3

CORE MIXED METHODS DESIGNS

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 researchers make interpretations at the end of their projects. 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 the 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 core types of mixed methods designs and the key decisions behind these designs to adequately consider available options. Each core design has its own history, intent, philosophical assumptions and theory, procedures, integration, strengths, challenges, and variants. With an understanding of the core mixed methods designs in hand, researchers are equipped to choose and describe the one best suited to address a stated problem.

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

- key concepts that inform the design, description, and visualization of mixed methods designs;
- three core mixed methods designs;
- choosing a core design; and
- writing about the design in a written report.

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KEY CONCEPTS THAT INFORM MIXED METHODS DESIGNS

Designing research studies is a challenging process in both quantitative and qualitative research. This process can become even more challenging when the researcher has decided to use mixed methods because of the added complexity of the approach. No other topic in the field of mixed methods has been as widely debated and discussed as the research designs. We acknowledge these discussions and suggest that every mixed methods study ultimately has its own unique design. Still, there are several key concepts to consider in selecting, visualizing, and conducting a mixed methods design. These concepts are not fixed in time but are being discussed and debated. We acknowledge our own thinking has evolved with regard to describing mixed methods designs, and we first turn our attention to our emerging understanding of these key concepts.

Fixed and Emergent Designs

Mixed methods core desings may be fixed or emergent, and researchers need to be cognizant of the approach they are using and open to considering the best alternative for their circumstances. **Fixed mixed methods designs** are mixed methods studies in which 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 in which 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 has been 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 used this quantitative component to address 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 project.

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 and involve both fixed and emergent aspects. 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 subsequent 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

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of combining both fixed and emergent elements. We recognize the importance and value of emergent mixed methods approaches. Although the emergent aspect is not always easy to convey in writing, we believe most of the design elements we address in this book apply whether the use of mixed methods is planned from the start or emerges due to the needs of a study.

Typology and Interactive Approaches 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 their mixed methods study. These design approaches fall into two categories: typology-based and interactive.

A **typology-based approach** emphasizes the classification of different mixed methods designs into a typology and the adaptation of a selected design from the typology to a study's purpose and questions. Unquestionably, this design approach has been the most discussed in the mixed methods literature, as shown by the amount of effort that has been spent on classifying mixed methods designs into different typologies. A wide range of classifications of types of mixed methods designs have been advanced by methodologists. Creswell, Plano Clark, Gutmann, and Hanson summarized the range of these classifications in 2003, and we have updated that summary with a list of 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. 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. It is the typology-based approach that we will emphasize in this book.

As the different scholars listed in Table 3.1 developed their typologies, they focused on different types of decisions and features of mixed methods designs. It is helpful to notice these differences to understand why we have the different typologies. For example, some authors emphasized the purpose (or intent) for mixing methods by using design names such as "triangulation" and "instrument design model" (e.g., Creswell et al., 2004; Greene et al., 1989). Some authors focused on the relative **timing** (or sequencing) of when the quantitative and qualitative **strands** are implemented relative to each other and used names such as "simultaneous" and "sequential" (e.g., Morse, 1991; Sandelowski, 2000). Some authors emphasized the relative **priority** (or weighting or importance) of the quantitative and qualitative strands in addressing the study's purpose by using

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TABLE 3.1 ■ Selected Typologies of Mixed Methods Design Classifications

Typology Authors	Discipline Orientation of Authors	Mixed Methods Designs in the Typology
Greene, Caracelli, and Graham (1989)	Evaluation	Triangulation Complementarity Development Initiation Expansion
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 in 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

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Typology Authors	Discipline Orientation of Authors	Mixed Methods Designs in the Typology
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
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
Creswell, Fetters, and Ivankova (2004)	Primary medical care	Instrument design model Triangulation design model Data transformation design model

(Continued)

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TABLE 3.1 ■ (Continued)

Typology Authors	Discipline Orientation of Authors	Mixed Methods Designs in the Typology
Tashakkori and Teddlie (2003b)	Social and behavioral research	Concurrent mixed designs Concurrent mixed method design Concurrent mixed model design Sequential mixed designs Sequential mixed method design Sequential mixed model design Multistrand conversion mixed designs Multistrand conversion mixed method design Multistrand conversion mixed model design Fully integrated mixed model designs
Greene (2007)	Evaluation	Component designs Convergence Extension Integrated designs Iteration Blending Nesting or embedding Mixing for reasons of substance or values
Teddlie and Tashakkori (2009)	Educational research	Mixed methods multistrand designs Parallel mixed designs Sequential mixed designs Conversion mixed designs Multilevel mixed designs Fully integrated mixed designs
Morse and Niehaus (2009)	Nursing	Simultaneous mixed method designs Sequential mixed method designs Complex mixed method designs Qualitatively driven complex mixed method design Quantitatively driven complex mixed method design Multiple method research program

