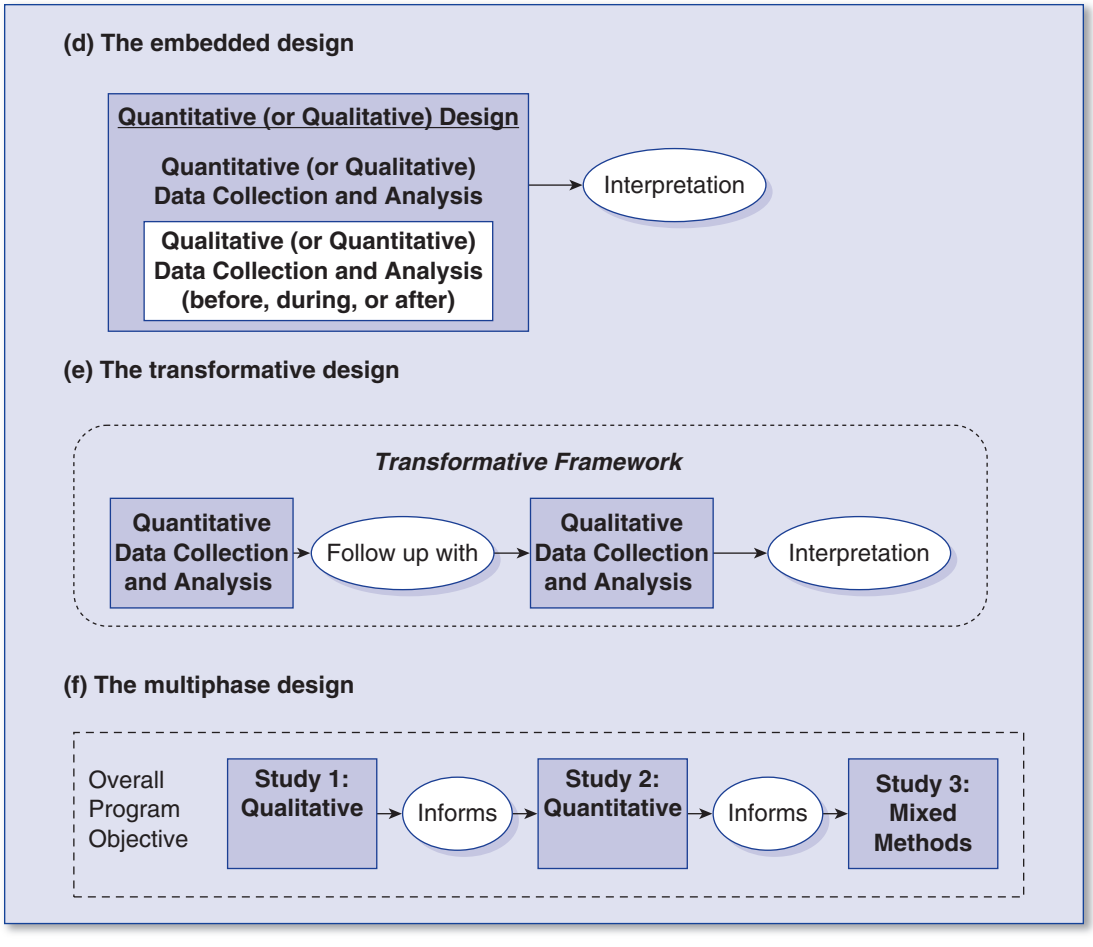
Prototypical versions of these six designs are portrayed in Figure 3.2. We start with a brief introduction to these designs, including simple examples of studies

Figure 3.2 Prototypical Versions of the Six Major Mixed Methods Research Designs



(Continued)

Figure 3.2 (Continued)



using the designs to study the topic of adolescent tobacco use. After this introduction, we provide a more detailed overview of each design in the sections that follow.

- **The convergent parallel design.** The **convergent parallel design** (also referred to as the convergent design) occurs when the researcher uses concurrent timing to implement the quantitative and qualitative strands during the same phase of the research process, prioritizes the methods equally, and keeps the strands independent during analysis and then mixes the

results during the overall interpretation, as shown in Figure 3.1a. For example, the researcher might use a convergent design to develop a complete understanding of high school students' attitudes about tobacco use. During one semester, the researcher surveys high school students about their attitudes and also conducts focus group interviews on the topic with students. The researcher analyzes the survey data quantitatively and the focus group qualitatively and then merges the two sets of results to assess in what ways the results about adolescent attitudes converge and diverge.

- **The explanatory sequential design.** The **explanatory sequential design** (also referred to as the explanatory design) occurs in two distinct interactive phases (see Figure 3.1b). This design starts with the collection and analysis of quantitative data, which has the priority for addressing the study's questions. This first phase is followed by the subsequent collection and analysis of qualitative data. The second, qualitative phase of the study is designed so that it follows from the results of the first, quantitative phase. The researcher interprets how the qualitative results help to explain the initial quantitative results. For example, the researcher collects and analyzes quantitative data to identify significant predictors of adolescent tobacco use. Finding a surprising association between participation in extracurricular activities and tobacco use, the researcher conducts qualitative interviews with adolescents who are actively involved in extracurricular activities to attempt to explain the unexpected result.

- **The exploratory sequential design.** As shown in Figure 3.1c, the **exploratory sequential design** (also referred to as the exploratory design) also uses sequential timing. In contrast to the explanatory design, the exploratory design begins with and prioritizes the collection and analysis of qualitative data in the first phase. Building from the exploratory results, the researcher conducts a second, quantitative phase to test or generalize the initial findings. The researcher then interprets how the quantitative results build on the initial qualitative results. For example, the researcher collects qualitative stories about adolescents' attempts to quit smoking and analyzes the stories to identify the conditions, contexts, strategies, and consequences of adolescent quit attempts. Considering the resulting categories as variables, the researcher develops a quantitative instrument and uses it to assess the overall prevalence of these variables for a large number of adolescent smokers.

- **The embedded design.** The **embedded design** occurs when the researcher collects and analyzes both quantitative and qualitative data within a traditional quantitative or qualitative design, as depicted in Figure 3.1d. In an embedded design, the researcher may add a qualitative strand within a quantitative design, such as an experiment, or add a quantitative strand

within a qualitative design, such as a case study. In the embedded design, the supplemental strand is added to enhance the overall design in some way. For example, the researcher may want to develop a peer intervention to help adolescents develop strategies for resisting pressure to smoke. The researcher begins by conducting a few focus groups with adolescents to learn when pressure is felt and how some adolescents resist. Using these results, the researcher develops a relevant intervention and tests it with a quantitative experimental design involving students at different schools.

- **The transformative design.** The **transformative design** is a mixed methods design that the researcher shapes within a transformative theoretical framework. All other decisions (interaction, priority, timing, and mixing) are made within the context of the transformative framework. The important role of the theoretical perspective is highlighted by the dotted line in Figure 3.1e, which depicts the possible methods that may have been selected within a transformative design. For example, the researcher using a feminist perspective may utilize a transformative design to quantitatively uncover and then qualitatively illuminate how the stereotypes of female smokers have served to marginalize them as "at risk" students within their school context.

- **The multiphase design.** As shown in Figure 3.1f, the **multiphase design** combines both sequential and concurrent strands over a period of time that the researcher implements within a program of study addressing an overall program objective. This approach is often used in program evaluation where quantitative and qualitative approaches are used over time to support the development, adaptation, and evaluation of specific programs. For example, a research team may want to help lower smoking rates for adolescents living in a particular Native American community. The researchers might first start by conducting a qualitative needs assessment study to understand the meaning of smoking and health from the perspective of adolescents in this community. Using these results, the researchers might develop an instrument and assess the prevalence of different attitudes across the community. In a third phase, the researchers might develop an intervention based on what they have learned and then examine both the process and outcomes of this intervention program.

With this brief introduction to six common mixed methods designs in hand, we now discuss each design in more detail. The detailed discussions address the history, purpose, reasons to use, philosophical assumptions, procedures, strengths, challenges, and variants of these mixed methods designs. We will examine examples of the major designs in depth in Chapter 4, but here we focus on the basic characteristics of the designs. These characteristics are also summarized in Table 3.3.

Table 3.3 Prototypical Characteristics of the Major Mixed Methods Types of Designs

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design	Transformative Design	Multiphase Design
Definition	• Concurrent quantitative and qualitative data collection, separate quantitative and qualitative analyses, and the merging of the two data sets	• Methods implemented sequentially, starting with quantitative data collection and analysis in Phase 1 followed by qualitative data collection and analysis in Phase 2, which builds on Phase 1	• Methods implemented sequentially, starting with qualitative data collection and analysis in Phase 1 followed by quantitative data collection and analysis in Phase 2, which builds on Phase 1	• Either the concurrent or sequential collection of supporting data with separate data analysis and the use of the supporting data before, during, or after the major data collection procedures	• Framing the concurrent or sequential collection and analysis of quantitative and qualitative data sets within a transformative, theoretical framework that guides the methods decisions	• Combining the concurrent and/or sequential collection of quantitative and qualitative data sets over multiple phases of a program of study
Design purpose	• Need a more complete understanding of a topic • Need to validate or corroborate quantitative scales	• Need to explain quantitative results	• Need to test or measure qualitative exploratory findings	• Need preliminary exploration before an experimental trial (sequential/before) • Need a more complete understanding of an experimental trial, such as the process and outcomes (concurrent/during) • Need follow-up explanations after an experimental trial (sequential/after)	• Need to conduct research that identifies and challenges social injustices	• Need to implement multiple phases to address a program objective, such as for program development and evaluation

(Continued)

Table 3.3 (Continued)