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Typology Authors	Discipline Orientation of Authors	Mixed Methods Designs in the Typology
Creswell and Plano Clark (2011)	Social sciences	Convergent parallel design Explanatory sequential design Exploratory sequential design Embedded design Transformative design Multiphase design
Plano Clark and Ivankova (2016)	Education and health sciences	Basic designs Concurrent Quan + Qual design Sequential Quan → Qual design Sequential Qual → Quan design Intersecting basic designs with other approaches Mixed methods experiment Mixed methods case study Mixed methods evaluation Mixed methods action research Transformative mixed methods research

Source: Adapted from Creswell & Plano Clark (2011) and Plano Clark & Ivankova (2016).

names such as "qualitatively driven" (Morse & Niehaus, 2009) and "equivalent status" (Tashakkori & Teddlie, 1998). Some authors emphasized the **level of interaction** (or independence or dependence) that occurs between the quantitative and qualitative strands by using design names such as "component" or "fully integrated" (e.g., Greene, 2007; Teddlie & Tashakkori, 2009). Most authors used at least a couple of these considerations in developing their typology of mixed methods designs. Therefore, the different typologies available not only represent different discipline orientations of the authors, they also represent different ways that researchers think about mixing methods.

In contrast to the typology-based approach, there is the interactive approach for thinking about the process of designing a mixed methods study. This approach focuses on the parts and processes of a research study as opposed to the focus on methods found with the typology-based approach. Maxwell and colleagues have advocated for an **interactive, system-based approach** to mixed methods design (Maxwell, 2012; Maxwell, Chmiel, & Rogers, 2015; Maxwell & Loomis, 2003). They argue the researcher should weigh five interconnected components when designing a mixed methods study: the study's goals, conceptual framework, research questions, methods, and validity considerations. They also acknowledge

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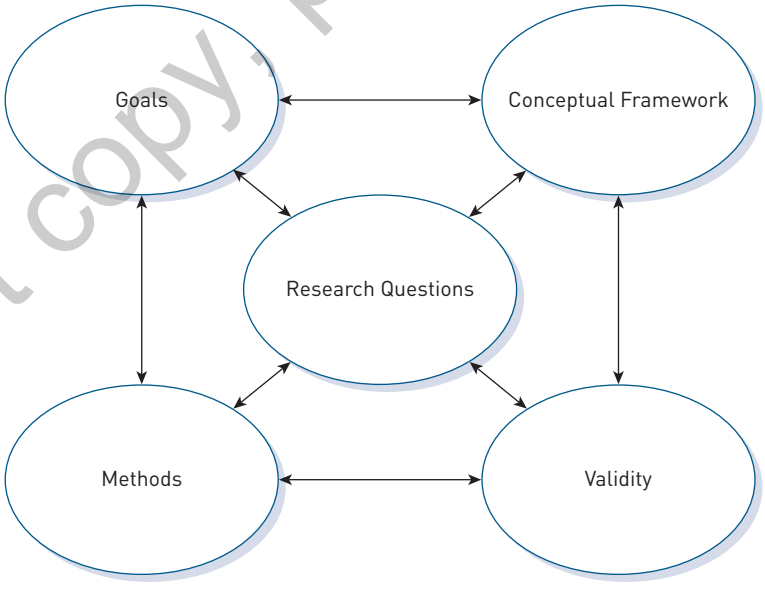
these considerations are shaped by external influences, such as the researcher's skills, situational constraints, ethical standards, funding agendas, and prior research. All these factors interact to influence the mixed methods design and how it may change during a research study. A visual of this interactive approach is shown in Figure 3.1.

Hall and Howard (2008) described a dynamic approach similar to the interactive approach, which they called the *synergistic approach*. They suggested the synergistic approach provides a way to combine a typological approach with an interactive approach. In a synergistic approach, two or more options interact so their combined effect is greater than the sum of the individual parts. Translated into mixed methods, this means the sum of quantitative and qualitative research is 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's effective combination of structure and flexibility 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.

FIGURE 3.1 ■ Maxwell's (2012) Interactive Model of Research Design



Source: Maxwell (2012), with permission of SAGE Publishing, Inc.

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Typologies provide the researcher with a range of available options to consider that are well defined, facilitate a solid approach for addressing the research problem, and help the investigator anticipate and resolve challenging issues. Typologies also cast focus on the data collection and analysis along with the **point of interface**, the point where the mixing or integration occurs—a feature that we feel is central to mixed methods. 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 better able to effectively design their studies using an interactive or dynamic approach.

The Evolution of Our Typology

Due to the numerous classifications available and the maturation of the mixed methods field, we have changed the names and our approaches to the designs over the years. This has led to some confusion about what designs we actually support. Table 3.2 shows how we have adjusted our thinking about designs from our early typology in 2003 (Creswell et al., 2003) through the first and second editions of this book (Creswell & Plano Clark, 2007, 2011) and into this current third edition. In the table we have listed

TABLE 3.2 ■ Our Changing Typologies

Our 2003 Typology (Creswell, Plano Clark, Gutmann, & Hanson, 2003)	Our 2007 Typology (Creswell & Plano Clark, 2007)	Our 2011 Typology (Creswell & Plano Clark, 2011)	Our Present Typology of Core Designs
Sequential explanatory	Explanatory design	Explanatory sequential design	Explanatory sequential design
Sequential exploratory	Exploratory design	Exploratory sequential design	Exploratory sequential design
Sequential transformative		Transformative design	
Concurrent triangulation	Triangulation design	Convergent parallel design	Convergent design
Concurrent nested	Embedded design	Embedded design	
Concurrent transformative		Transformative design	
		Multiphase design	

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the design names from our writings that are most closely associated with our original typology in 2003. As the table illustrates, we have changed the number and names of the designs, and we have eliminated some of them. Our goal all along has been to advance a typology of core designs that is both parsimonious and practical so as to best assist researchers in understanding the major design options available. With these changes, we feel we are in a better position to suggest the type of design when people come to us for advice.

As indicated in Table 3.2, the number of designs have fluctuated over the years. Our current typology of three core designs reflects our most parsimonious statement of designs. We now see that at the heart of a mixed methods study is one or more of the three core designs (convergent, explanatory sequential, and exploratory sequential). Individuals may engage in a study that uses one or more of the core designs, and sometimes they apply the core designs within larger frameworks or approaches (such as in experiments or evaluation projects). In this chapter we discuss the three core designs; in Chapter 4 we explore how these designs have been applied (or intersected) in larger frameworks or approaches, such as in intervention or experimental trials, case studies, participatory or social justice perspectives, and program evaluations. In other recent writings (Creswell, 2014), these larger frameworks or approaches were discussed as "advanced" designs, but we recognized this label raised perplexing questions as to what was meant by "advanced" and whether a researcher should only use an advanced design to have a rigorous mixed methods study. Therefore, we have avoided that language in this book.

Table 3.2 also shows that the names of the designs have changed over time to labels that reflect the primary emphasis of the researcher's general intent for using and integrating the quantitative and qualitative databases. Our names for the designs initially focused on the "timing" of the quantitative and qualitative components of a mixed methods study (e.g., *sequential* explanatory or *concurrent* triangulation), but timing is a difficult standard to apply in practice because both databases may be collected at roughly the same time. In contrast, the **intent of a design** is the outcome that the researcher hopes to attain by mixing the two databases. Thus, the intent of the design, whether it is to explain, explore, or converge, becomes the first word in our design names (e.g., *convergent* design). The idea of sequentially ordering the qualitative and quantitative methods becomes the second word in our label (e.g., explanatory *sequential* design). Furthermore, instead of focusing on the triangulation of data sources, we now emphasize what the researcher does with the data sources within the intent of the study (e.g., to *converge* the results for enhanced understanding). Granted, these are subtle wording changes, but together they shift the conceptualization of the design from a question of timing or sequence to the purpose or intent of the design. The design names also deemphasize the question of the priority or emphasis of one of the databases over the other. Like timing, priority is a difficult

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standard to apply, and we believe that the intent provides a more useful scheme for helping researchers understand and communicate the design being used.