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design	Transformative Design	Multiphase Design
Typical paradigm foundation	• Pragmatism as an umbrella philosophy	• Postpositivist in Phase 1 • Constructivist in Phase 2	• Constructivist in Phase 1 • Postpositivist in Phase 2	• Worldview may reflect the primary approach (e.g., postpositivist or constructivist) or pragmatism if concurrent • Constructivist for the qualitative component and postpositivist for the quantitative component if sequential	• Transformative worldview as an umbrella philosophy	• Pragmatism if concurrent • Constructivist for the qualitative component and postpositivist for the quantitative component if sequential
Level of interaction	Independent	Interactive	Interactive	Interactive	Interactive	Interactive
Priority of the strands	Equal emphasis	Quantitative emphasis	Qualitative emphasis	Either quantitative or qualitative emphasis	Equal, quantitative, or qualitative emphasis	Equal emphasis
Timing of the strands	Concurrent	Sequential: quantitative first	Sequential: qualitative first	Either concurrent or sequential	Either concurrent or sequential	Multiphase combination
Primary point of interface for mixing	• Interpretation if independent • Analysis if interactive	• Data collection	• Data collection	• Design level	• Design level	• Design level

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design	Transformative Design	Multiphase Design
Primary mixing strategies	Merging the two strands: • After separate data analysis • With further analyses (e.g., comparisons or transformations) of separate results	Connecting the two strands: • From quantitative data analysis to qualitative data collection • Use quantitative results to make decisions about qualitative research questions, sampling, and data collection in Phase 2	Connecting the two strands: • From qualitative data analysis to quantitative data collection • Use qualitative results to make decisions about quantitative research questions, sampling, and data collection in Phase 2	Embedding one strand within a design based on the other type: • Before, during, or after major component • Use secondary results to enhance planning, understanding, or explaining of primary strand	Mixing within a theoretical framework: • Merging, connecting, or embedding the strands within a transformative theoretical lens	Mixing within a program-objective framework: • Connecting and possibly merging and/or embedding within a programmatic objective

(Continued)

Table 3.3 (Continued)

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design	Transformative Design	Multiphase Design
Common variants	• Parallel databases • Data transformation • Data validation	• Follow-up explanations • Participant selection	• Theory development • Instrument development	• Embedded experiment • Embedded correlational design • Mixed methods case study • Mixed methods narrative research • Mixed methods ethnography	• Feminist lens • Disability lens • Socioeconomic class lens	• Large-scale program development and evaluation projects • Multilevel statewide studies • Single mixed methods studies that combine both concurrent and sequential phases

The Convergent Parallel Design

The most well-known approach to mixing methods is the convergent design. Scholars began discussing this design as early as the 1970s (e.g., Jick, 1979), and it is probably the most common approach used across disciplines. The convergent design was initially conceptualized as a "triangulation" design where the two different methods were used to obtain triangulated results about a single topic, but it often becomes confused with the use of triangulation in qualitative research, and researchers often use this design for purposes other than to produce triangulated findings. Since the 1970s, this design has gone by many names, including simultaneous triangulation (Morse, 1991), parallel study (Tashakkori & Teddlie, 1998), convergence model (Creswell, 1999), and concurrent triangulation (Creswell, Plano Clark, et al., 2003). Regardless of the name, the convergent design occurs when the researcher collects and analyzes both quantitative and qualitative data during the same phase of the research process and then merges the two sets of results into an overall interpretation.

The purpose of the convergent design. The purpose of the convergent design is "to obtain different but complementary data on the same topic" (Morse, 1991, p. 122) to best understand the research problem. The intent in using this design is to bring together the differing strengths and nonoverlapping weaknesses of quantitative methods (large sample size, trends, generalization) with those of qualitative methods (small sample, details, in depth) (Patton, 1990). This design is used when the researcher wants to triangulate the methods by directly comparing and contrasting quantitative statistical results with qualitative findings for corroboration and validation purposes. Other purposes for this design include illustrating quantitative results with qualitative findings, synthesizing complementary quantitative and qualitative results to develop a more complete understanding of a phenomenon, and comparing multiple levels within a system.

When to choose the convergent design. In addition to matching the design to the study's purpose, the following considerations also suggest when to use the convergent design:

- The researcher has limited time for collecting data and must collect both types of data in one visit to the field.
- The researcher feels that there is equal value for collecting and analyzing both quantitative and qualitative data to understand the problem.
- The researcher has skills in both quantitative and qualitative methods of research.
- The researcher can manage extensive data collection and analysis activities. In view of this, this design is best suited for team research or for the sole researcher who can collect limited quantitative and qualitative data.

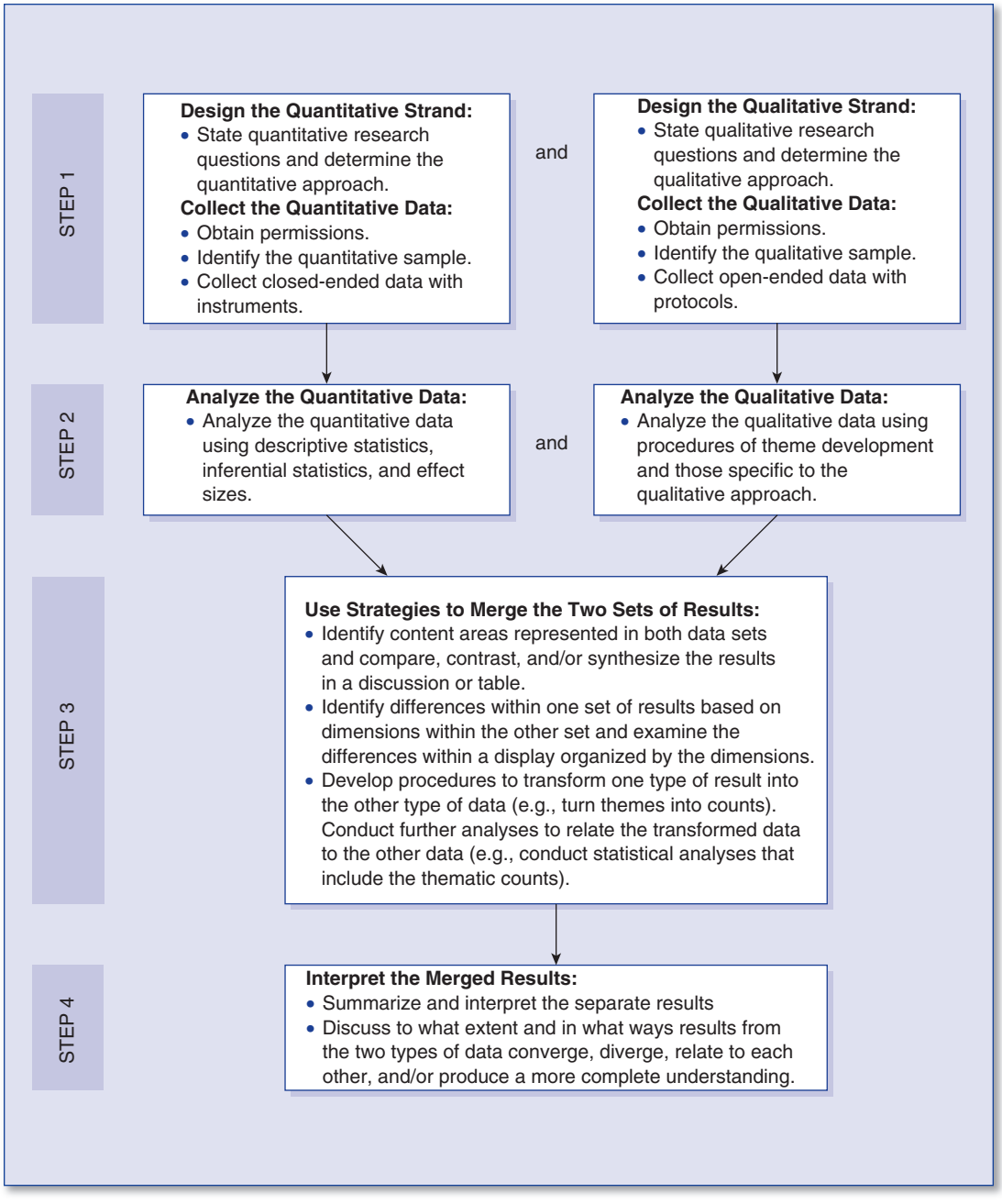
Philosophical assumptions behind the convergent design. Since the convergent design involves collecting, analyzing, and merging quantitative and qualitative data and results at one time, it can raise issues regarding the philosophical assumptions behind the research. Instead of trying to "mix" different paradigms, we recommend that researchers who use this design work from a paradigm such as pragmatism to provide an "umbrella" paradigm to the research study. The assumptions of pragmatism (as discussed earlier in Chapter 2) are well suited for guiding the work of merging the two approaches into a larger understanding.

The convergent design procedures. The procedures for implementing a convergent design are outlined in the procedural flowchart in Figure 3.3. As indicated in the figure, there are four major steps in the convergent design. First, the researcher collects both quantitative data and qualitative data about the topic of interest. These two types of data collection are concurrent but separate—that is, one does not depend on the results of the other. They also typically have equal importance for addressing the study's research questions. Second, the researcher analyzes the two data sets separately and independently from each other using typical quantitative and qualitative analytic procedures. Once the two sets of initial results are in hand, the researcher reaches the point of interface and works to merge the results of the two data sets in the third step. This merging step may include directly comparing the separate results or transforming results to facilitate relating the two data types during additional analysis. In the final step, the researcher interprets to what extent and in what ways the two sets of results converge, diverge from each other, relate to each other, and/or combine to create a better understanding in response to the study's overall purpose.

Strengths of the convergent design. This design has a number of strengths and advantages:

- The design makes intuitive sense. Researchers new to mixed methods often choose this design. It was the design first discussed in the literature (Jick, 1979), and it has become a popular approach for thinking about mixed methods research.
- It is an efficient design, in which both types of data are collected during one phase of the research at roughly the same time.
- Each type of data can be collected and analyzed separately and independently, using the techniques traditionally associated with each data type. This lends itself to team research, in which the team can include individuals with both quantitative and qualitative expertise.