As shown in Table 3.2, we have eliminated some designs in our current typology. We now see embedding as one of several possible ways that researchers may intersect the core mixed methods designs with another approach, such as in the mixed methods experiment application that we will discuss in Chapter 4. We also now see transformative not as a unique design but as a worldview or philosophy that can provide the foundation for the use of mixed methods, as discussed in Chapter 2 and as several reviewers have told us over the years. In Chapter 4 we discuss how researchers use this worldview within the social justice application. The term *multiphase design*, as used in previous discussions (Creswell & Plano Clark, 2011), has become much too general, although it can be argued that most mixed methods studies have multiple phases. We have found it useful to think about researchers applying the three core designs within multiple stages of procedures. In Chapter 4 we examine the application of the core designs within multiple stages of a program evaluation. We find these changes help to focus researchers' attention on the core mixed methods designs as well as leaving open the wide range of possible applications of these core designs.

This last point leads to one further change in our thinking about designs. Over the years individuals have come to us with projects asking what design they are using. They tell us that they have multiple core designs operating in a single study. This may be the case, but, when we look closely at their projects, we see one of the core designs weighs more heavily in the study than the others. We ask, "What is the intent for you to collect and integrate both quantitative and qualitative data?" Their answer to this question then helps to focus on the *primary* intent for gathering both types of data. We see the primary intent then leading to a labeling of their core design. This concept holds true as well for the complex designs we will discuss in Chapter 4. For example, in a mixed methods experimental study, multiple core designs may be used, but typically one of the core designs is central to the intent for employing quantitative and qualitative data in the project (e.g., in a mixed methods experimental study the qualitative data flows into the study after the experiment concludes in order to explain the experimental results).

A Notation System for Drawing Diagrams of Designs

Although our design names focus attention on the intent of different designs, researchers still need to clearly convey the flow of the quantitative and qualitative methods within their particular study. To facilitate the discussion of mixed methods design features, a notation system, first used by Morse (1991), has been expanded and appears in the discussion of designs throughout the mixed methods literature. The common notations used from this system are summarized in Table 3.3. Morse's initial notation

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system used "quan" to indicate the quantitative methods of a study and "qual" to indicate the qualitative methods. This shorthand aims to convey an equal status of the two methods (i.e., both abbreviations have the same number of letters and same format). The relative priority (or importance) of the two methods within a particular study is indicated through the use of uppercase and lowercase letters—that is, prioritized methods are indicated with uppercase letters (i.e., QUAN and QUAL) and secondary methods with lowercase letters (i.e., quan and qual). In addition, the notation uses a plus (+) to indicate methods that occur at the same time and an arrow (→) to indicate methods that occur in a sequence. As shown in Table 3.3, several authors have expanded the notations beyond these basic elements. Plano Clark (2005) added the use of parentheses to indicate methods that are embedded (or intersected) within a larger framework. Nastasi et al. (2007) added double arrows (→←) to indicate methods that are implemented in a recursive fashion. More recently, Morse and Niehaus (2009) suggested the use of brackets ([ ]) to distinguish mixed methods projects in a series of studies and an equal sign (=) as a shorthand way to indicate the intent (or justification) for combining the methods. The shorthand notation using an equal sign can be helpful for describing the overall design of a study.

TABLE 3.3 ■ Summary of Notations Used to Describe Mixed Methods Designs

Notation	Example	What the Example Notation Indicates	Key Citations
Shorthand: Quan, Qual	Quan strand	Quantitative methods for data collection, analysis, and interpretation	Morse (1991, 2003)
Uppercase letters: QUAN, QUAL	QUAL priority	The qualitative methods are prioritized or emphasized in the design.	Morse (1991, 2003)
Lowercase letters: quan, qual	qual supplement	The qualitative methods have a lesser priority in the design.	Morse (1991, 2003)
Plus: +	QUAN + QUAL	The QUAN and QUAL methods occur concurrently.	Morse (1991, 2003)
Arrow: →	QUAN → qual	The methods occur in a sequence of QUAN followed by qual.	Morse (1991, 2003)
Parentheses: ( )	Intervention (QUAN + qual)	The methods are embedded (or intersected) within a larger intervention design.	Plano Clark (2005)

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Notation	Example	What the Example Notation Indicates	Key Citations
Double arrows: →←←	QUAL →←← QUAN	The methods are implemented in a recursive process (QUAL → QUAN → QUAL → QUAN → etc.).	Nastasi et al. (2007)
Brackets: [ ]	QUAL → QUAN → [QUAN + qual]	A core mixed methods design [QUAN + qual] is used within a series of studies.	Morse & Niehaus (2009)
Equal sign: =	QUAN → qual = explain quantitative results	The intent for mixing (or integrating) methods	Morse & Niehaus (2009)

Source: Adapted from Creswell & Plano Clark (2011).