Figure 3.3 Flowchart of the Basic Procedures in Implementing a Convergent Design



Challenges in using the convergent design. Although this design is the most popular mixed methods design, it is also probably the most challenging of the major types of designs. Here are some of the challenges facing researchers using the convergent design as well as options for addressing them:

- Much effort and expertise is required, particularly because of the concurrent data collection and the fact that equal weight is usually given to each data type. This can be addressed by forming a research team that includes members who have quantitative and qualitative expertise, by including researchers who have quantitative and qualitative expertise on graduate committees, or by training single researchers in both quantitative and qualitative research. Considerations for team research were discussed in Chapter 1.
- Researchers need to consider the consequences of having different samples and different sample sizes when merging the two data sets. Different sample sizes may arise because the quantitative and qualitative data are usually collected for different purposes (generalization vs. in-depth description, respectively). Effective strategies, such as collecting large qualitative samples or using unequal sample sizes, are discussed in Chapter 6.
- It can be challenging to merge two sets of very different data and their results in a meaningful way. Researchers need to design their studies so that the quantitative and qualitative data address the same concepts. This strategy facilitates merging the data sets. In addition, Chapter 7 provides techniques for designing a discussion, building comparison displays, and using data transformation.
- Researchers may face the question of what to do if the quantitative and qualitative results do not agree. Contradictions may provide new insights into the topic, but these differences can be difficult to resolve and may require the collection of additional data. The question then develops as to what type of additional data to collect or to reanalyze: quantitative data, qualitative data, or both? Chapter 7 discusses the collection of additional data or the reexamination of existing data to address this challenge.

Convergent design variants. Design variants convey the variation found in researchers' use of the major designs. There are three common variants of the convergent design found in the literature:

- The **parallel-databases variant** is the common approach where two parallel strands are conducted independently and are only brought together during the interpretation. The researcher uses the two types of data to

examine facets of a phenomenon, and the two sets of independent results are then synthesized or compared during the discussion. For example, Feldon and Kafai (2008) gathered qualitative ethnographic interviews along with quantitative survey responses and computer server logs and discussed how the two sets of results developed a more complete picture of youth's activities within online virtual communities.

- The **data-transformation variant** occurs when researchers implement the convergent design using an unequal priority, placing greater emphasis on the quantitative strand, and use a merging process of data transformation. That is, after the initial analysis of the two data sets, the researcher uses procedures to quantify the qualitative findings (e.g., creating a new variable based on qualitative themes). The transformation allows the results from the qualitative data set to be combined with the quantitative data and results through direct comparison, interrelation, and further analyses. The study of parental values by Pagano, Hirsch, Deutsch, and McAdams (2002) is an example of using this approach. They derived qualitative themes from the qualitative interview data and then scored the themes dichotomously as "present" or "not present" for each participant. These quantified scores were then analyzed with the quantitative data, using correlations and logistical regression to identify relationships between categories, as well as gender and racial differences.

- The **data-validation variant** is used when the researcher includes both open- and closed-ended questions on a questionnaire and the results from the open-ended questions are used to confirm or validate the results from the closed-ended questions. Because the qualitative items are an add-on to a quantitative instrument, the items generally do not result in a complete context-based qualitative data set. However, they provide the researcher with emergent themes and interesting quotes that can be used to validate and embellish the quantitative survey findings. For example, Webb, Sweet, and Pretty (2002) included qualitative questions with their quantitative survey measures in their study of the emotional and psychological impact of mass casualty incidents on forensic odontologists. They used the qualitative data to validate the quantitative results from the survey items.

The Explanatory Sequential Design

Most writings about mixed methods designs have emphasized sequential approaches, using design names such as sequential model (Tashakkori & Teddlie, 1998), sequential triangulation (Morse, 1991), and iteration design (Greene, 2007). Although these names apply to any sequential two-phase approach, we introduced specific names to distinguish whether the sequence

begins quantitatively or qualitatively (Creswell, Plano Clark, et al., 2003). The explanatory design is a mixed methods design in which the researcher begins by conducting a quantitative phase and follows up on specific results with a second phase (refer back to Figure 3.1b). The second, qualitative phase is implemented for the purposes of explaining the initial results in more depth, and it is due to this focus on explaining results that is reflected in the design name. This design has also been called a qualitative follow-up approach (Morgan, 1998).

The purpose of the explanatory design. The overall purpose of this design is to use a qualitative strand to explain initial quantitative results (Creswell, Plano Clark, et al., 2003). For example, the explanatory design is well suited when the researcher needs qualitative data to explain quantitative significant (or nonsignificant) results, positive-performing exemplars, outlier results, or surprising results (Bradley et al., 2009; Morse, 1991). This design can also be used when the researcher wants to form groups based on quantitative results and follow up with the groups through subsequent qualitative research or to use quantitative results about participant characteristics to guide purposeful sampling for a qualitative phase (Creswell, Plano Clark, et al., 2003; Morgan, 1998; Tashakkori & Teddlie, 1998).

When to choose the explanatory design. This design is most useful when the researcher wants to assess trends and relationships with quantitative data but also be able to explain the mechanism or reasons behind the resultant trends. Other important considerations include

- The researcher and the research problem are more quantitatively oriented.
- The researcher knows the important variables and has access to quantitative instruments for measuring the constructs of primary interest.
- The researcher has the ability to return to participants for a second round of qualitative data collection.
- The researcher has the time to conduct the research in two phases.
- The researcher has limited resources and needs a design where only one type of data is being collected and analyzed at a time.
- The researcher develops new questions based on quantitative results, and they cannot be answered with quantitative data.

Philosophical assumptions behind the explanatory design. Since this study begins quantitatively, the research problem and purpose often call for a greater importance to be placed on the quantitative aspects. Although this may encourage researchers to use a postpositivist orientation to the study, we encourage researchers to consider using different assumptions within each

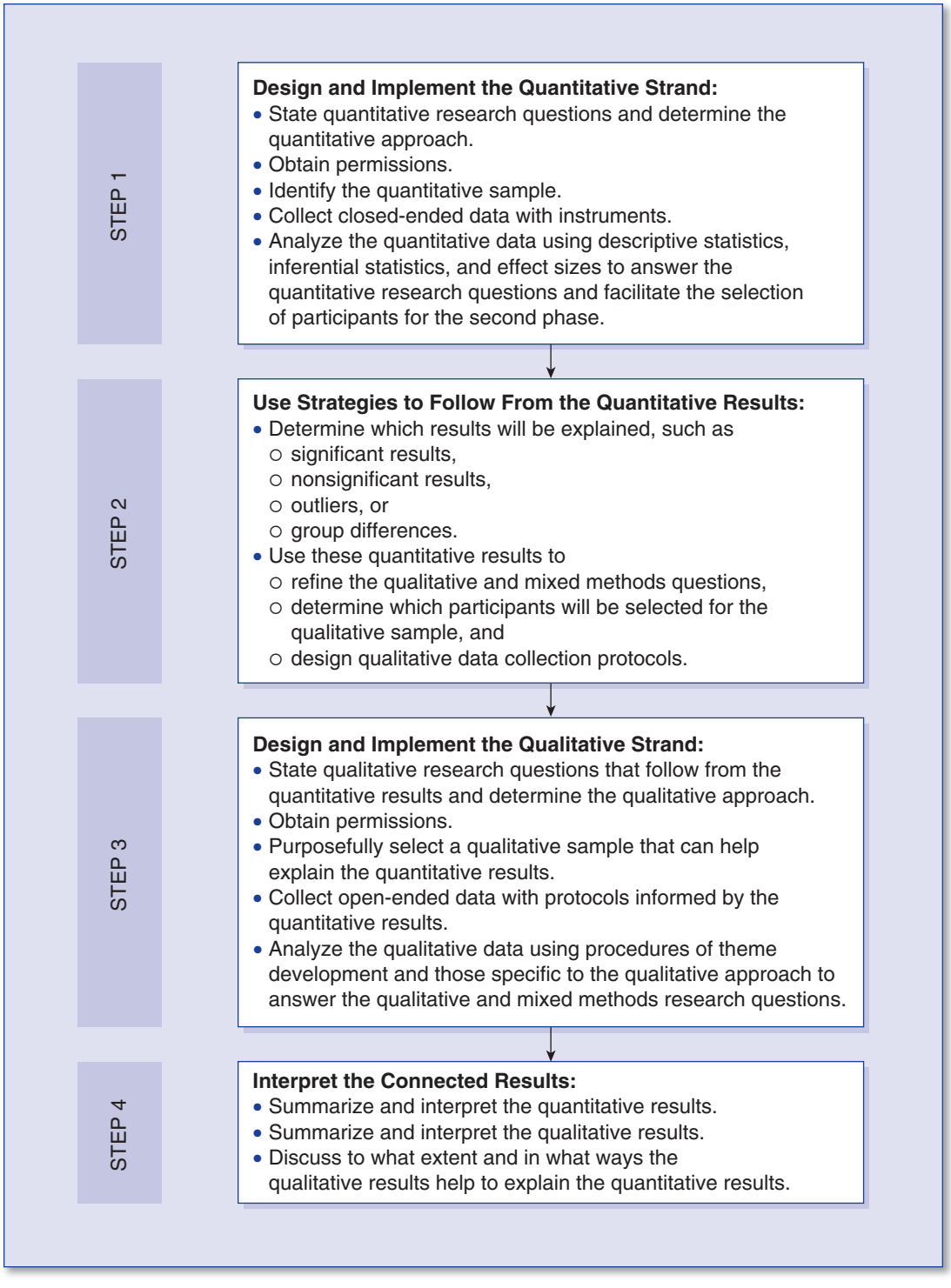
phase—that is, since the study begins quantitatively, the researcher typically begins from the perspectives of postpositivism to develop instruments, measure variables, and assess statistical results. When the researcher moves to the qualitative phase that values multiple perspectives and in-depth description, there is a shift to using the assumptions of constructivism. The overall philosophical assumptions in this design change and shift from postpositivist to constructivist as researchers use multiple philosophical positions.

The explanatory design procedures. The explanatory design is probably the most straightforward of the mixed methods designs. Figure 3.4 provides an overview of the procedural steps used to implement a typical two-phase explanatory design. During the first step, the researcher designs and implements a quantitative strand that includes collecting and analyzing quantitative data. In the second step, the researcher connects to a second phase—the point of interface for mixing—by identifying specific quantitative results that call for additional explanation and using these results to guide the development of the qualitative strand. Specifically, the researcher develops or refines the qualitative research questions, purposeful sampling procedures, and data collection protocols so they follow from the quantitative results. As such, the qualitative phase depends on the quantitative results. In the third step, the researcher implements the qualitative phase by collecting and analyzing qualitative data. Finally, the researcher interprets to what extent and in what ways the qualitative results explain and add insight into the quantitative results and what overall is learned in response to the study's purpose.

Strengths of the explanatory design. The many advantages of the explanatory design make it the most straightforward of the mixed methods designs. These advantages include the following:

- This design appeals to quantitative researchers, because it often begins with a strong quantitative orientation.
- Its two-phase structure makes it straightforward to implement, because the researcher conducts the two methods in separate phases and collects only one type of data at a time. This means that single researchers can conduct this design; a research team is not required to carry out the design.
- The final report can be written with a quantitative section followed by a qualitative section, making it straightforward to write and providing a clear delineation for readers.
- This design lends itself to emergent approaches where the second phase can be designed based on what is learned from the initial quantitative phase.

Figure 3.4 Flowchart of the Basic Procedures in Implementing an Explanatory Design



Challenges in using the explanatory design. Although the explanatory design is straightforward, researchers choosing this approach still need to anticipate challenges specific to this design. The explanatory design faces the following challenges:

- This design requires a lengthy amount of time for implementing the two phases. Researchers should recognize that the qualitative phase takes more time to implement than the quantitative phase. Although the qualitative phase can be limited to a few participants, adequate time must still be budgeted for the qualitative phase.
- It can be difficult to secure institutional review board (IRB) approval for this design, because the researcher cannot specify how participants will be selected for the second phase until the initial findings are obtained. Approaches to addressing this issue by tentatively framing the qualitative phase for the IRB and informing participants of the possibility that they will be contacted again are discussed in Chapter 6.
- The researcher must decide which quantitative results need to be further explained. Although this cannot be determined precisely until after the quantitative phase is complete, options such as selecting significant results and strong predictors can be considered as the study is being planned, as discussed in Chapters 6 and 7.
- The researcher must decide who to sample in the second phase and what criteria to use for participant selection. Chapter 6 explores approaches to using individuals from the same sample to provide the best explanations and criteria options, including the use of demographic characteristics, groups used in comparisons during the quantitative phase, and individuals who vary on select predictors.

Explanatory design variants. There are two variants of the explanatory design:

- The prototypical **follow-up explanations variant** is the most common approach for using the explanatory design. The researcher places the priority on the initial, quantitative phase and uses the subsequent qualitative phase to help explain the quantitative results. For example, Igo, Riccomini, Bruning, and Pope (2006) started by quantitatively studying the effect of different modes of note taking on test performance for middle school students with learning disabilities. Based on the quantitative results, the researchers conducted a qualitative phase that included gathering interviews and documents from the students to understand their note taking attitudes and behaviors to help explain the quantitative results.

- Although less common, the **participant-selection variant** arises when the researcher places priority on the second, qualitative phase instead of the initial quantitative phase. This variant has also been called a quantitative preliminary design (Morgan, 1998). This variant is used when the researcher is focused on qualitatively examining a phenomenon but needs initial quantitative results to identify and purposefully select the best participants. For example, May and Etkina (2002) collected quantitative data to identify physics students with consistently high and low conceptual learning gains. They then completed an in-depth qualitative comparison study of these two groups of students' perceptions of learning.

The Exploratory Sequential Design

As was depicted in Figure 3.1c, the exploratory design is also a two-phase sequential design that can be recognized because the researcher starts by qualitatively exploring a topic before building to a second, quantitative phase. This emphasis on exploration is reflected in the design name. In many applications of this iterative design, the researcher develops an instrument as an intermediate step between the phases that builds on the qualitative results and is used in the subsequent quantitative data collection. For that reason, this design has been referred to as the instrument development design (Creswell, Fetters, & Ivankova, 2004) and the quantitative follow-up design (Morgan, 1998).

The purpose of the exploratory design. The primary purpose of the exploratory design is to generalize qualitative findings based on a few individuals from the first phase to a larger sample gathered during the second phase. As with the explanatory design, the intent of the two-phase exploratory design is that the results of the first, qualitative method can help develop or inform the second, quantitative method (Greene et al., 1989). This design is based on the premise that an exploration is needed for one of several reasons: (1) measures or instruments are not available, (2) the variables are unknown, or (3) there is no guiding framework or theory. Because this design begins qualitatively, it is best suited for exploring a phenomenon (Creswell, Plano Clark, et al., 2003). This design is particularly useful when the researcher needs to develop and test an instrument because one is not available (Creswell, 1999; Creswell et al., 2004) or to identify important variables to study quantitatively when the variables are unknown. It is also appropriate when the researcher wants to generalize qualitative results to different groups (Morse, 1991), to test aspects of an emergent theory or classification

(Morgan, 1998), or to explore a phenomenon in depth and measure the prevalence of its dimensions.

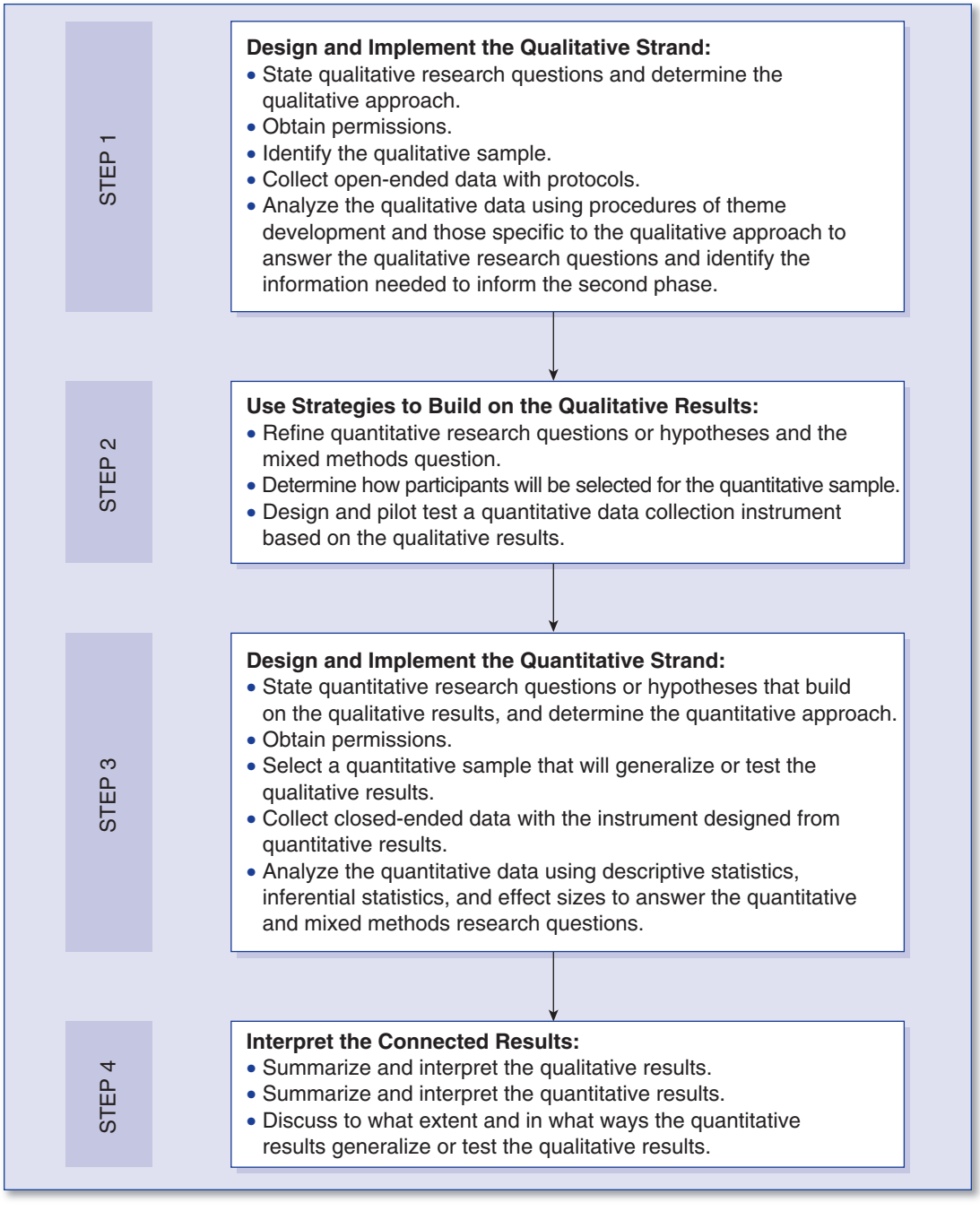
When to choose the exploratory design. The exploratory design is most useful when the researcher wants to generalize, assess, or test qualitative exploratory results to see if they can be generalized to a sample and a population. In addition, the following considerations are relevant:

- The researcher and the research problem are more qualitatively oriented.
- The researcher does not know what constructs are important to study, and relevant quantitative instruments are not available.
- The researcher has the time to conduct the research in two phases.
- The researcher has limited resources and needs a design where only one type of data is being collected and analyzed at a time.
- The researcher identifies new emergent research questions based on qualitative results that cannot be answered with qualitative data.

Philosophical assumptions behind the exploratory design. Since the exploratory design begins qualitatively, the research problem and purpose often call for the qualitative strand to have greater priority within the design. Therefore, researchers generally work from constructivist principles during the first phase of the study to value multiple perspectives and deeper understanding. When the researcher moves to the quantitative phase, the underlying assumptions may shift to those of postpositivism to guide the need for identifying and measuring variables and statistical trends. Thus, multiple worldviews are used in this design, and the worldviews shift from one phase to the other phase.