Consider the following examples of using this notation system for the three core mixed methods designs:

- QUAN + QUAL = converge results: This notation indicates a convergent design in which the researcher implemented the quantitative and qualitative strands at the same time, both strands had equal emphasis, and the results of the separate strands were converged. It is possible for the two parts to be unequal and notated as QUAN + qual or as quan + QUAL. Regardless of the emphasis being placed on each of the two strands, the overall intent of the researcher is to converge or compare the results from the two databases.
- QUAN → qual = explain quantitative results: This notation indicates an explanatory sequential design in which the researcher implemented the two strands in a sequence, the quantitative methods occurred first and had a greater emphasis in addressing the study's purpose, and the qualitative methods followed to help explain the quantitative results. It is also possible for the emphasis to be given to the second, qualitative strand, which would be notated as quan → QUAL.
- QUAL → quan = explore and generalize findings: This notation indicates an exploratory sequential design in which the researcher implemented the two strands in a sequence, the qualitative methods occurred first to explore a phenomenon and had a greater emphasis in addressing the study's purpose, and the quantitative methods followed to assess the extent to which the initial qualitative findings generalize to a population. It is also possible for the emphasis to be given to the second, quantitative strand, which would be notated as qual → QUAN.

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Elements for Drawing Diagrams of Designs

Building from this notation system, procedural diagrams have been used to convey the complexity of mixed methods designs. Such diagrams were introduced by Steckler, McLeroy, Goodman, Bird, and McCormick (1992) and have been adopted by many other authors (e.g., Morse & Niehaus, 2009; Tashakkori & Teddlie, 2003b). These diagrams use geometric shapes (boxes and ovals) to illustrate the steps in the research process (i.e., data collection, data analysis, interpretation) and arrows made with solid lines to show the progression through these steps. They incorporate details about specific procedures and products (e.g., specific reports that might go to a funding agency) that go beyond the level of information conveyed by the mixed methods notation system. Ivankova, Creswell, and Stick (2006) studied the use of procedural diagrams and suggested 10 guidelines for drawing diagrams for mixed methods designs so that they could be easily and conveniently constructed. These guidelines are listed in Figure 3.2 and are applied in the diagrams that appear throughout the remainder of this chapter.

FIGURE 3.2 ■ Ten Guidelines for Drawing Procedural Diagrams for Mixed Methods Studies

1. Give a title to the diagram.
2. Choose either a horizontal or a vertical layout for the diagram.
3. Draw boxes for the quantitative and qualitative stages of data collection, data analysis, and interpretation of the study results.
4. Use uppercase or lowercase letters to designate the relative priority of the quantitative and qualitative data collection and analysis.
5. Use single-headed arrows to show the flow of procedures in the design.
6. Specify procedures for each stage of quantitative and qualitative data collection and analysis.
7. Specify expected products or outcomes of each procedure in quantitative and qualitative data collection and analysis.
8. Use concise language for describing the procedures and products.
9. Make your diagram simple.
10. Limit your diagram to a single page.

Source: Adapted from Ivankova et al. (2006, p. 15) with permission of Sage Publishing, Inc.

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THE THREE CORE MIXED METHODS DESIGNS

We recommend three core mixed methods designs that provide a useful framework for researchers working to plan their own studies. We urge researchers to carefully select a core design that best matches the research problem and reasons for mixing in order to make the study manageable and straightforward 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 and of high quality. The three core mixed methods designs are the convergent design, the explanatory sequential design, and the exploratory sequential design, as shown in a general form in Figure 3.3.