The exploratory design procedures. The four major steps of the exploratory design are summarized in Figure 3.5. As this figure shows, this design starts with the collection and analysis of qualitative data to explore a phenomenon. In the next step, which represents the point of interface in mixing, researchers using this design build on the results of the qualitative phase by developing an instrument, identifying variables, or stating propositions for testing based on an emergent theory or framework. These developments connect the initial qualitative phase to the subsequent quantitative strand of the study. In the third step, the researcher implements the quantitative strand of the study to examine the salient variables using the developed instrument with a new sample of participants. Finally, the researcher interprets in what ways and to what extent the quantitative results generalize or expand on the initial qualitative findings.

Figure 3.5 Flowchart of the Basic Procedures in Implementing an Exploratory Design



Strengths of the exploratory design. Due to its two-phase structure and the fact that only one type of data is collected at a time, the exploratory design shares several of the same advantages as the explanatory design. Its specific advantages are as follows:

- Separate phases make the exploratory design straightforward to describe, implement, and report.
- Although this design typically emphasizes the qualitative aspect, the inclusion of a quantitative component can make the qualitative approach more acceptable to quantitative-biased audiences.
- This design is useful when the need for a second, quantitative phase emerges based on what is learned from the initial qualitative phase.
- The researcher can produce a new instrument as one of the potential products of the research process.

Challenges in using the exploratory design. There are a number of challenges associated with using the exploratory design:

- The two-phase approach requires considerable time to implement, potentially including time to develop a new instrument. Researchers need to recognize this factor and build time into their study's plan.
- It is difficult to specify the procedures of the quantitative phase when applying for initial IRB approval for the study. Providing some tentative direction in a project plan or planning to submit two separate applications for the IRB will be discussed further in Chapter 6.
- Researchers should consider using a small purposeful sample in the first phase and a large sample of different participants in the second phase to avoid questions of bias in the quantitative strand (see the discussion of sampling in Chapter 6).
- If an instrument is developed between phases, the researcher needs to decide which data to use from the qualitative phase to build the quantitative instrument and how to use these data to generate quantitative measures. In Chapter 6, we will discuss procedures for using qualitative themes, codes, and quotes to generate aspects of quantitative instruments.
- Procedures should be undertaken to ensure that the scores developed on the instrument are valid and reliable. In Chapter 6, we will review rigorous steps of instrument and scale development for this process.

Exploratory design variants. As with the explanatory design, the two main variants of the exploratory design are differentiated by the relative priority of the two strands:

- In the **theory-development variant**, the researcher places the priority on the initial qualitative phase with the ensuing quantitative phase playing a secondary role to expand on the initial results. The qualitative strand is conducted to develop an emergent theory or a taxonomy or classification system, and the researcher examines the prevalence of the findings and/or tests the theory with a larger sample (Morgan, 1998; Morse, 1991). This model is used when the researcher formulates quantitative research questions or hypotheses based on qualitative findings and proceeds to conduct a quantitative phase to answer the questions. For example, Goldenberg, Gallimore, and Reese (2005) described how they identified new variables and hypotheses about predictors of family literacy practices based on their qualitative case study. Then they conducted a quantitative path analysis study to test these qualitatively identified variables and relationships.

- Researchers using the exploratory design, however, often place the emphasis on the second, quantitative phase. In the **instrument-development variant**, the initial qualitative phase plays a secondary role, often for the purpose of gathering information to build a quantitative instrument that is needed for the prioritized quantitative phase. Using this model, Mak and Marshall (2004) initially qualitatively explored young adults' perceptions about the significance of the self to others in romantic relationships (i.e., how they perceive that they matter to someone else). Based on their qualitative results, they developed the Mattering to Romantic Others Questionnaire and administered it as part of the second, quantitative phase to test hypotheses based on the theoretical model of the formation and maintenance of perceived mattering.

The Embedded Design

The embedded design is a mixed methods approach where the researcher combines the collection and analysis of both quantitative and qualitative data within a traditional quantitative research design or qualitative research design (refer back to Figure 3.1d) (Caracelli & Greene, 1997; Greene, 2007). The collection and analysis of the second data set may occur before, during, and/or after the implementation of the data collection and analysis procedures traditionally associated with the larger

design. In some embedded designs, one data set provides a supportive, secondary role in the study. For example, researchers embed a qualitative strand within quantitative experiments to support aspects of the experimental design (Creswell, Fetters, Plano Clark, & Morales, 2009). In other cases, the quantitative and qualitative approaches are combined and embedded within a traditional design or procedure. For example, in an embedded mixed methods case study, the researcher collects and analyzes both quantitative and qualitative data to examine a case. The researcher could also embed quantitative and qualitative approaches within a procedure such as social network analysis.

The purpose of the embedded design. The premises of this design are that a single data set is not sufficient, that different questions need to be answered, and that each type of question requires different types of data. In the case of the embedded experimental mixed methods design, researchers use it when they need to include qualitative data to answer a secondary research question within the predominantly quantitative study. In the experimental example, the investigator embeds qualitative data for several reasons, such as to improve recruitment procedures (e.g., Donovan et al., 2002), examine the process of an intervention (e.g., Victor, Ross, & Axford, 2004), or to explain reactions to participation in an experiment (e.g., Evans & Hardy, 2002a, 2002b). Notice that the purposes for including the qualitative data are tied to but different from the primary purpose of the experiment to assess whether a treatment has a significant effect. This distinguishes the embedded design from a convergent design where the researcher is using both methods to address a single overarching question.

When to choose the embedded design. The embedded design is appropriate when the researcher has different questions that require different types of data in order to enhance the application of a quantitative or qualitative design to address the primary purpose of the study. The following are additional considerations:

- The researcher has the expertise necessary to implement the planned quantitative or qualitative design in a rigorous way.
- The researcher is comfortable having the study be driven by either a quantitative or a qualitative primary orientation.
- The researcher has little prior experience with the supplemental method.
- The researcher does not have adequate resources to place equal priority on both types of data.

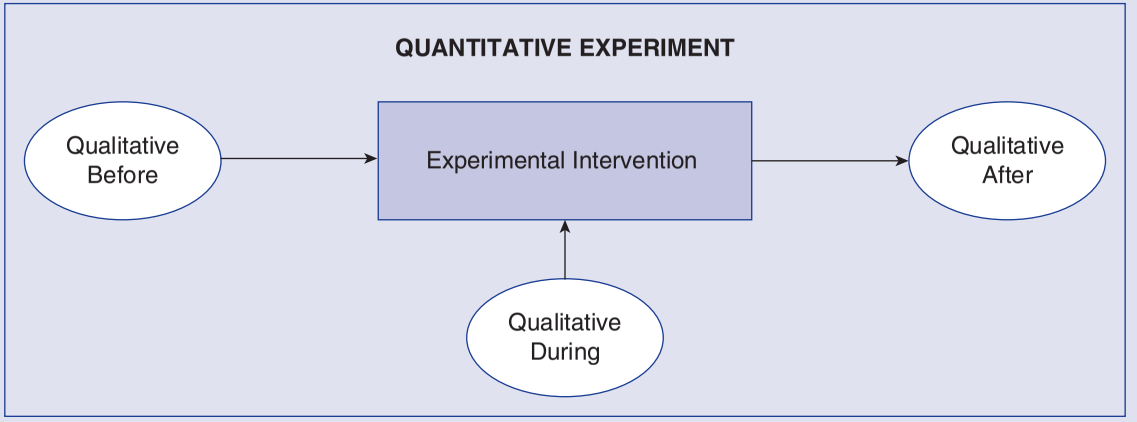
- The researcher identifies emergent issues related to the implementation of the primary quantitative or qualitative design, and insight into these issues can be obtained with a secondary data set.

Philosophical assumptions behind the embedded design. The embedded design is used to enhance the application of a traditional quantitative or qualitative design. The assumptions of this design are therefore established by the primary approach, and the other data set is subservient within that methodology. For example, if the primary design is experimental, correlational, longitudinal, or focused on instrument validation, then the researcher will most likely be working from postpositivist assumptions as the overarching paradigm. Likewise, if the primary design is phenomenological, grounded theory, ethnography, case study, or narrative, then the researcher will most likely be working from a constructivist paradigm. In either case, the supplemental method is used in service to the guiding approach.

The embedded design procedures. A good way to think about the procedures for the embedded design is to focus on the timing of the collection and analysis of the supplemental data relative to the primary strand of the study and the reasons for adding in the supplemental data. Sandelowski (1996) first introduced the notion of the supplemental strand occurring before, during, or after (or some combination) the primary strand, and we find this to be a useful framework for thinking about the embedded design no matter which approach is placed in the primary role. The researcher makes this procedural decision (before, during, after, or some combination) based on the purpose of the supplemental data within the larger design (Creswell et al., 2009). Therefore, embedded designs can use either a one-phase or a two-phase approach for the embedded strand, and the procedures reflect the issues relevant to the sequential or concurrent nature of the implementation.

Because the most common type of embedded design found in the literature occurs when researchers embed qualitative data within an experimental design, Figure 3.6 provides a general overview of the procedures for implementing qualitative data before, during, and/or after the intervention in an experiment. The general steps include (1) designing the overall experiment and deciding the reason why qualitative data need to be included, (2) collecting and analyzing qualitative data to enhance the experimental design, (3) collecting and analyzing quantitative outcome data for the experimental groups, and (4) interpreting how the qualitative results enhanced the experimental procedures and/or understanding of the experimental outcomes.

Figure 3.6 Flowchart of the Basic Procedures in Implementing an Embedded Design



Implement the Qualitative Strand Before the Experiment:

- Decide the reason for the qualitative strand.
- State qualitative research questions, and determine the qualitative approach.
- Obtain permissions.
- Identify the qualitative sample.
- Collect open-ended data.
- Analyze the qualitative data using procedures of theme development and those specific to the qualitative approach.

Use the Qualitative Strand to Plan the Experiment, Such as:

- Refine recruitment procedures.
- Develop outcome measure.
- Develop intervention.

Implement the Qualitative Strand During the Experiment:

- Decide the reason for the qualitative strand.
- State qualitative research questions, and determine the qualitative approach.
- Obtain permissions.
- Identify the qualitative sample.
- Collect open-ended data.
- Analyze the qualitative data using procedures of theme development and those specific to the qualitative approach.

Use the Qualitative Strand to Understand the Experiment, Such as:

- Describe participants' experiences with the intervention.
- Describe the process.
- Describe treatment fidelity.

Implement the Qualitative Strand After the Experiment:

- Decide the reason for the qualitative strand.
- State qualitative research questions, and determine the qualitative approach.
- Obtain permissions.
- Identify the qualitative sample.
- Collect open-ended data.
- Analyze the qualitative data using procedures of theme development and those specific to the qualitative approach.

Use the Qualitative Strand to Explain the Experiment, Such as:

- Describe why outcomes occurred.
- Describe how participants respond to the results.
- Describe what long-term effects are experienced.

Strengths of the embedded design. There are several advantages specific to the embedded design:

- This design can be used when the researcher does not have sufficient time or resources to commit to extensive quantitative and qualitative data collection because one data type is given less priority than the other.
- By the addition of supplemental data, the researcher is able to improve the larger design.
- Because the different methods are addressing different questions, this design fits a team approach well, where members on the team can focus their work on one of the questions based on their interests and expertise.
- The focus on different questions means that the two types of results can be published separately.
- This design may be appealing to funding agencies that are less familiar with mixed methods research because the primary focus of the approach is on a traditional quantitative or qualitative design.

Challenges in using the embedded design. There are many challenges associated with the embedded design. The following are challenges and suggested strategies for dealing with them:

- The researcher needs to have expertise in the quantitative or qualitative design used in addition to expertise in mixed methods research.
- The researcher must specify the purpose of collecting qualitative (or quantitative) data as part of a larger quantitative (or qualitative) study. Researchers can state these as the primary and secondary purposes for the study. See Chapter 5 for examples for writing these primary and secondary purpose statements.
- The researcher must decide at what point in the experimental study to collect the qualitative data in relation to the intervention (i.e., before, during, after, or some combination). This decision should be made based on the intent for including the qualitative data (e.g., to shape the intervention, to explain the process of participants during treatment, or to follow up on results of the experimental trial). Chapter 6 provides more detail about these options at different phases of a project.
- It can be difficult to integrate the results when the two methods are used to answer different research questions. However, unlike the convergent design, the intent of the embedded design is not to merge two

different data sets collected to answer the same question. Researchers using an embedded design can keep the two sets of results separate in their reports or even report them in separate papers (see Chapter 8 for further discussion about these writing strategies).

- For during-intervention experimental approaches, the qualitative data collection may introduce potential treatment bias that affects the outcomes of the experiment. Suggestions for addressing this potential bias through collecting unobtrusive data are discussed in Chapter 6.

Embedded design variants. Conceptually, there are two variants of the embedded design based on whether one method is embedded as a supplement to a larger design or both methods are embedded in combination within a larger design or procedure. Many variations also exist within these two larger categories:

- The prototypical variant of the embedded design occurs when the researcher embeds a supplemental data set within a larger design to address different questions. The most common example is the **embedded-experiment variant**, which occurs when the researcher embeds qualitative data within an experimental trial. Other similar variants include the **embedded-correlational variant** (Harrison, 2005) and the **embedded instrument development and validation variant** (Plano Clark & Galt, 2009). For example, Hilton, Budgen, Molzahn, and Attridge (2001) gathered qualitative information (e.g., participant comments, open-ended responses, and observational field notes) as they pilot tested their instrument to provide additional evidence that the instrument measured meaningful client outcomes at a nursing center.
- Recently, scholars have also discussed hybrid designs where researchers embed both quantitative and qualitative data within traditional designs or procedures. These approaches result in variants, such as **mixed methods case studies** (Luck, Jackson, & Usher, 2006) and **mixed methods narrative research** (Elliot, 2005). In these examples, the case, or the narrative, becomes a placeholder for collecting both quantitative and qualitative data (Creswell & Tashakkori, 2007). Another example would be a **mixed methods ethnography** in which the researcher discusses the collection of both forms of data within an ethnographic design (Morse & Niehaus, 2009). The embedding of both forms of data may also take place within larger procedures, such as Neighborhood History Calendars, Life History Calendars, or geographic information systems (GIS) as discussed by

social demographers (Axinn & Pearce, 2006). For example, Skinner, Matthews, and Burton (2005) joined quantitative spatial data with qualitative ethnographic information within a GIS procedure to map the experiences of families meeting the needs of their children with disabilities.

The Transformative Design

A design that goes beyond the basic four mixed methods designs occurs when researchers conduct mixed methods research using a theoretical-based framework, such as a transformative worldview. A transformative-based theoretical framework is a framework for advancing the needs of underrepresented or marginalized populations. As discussed in Chapter 2, it involves the researcher taking a position, being sensitive to the needs of the population being studied, and recommending specific changes as a result of the research to improve social justice for the population under study. Some scholars discount ideological perspectives as a criterion for classifying mixed methods designs, arguing that they relate more to the content purpose of the study than the methods decisions of the study (e.g., Teddlie & Tashakkori, 2009). Others, however, have included transformative designs among the major mixed methods designs (Creswell, Plano Clark, et al., 2003; Greene, 2007; Greene & Caracelli, 1997; Mertens, 2003). Mertens (2003, 2009) specifically discussed ways in which a transformative perspective influences every stage of the research and design process. We do find researchers planning and naming their designs in ways that reflect the importance that they place on the use of a transformative perspective. As mentioned in Chapter 2, a number of mixed methods studies have been published that use a transformative lens drawn from a feminist theory, a racial or ethnic theory, a sexual orientation theory, or a disability theory (Mertens, 2009). For example, Lehan-Mackin (2007) classified her two-phase proposed study of unintended pregnancies in college-aged women as an "equivalent, sequential, transformative, mixed-methods study" (Abstract, para. 1). She planned her procedures so that implications for social contexts and policies that promote health disparities would result.

The purpose of the transformative design. The purpose of this design is to conduct research that is change oriented and seeks to advance social justice causes by identifying power imbalances and empowering individuals and/or communities—that is, the purpose for mixing methods in the transformative design is for value-based and ideological reasons more than for reasons related to methods and procedures (Greene, 2007). The purpose is to use

the methods that are best suited for advancing the transformative goals (e.g., challenging the status quo and developing solutions) of the study.

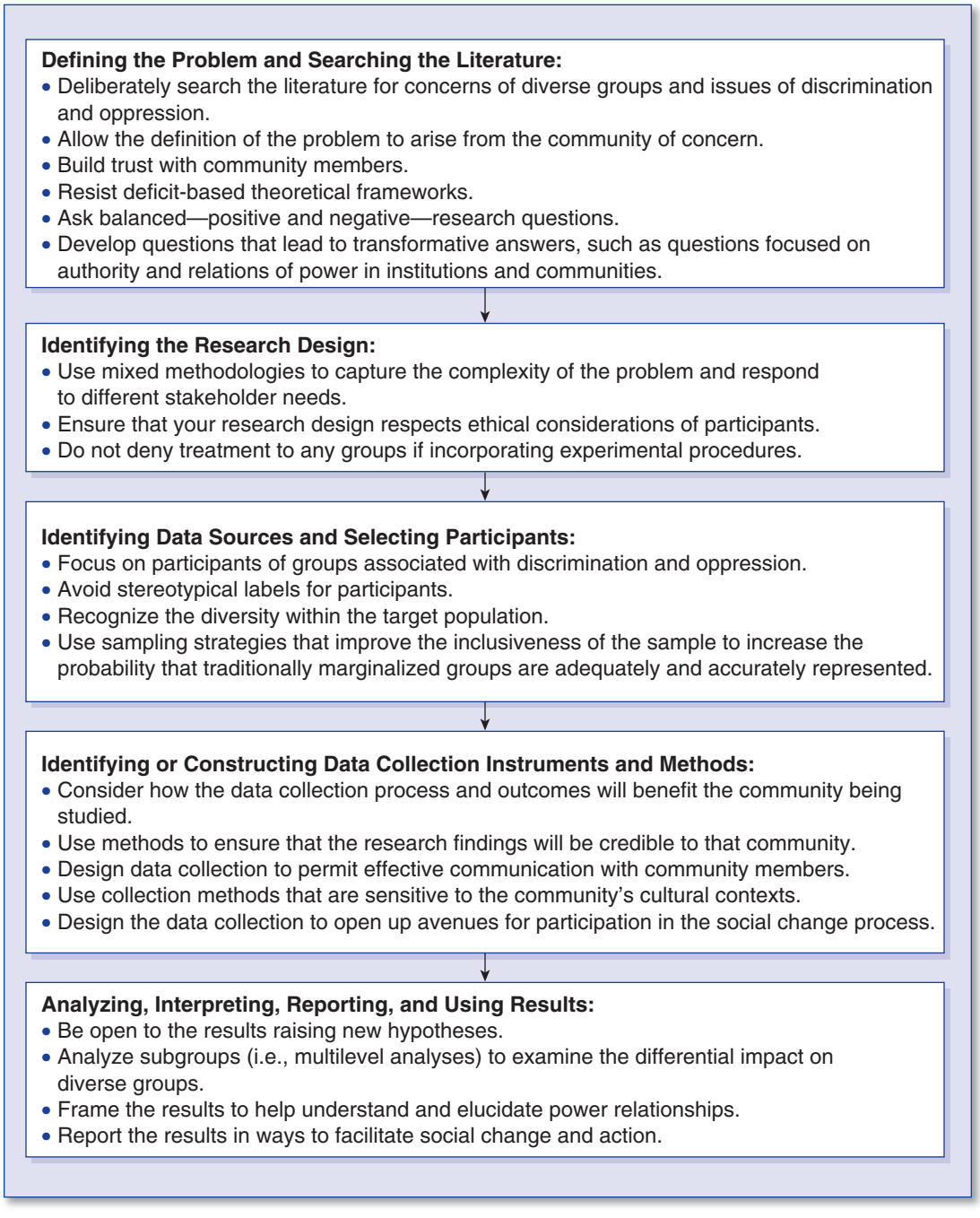
When to choose the transformative design. This design should be used when the researcher determines that mixed methods is needed to address a transformative aim. The following are other considerations:

- The researcher seeks to address issues of social justice and call for change.
- The researcher sees the needs of underrepresented or marginalized populations.
- The researcher has a good working knowledge of theoretical frameworks used to study underrepresented or marginalized populations.
- The researcher can conduct the study without further marginalizing the population under study.