General Diagrams of the Three Core Designs

We start with a brief introduction to the core designs, including simple examples of studies that used them to explore 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 design**. The **convergent design** (Figure 3.3a; previously referred to as the concurrent or parallel design) occurs when the researcher intends to bring together the results of the quantitative and the qualitative data analysis so they can be compared or combined. The basic idea is to compare the two results with the intent of obtaining a more complete understanding of a problem, to validate one set of findings with the other, or to determine if participants respond in a similar way if they check quantitative predetermined scales and if they are asked open-ended qualitative questions. The two databases are essentially combined. An example of a comparison approach to the convergent design would be if the researcher during one semester surveys high school students about their attitudes toward tobacco use and also conducts focus group interviews on the same topic with students. The researcher analyzes the survey data quantitatively and the focus group qualitatively and then compares 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 3.3b). This design starts with the collection and analysis of quantitative data. This first phase is followed by the collection and analysis of qualitative data in order to explain or expand on the first-phase quantitative results. The subsequent qualitative phase of the study is designed so that it follows from

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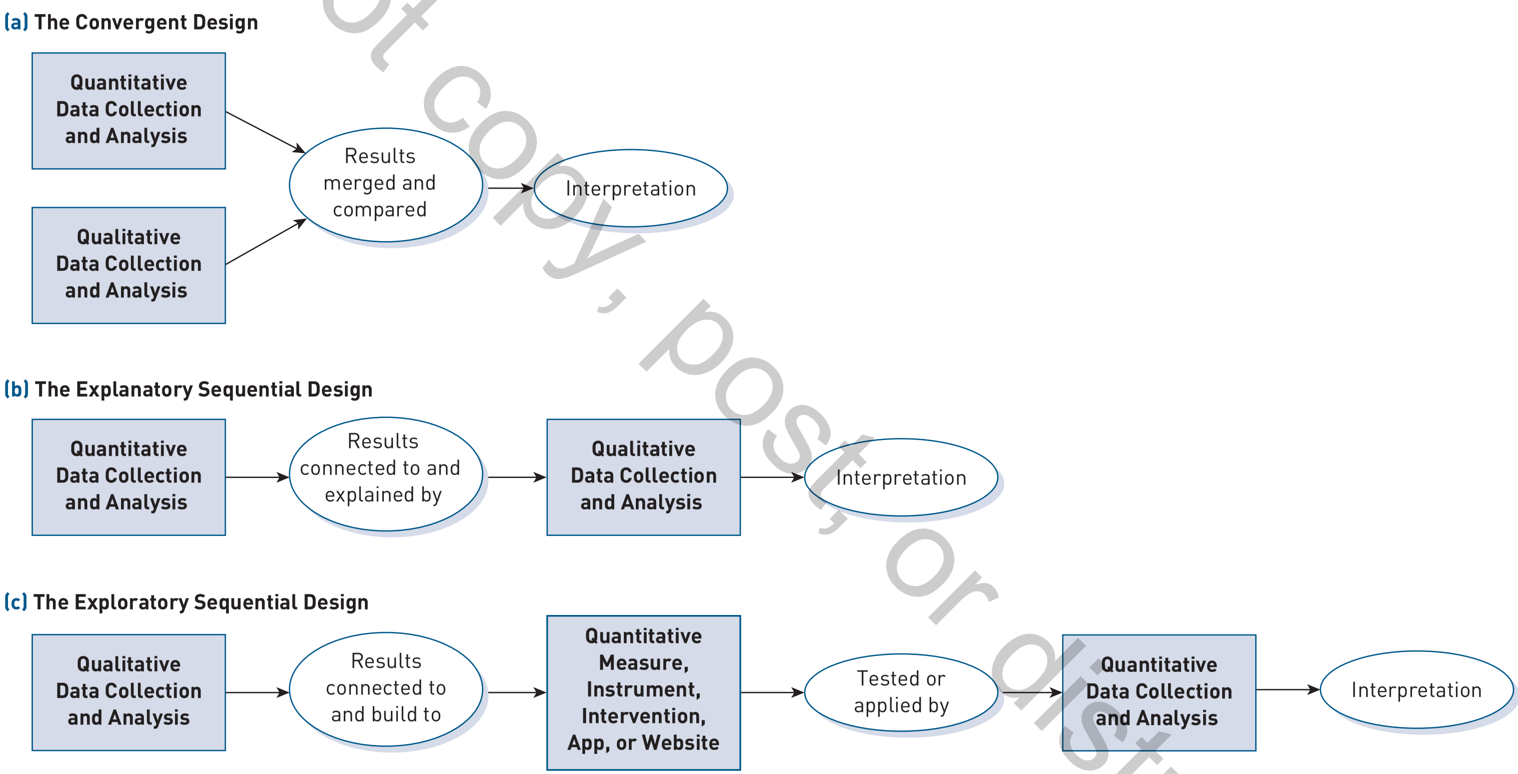
FIGURE 3.3 ■ General Diagrams of the Three Core Designs



Source: Adapted from Creswell & Plano Clark (2011).