Philosophical assumptions behind the transformative design. The transformative paradigm provides the overarching assumptions behind the conduct of the transformative design (Mertens, 2003, 2007). This worldview, as discussed in Chapter 2 as the advocacy and participatory worldview, provides an umbrella paradigm to the project and includes political action, empowerment, collaborative, and change-oriented research perspectives.

The transformative design procedures. Depending on the specific contexts of an individual transformative study, the researcher may end up using procedures that are consistent with any of the four basic mixed methods designs already discussed. The difference is that the transformative paradigm and theoretical lens in use by the researcher has a "pervasive influence throughout the research process" (Mertens, 2003, p. 142). Mertens described ways in which this perspective influences five steps of the research process, including (1) defining the problem and searching the literature; (2) identifying the research design; (3) identifying data sources and selecting participants; (4) identifying or constructing data collection instruments and methods; and (5) analyzing, interpreting, reporting, and using results. In addition, Plano Clark and Wang (2010) identified several procedures for conducting mixed methods research in a multiculturally competent way by examining researchers' practices in 11 published studies. As suggested by these authors, Figure 3.7 summarizes some of the key considerations that transformative researchers need to consider as they design their mixed methods procedures. More details will be provided in Chapters 6 and 7 about the data collection and analysis procedures within a transformative design.

Figure 3.7 Flowchart of the Basic Considerations for Designing a Transformative Design



SOURCE: Adapted from D. M. Mertens (2003) and J. W. Creswell (2009c, pp. 67–68). Adapted with permission of SAGE Publications, Inc.

Strengths of the transformative design. Researchers may implement procedures consistent with any of the four basic mixed methods designs within their transformative designs. As such, the transformative design shares the same strengths previously discussed with these designs. In addition, the transformative design has the following advantages:

- The researcher positions the study within a transformative framework and an advocacy or emancipatory worldview.
- The research helps to empower individuals and bring about change and action.
- Participants often play an active, participatory role in the research.
- The researcher is able to use a collection of methods that produces results that are both useful to community members and viewed as credible to stakeholders and policy makers.

Challenges in using the transformative design. As with the strengths, the transformative design shares procedural challenges associated with the corresponding basic mixed methods designs. In addition, the transformative design has these further challenges:

- There is still little guidance in the literature to assist researchers with implementing mixed methods in a transformative way. One way to proceed is to review published mixed methods studies that employ a transformative lens (see Sweetman, Badiee, & Creswell, 2010).
- The researcher may need to justify the use of the transformative approach. This can be done by explicitly discussing the philosophical and theoretical foundations as part of the study proposal and report, as discussed in Chapter 2.
- The researcher must develop trust with participants and be able to conduct the research in a culturally sensitive way.

Transformative design variants. The variants of the transformative design are best described by the diverse theoretical frameworks used rather than by different methods decisions. For example, Sweetman, Badiee, and Creswell (2010) identified several transformative mixed methods studies in the literature and classified the variants by the theoretical lens in use. These studies used different theoretical lenses, including a feminist lens (e.g., Cartwright, Schow, & Herrera, 2006), a disability lens (e.g., Boland, Daly, & Staines, 2008), and a socioeconomic class lens (Newman & Wyly, 2006). Therefore, three variants of the transformative design are (1) the **feminist lens transformative variant**, in which the researcher frames the study using a feminist theoretical lens; (2) the **disability lens transformative variant**, in which the researcher

frames the study using a disability theoretical lens; and (3) the **socioeconomic class lens transformative variant**, in which the researcher frames the study using a socioeconomic class theoretical lens.

The Multiphase Design

The multiphase design is an example of a mixed methods design that goes beyond the basic designs (convergent, explanatory, exploratory, and embedded). Multiphase designs occur when an individual researcher or team of investigators examines a problem or topic through an iteration of connected quantitative and qualitative studies that are sequentially aligned, with each new approach building on what was learned previously to address a central program objective. Early writings in the area referred to the sandwich design, which occurs when the researcher alternates the quantitative and qualitative methods across three phases (e.g., qualitative then quantitative then qualitative) (Sandelowski, 2003). Today, multiphase designs combine sequential and concurrent aspects and are most common in large funded studies that have numerous questions being investigated to advance one programmatic objective. Two primary examples of this design would be a multi-project funded mixed methods project involving numerous investigators and researchers for U.S. federal funding (e.g., a National Institutes of Health [NIH] or National Science Foundation [NSF] project) or a statewide evaluation study involving multiple levels of data collection and analysis as well as multiple studies.

The purpose of the multiphase design. The purpose of this design is to address a set of incremental research questions that all advance one programmatic research objective. It provides an overarching methodological framework to a multiyear project that calls for multiple phases to develop an overall program of research, or evaluation. For example, in the context of program evaluation, these multiple phases may be tied to phases for needs assessment, program development, and program evaluation testing.

When to choose the multiphase design. In addition to matching the design to the series of research questions, a multiphase design should be selected for the following considerations:

- The researcher cannot fulfill the long-term program objective of the study with a single mixed methods study.
- The researcher has experience in large-scale research (e.g., an evaluation background, a background in complex health science projects).
- The researcher has sufficient resources and funding to implement the study over multiple years.

- The researcher is part of a team that includes practitioners in addition to individuals with research expertise in both qualitative and quantitative research.
- The researcher is conducting a mixed methods project that is emerging, and new questions arise during different stages of the research project.

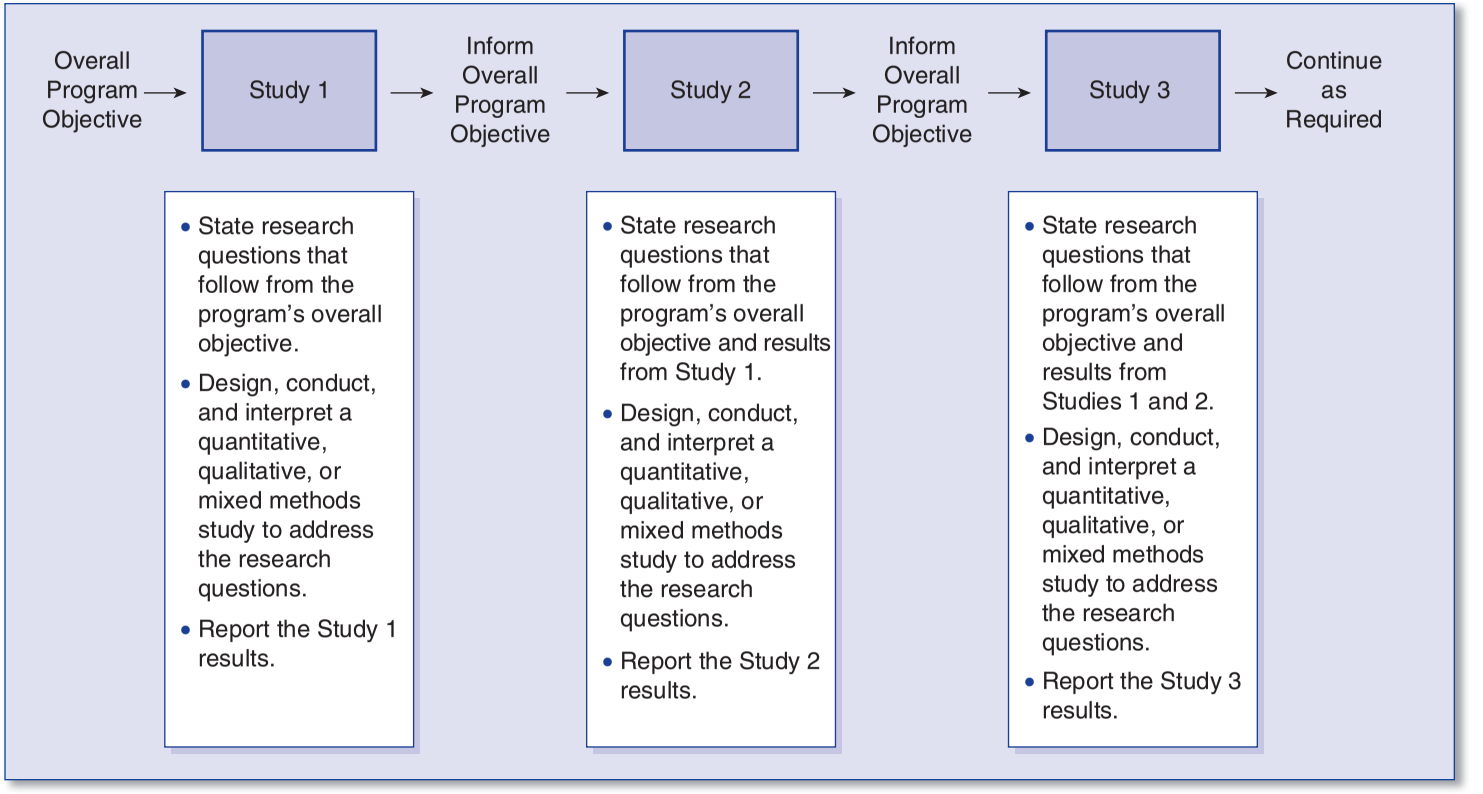
Philosophical assumptions behind the multiphase design. The philosophical assumptions that provide the foundation for a multiphase design will vary dependent on the specifics of the design. As a general framework, we suggest that the researcher use pragmatism as an umbrella foundation if strands are implemented concurrently and use constructivism for the qualitative component and postpositivism for the quantitative component if the strands are sequential. Since teams often implement this approach, it is common for different subgroups within the teams to be working from different assumptions and focusing on different aspects of the overall design. In addition to the importance of philosophical assumptions, multiphase designs also benefit from a strong theoretical perspective that provides a guiding framework for thinking about the substantive aspects of the study across the multiple phases.

The multiphase design procedures. The general procedures indicative of a multiphase design are depicted in Figure 3.8. As the figure illustrates, the multiphase design allows for each individual study to address a specific set of research questions that evolve to address a larger program objective. These procedures within a given study phase, or sequence of studies, often mirror the procedures for implementing one or more of the basic mixed methods designs. In addition, researchers utilizing a multiphase design also have to carefully state the research questions for each phase, which both contribute to the overall program of inquiry and build upon what has been learned in previous phases, and design procedures that build on the earlier findings and results.

Strengths of the multiphase design. This design has a number of strengths:

- The multiphase design incorporates the flexibility needed to utilize the mixed methods design elements required to address a set of interconnected research questions.
- Researchers can publish the results from individual studies while at the same time still contributing to the overall evaluation or research program.
- The design fits the typical program evaluation and development approach well.
- The researcher can use this design to provide an overall framework for conducting multiple iterative studies over multiple years.

Figure 3.8 Flowchart of the Basic Procedures in Implementing a Multiphase Design



SOURCE: Figure based on Creswell and Plano Clark (2007) and Morse and Niehaus (2009)

Challenges in using the multiphase design. While the multifaceted nature and flexibility of the multiphase design are its main strengths, they also represent the primary challenges:

- The researcher must anticipate the challenges generally associated with individual concurrent and sequential approaches within individual or subsequent phases.
- The researcher needs sufficient resources, time, and effort to successfully implement several phases over multiple years.
- The researcher needs to effectively collaborate with a team of researchers over the scope of the project, while also accommodating the potential addition and loss of team members.
- The researcher needs to consider how to meaningfully connect the individual studies in addition to mixing quantitative and qualitative strands within phases.
- Due to the practical focus of many multiphase designs for program development, the investigator needs to consider how to translate research findings into practice through developing materials and programs.
- The researcher may need to submit new or modified protocols to the IRB for each phase of the project.

Multiphase design variants. We are only beginning to think about how to classify variants of the multiphase designs. Examples can be difficult to identify, because they are frequently published as different projects across different journals. Considering the examples we do have from the literature, we suggest the following variants:

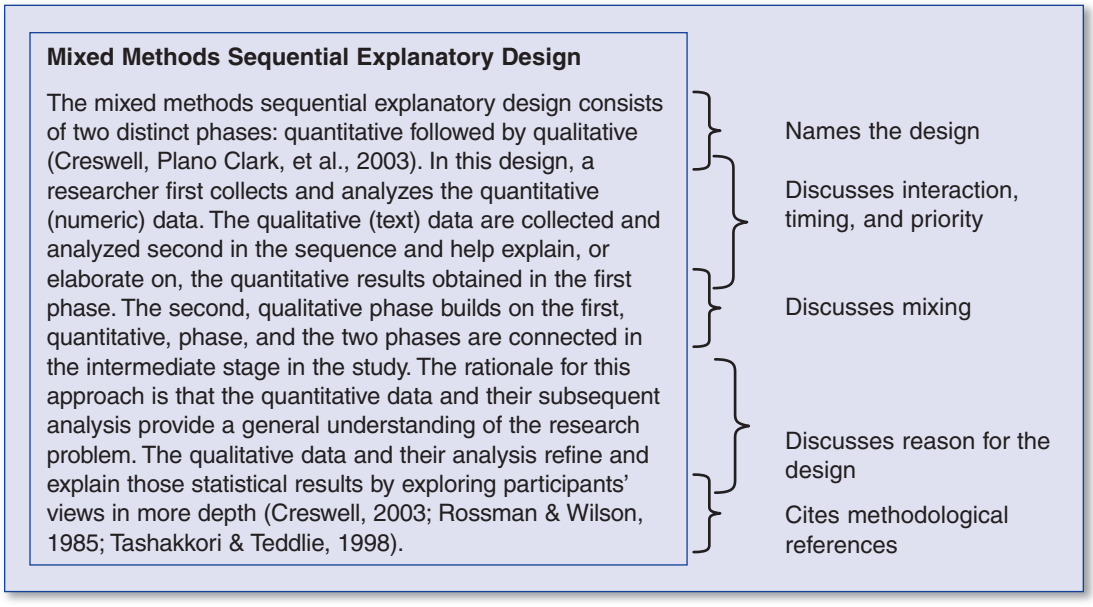
- **Large-scale program development and evaluation projects** may be the most common use of multiphase designs. These projects are often federally funded research programs in areas such as education and health services research where investigators conduct projects that require exploration, program development, program testing, and feasibility studies.
- **Multilevel statewide studies** utilize different methods and phases to examine different levels within a system, such as at the local, state, and national levels. For example, Teddlie and Yu (2007) discussed how multilevel projects focused on educational issues need to study five different levels: school systems, school districts, schools, teachers and classrooms, and students, with each level requiring different methods.
- A final variant includes **single mixed methods studies that combine both concurrent and sequential phases**. For example, Fetters, Yoshioka, Greenberg, Gorenflo, and Yeo (2007) reported their use of a combined design to study the practice of seeking consent for epidural anesthesia in advance of childbirth for Japanese women.

These researchers used a sequential approach to identify and explain the women's perspectives with a survey followed by interviews. They combined this sequential approach with a concurrent study of health professionals' perspectives by collecting quantitative and qualitative data in an e-mail survey.

● A MODEL FOR DESCRIBING A DESIGN IN A WRITTEN REPORT

Because many researchers and reviewers are currently unfamiliar with the different types of mixed methods designs, it is important to include a paragraph that introduces the design when writing about a study in proposals or research reports. This overview paragraph generally is placed at the beginning of the methods discussion and should address four topics. First, identify the type of mixed methods design. Next, give the defining characteristics of this design, including its level of interaction, timing, priority, and mixing decisions. Third, state the overall purpose or rationale for using this design for the study. Finally, include references to the mixed methods literature on this design. An example of an overview paragraph is included in Figure 3.9, along with comments that will assist in identifying these features within the paragraph.

Figure 3.9 A Sample Paragraph for Writing a Mixed Methods Design Into a Report



SOURCE: Ivankova, Creswell, and Stick, 2006, p. 5.

SUMMARY

Like quantitative and qualitative research approaches, mixed methods research encompasses several different designs. The designs provide sound frameworks for collecting, analyzing, mixing, interpreting, and reporting quantitative and qualitative data to best address specific types of research purposes. There are four principles that researchers should consider as they design their mixed methods studies. First, mixed methods designs can be fixed from the start and/or emerge as the study is underway. Second, researchers should consider their approach to research design and weigh the use of a typology-based or dynamic approach. Third, researchers must match the design to their research problem and questions. Finally, researchers should articulate at least one reason why they are mixing methods.

Researchers designing a mixed methods study make four key decisions in choosing a mixed methods design: whether the strands will remain independent or be interactive; whether the two strands will have equal or unequal priority for addressing the study's purpose; whether the strands will be implemented concurrently, sequentially, or across multiple phases; and how the strands are to be mixed. Mixing involves making decisions as to the stage in the research in which mixing occurs and the specific strategies used in mixing (i.e., merging, connecting, embedding, or using a framework). These decisions, along with the underlying logic that is best suited to the research problem and practical considerations, are the foundation researchers should use in selecting a mixed methods design for their study.

Researchers can choose among six major mixed methods designs: convergent, explanatory, exploratory, embedded, transformative, or multiphase. These designs are suited for different purposes and often find their basis within different philosophical assumptions. They each include a specific set of procedures that provide the underlying logic of the approach. Researchers should carefully consider the challenges associated with their design choice and plan strategies for addressing these challenges. Within the different designs, we also find that there are common variants in addition to the design decisions that are most common within studies published in the recent literature.

ACTIVITIES

1. Reflect on the four principles of mixed methods design (using a design that is fixed and/or emergent, using a mixed methods design approach, matching the design to the problem, and stating the reason for mixing methods) in regards to a study you are planning. Briefly describe how these principles will be applied in your study.

2. Identify a substantive topic of interest to you. Describe how this topic could be studied using each of the major designs discussed in this chapter.
3. Which of the major design types will you use in your study? Write a one-paragraph overview that identifies this design; defines its level of interaction, priority, timing, and mixing; and conveys your reason for choosing it for your study.
4. What challenges are associated with your design choice? Write a paragraph that discusses the challenges that you anticipate occurring with your design and how you might address them.

ADDITIONAL RESOURCES TO EXAMINE

For additional discussions on the major types of mixed methods designs, consult the following resources:

Creswell, J. W., Plano Clark, V. L., Gutmann, M., & Hanson, W. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 209–240). Thousand Oaks, CA: Sage.

Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco: Jossey-Bass.

Mertens, D. M. (2003). Mixed methods and the politics of human research: The transformative-emancipatory perspective. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 135–164). Thousand Oaks, CA: Sage.

Morse, J. M., & Niehaus, L. (2009). *Mixed methods design: Principles and procedures*. Walnut Creek, CA: Left Coast Press.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research*. Thousand Oaks, CA: Sage.

Look to these resources for further discussions of the interaction, timing, priority, and mixing decisions:

Bazeley, P. (2009). Integrating data analyses in mixed methods research [Editorial]. *Journal of Mixed Methods Research*, *3*(3), 203–207.

Caracelli, V. J., & Greene, J. C. (1993). Data analysis strategies for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, *15*(2), 195–207.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, *11*(3), 255–274.

See the following discussions for alternative approaches for mixed methods design:

Hall, B., & Howard, K. (2008). A synergistic approach: Conducting mixed methods research with typological and systemic design considerations. *Journal of Mixed Methods Research*, *2*(3), 248–269.

Maxwell, J. A., & Loomis, D. M. (2003). Mixed methods design: An alternative approach. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 241–271). Thousand Oaks, CA: Sage.