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the results of the quantitative phase. For example, the researcher collects and analyzes quantitative survey 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 focus group 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 3.3c, the **exploratory sequential design** (also referred to as the exploratory design) also uses sequential timing. In contrast to the explanatory design, the exploratory sequential design begins with and typically prioritizes the collection and analysis of qualitative data in the first phase. Building from the exploratory results, the researcher conducts a development phase by designing a quantitative feature based on the qualitative results. This feature may be the generation of new variables, the design of an instrument, the development of activities for an intervention, or a digital product, such as an app or website. Finally, in the third phase the investigator quantitatively tests the new feature. The researcher then interprets how the quantitative results build on the initial qualitative results or how the quantitative results provide a clear understanding because they are grounded in the initial qualitative perspectives of participants. 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 survey instrument and then uses it to assess the overall prevalence of these variables for a large number of adolescent smokers.

To facilitate our discussion of the core mixed methods designs, we have included three complete studies in this book (see Appendixes A, B, and C). These studies represent examples of mixed methods research from health, education, and the social sciences. In addition, each study illustrates the application of one of the three core mixed methods designs.

The three articles included in the appendixes are:

- Convergent design: Wittink, M. N., Barg, F. K., & Gallo, J. J. (2006). Unwritten rules of talking to doctors about depression: Integrating qualitative and quantitative methods. *Annals of Family Medicine*, *4*(4), 302–309. (See Appendix A.)
- Explanatory sequential design: Ivankova, N. V., & Stick, S. L. (2007). Students' persistence in a distributed doctoral program in educational leadership in higher education: A mixed methods study. *Research in Higher Education*, *48*(1), 93–135. (See Appendix B.)

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- Exploratory sequential design: Enosh, G., Tzafrir, S. S., & Stolovy, T. (2015). The development of Client Violence Questionnaire (CVQ). *Journal of Mixed Methods Research, 9*(3), 273–290. (See Appendix C.)

The Convergent Design

A popular 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 often the first design that comes to mind when a researcher hears *mixed methods*. The convergent design was initially conceptualized as a triangulation design in which the two different methods were used to obtain triangulated (quantitative and qualitative) results about a single topic, but it often became confused with the use of triangulation in qualitative research, and mixed methods researchers 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 et al., 2003). Regardless of the name, the convergent design is a mixed methods design in which the researcher collects and analyses two separate databases—quantitative and qualitative—and then merges the two databases for the purpose of comparing or combining the results.

Intent of the convergent design. The intent of the convergent design is "to obtain different but complementary data on the same topic" (Morse, 1991, p. 122) in order to best understand the research problem. The intent in using this design is to bring together the strengths and weaknesses of quantitative and qualitative methods (e.g., quantitatively, a large sample size, objective measures, trends, and generalization combined with, qualitatively, a small sample, subjective interpretation, details, and depth) (Patton, 1990). This design is used when the researcher wants to compare quantitative statistical results with qualitative findings for a complete understanding of the research problem. Other purposes for this design include corroboration and validation purposes, illustrating quantitative results with qualitative findings (or vice versa), or examining relationships among variables by adding new variables based on transformed qualitative data into the relationships.

Choice of the convergent design. In addition to the intent of comparing results to best understand a problem, there are other compelling reasons for using the convergent design. It is useful when

- the researcher has limited time for collecting data in the field and must gather both types of data in one visit,

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- the researcher needs both quantitative and qualitative forms of information from every participant,
- the researcher has skills in both quantitative and qualitative methods of research, and
- the mixed methods team has individuals skilled in both quantitative and qualitative research.

Philosophical assumptions and theory use in 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, which provides an umbrella worldview for 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. Alternatively, those who choose to mix paradigms, such as in a dialectical framework, can advance multiple philosophical perspectives in the study and report these various philosophies. When using a theory orientation, the theory may operate in the convergent design by providing an umbrella theoretical or conceptual model that informs both the quantitative and qualitative data collection and analysis as well as the researcher's approach to integrating the two sets of results.

The convergent design procedures. The procedures for implementing a convergent design are outlined in the procedural flowchart in Figure 3.4. 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 typically 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 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 in a table or a discussion, or it may involve 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 or diverge from each other, relate to each other, and/or combine to create a better understanding in response to the study's overall purpose. If the results diverge, then the researcher takes further steps to explain this difference through reexamining the results, collecting more data, or reflecting on the quality of the databases.

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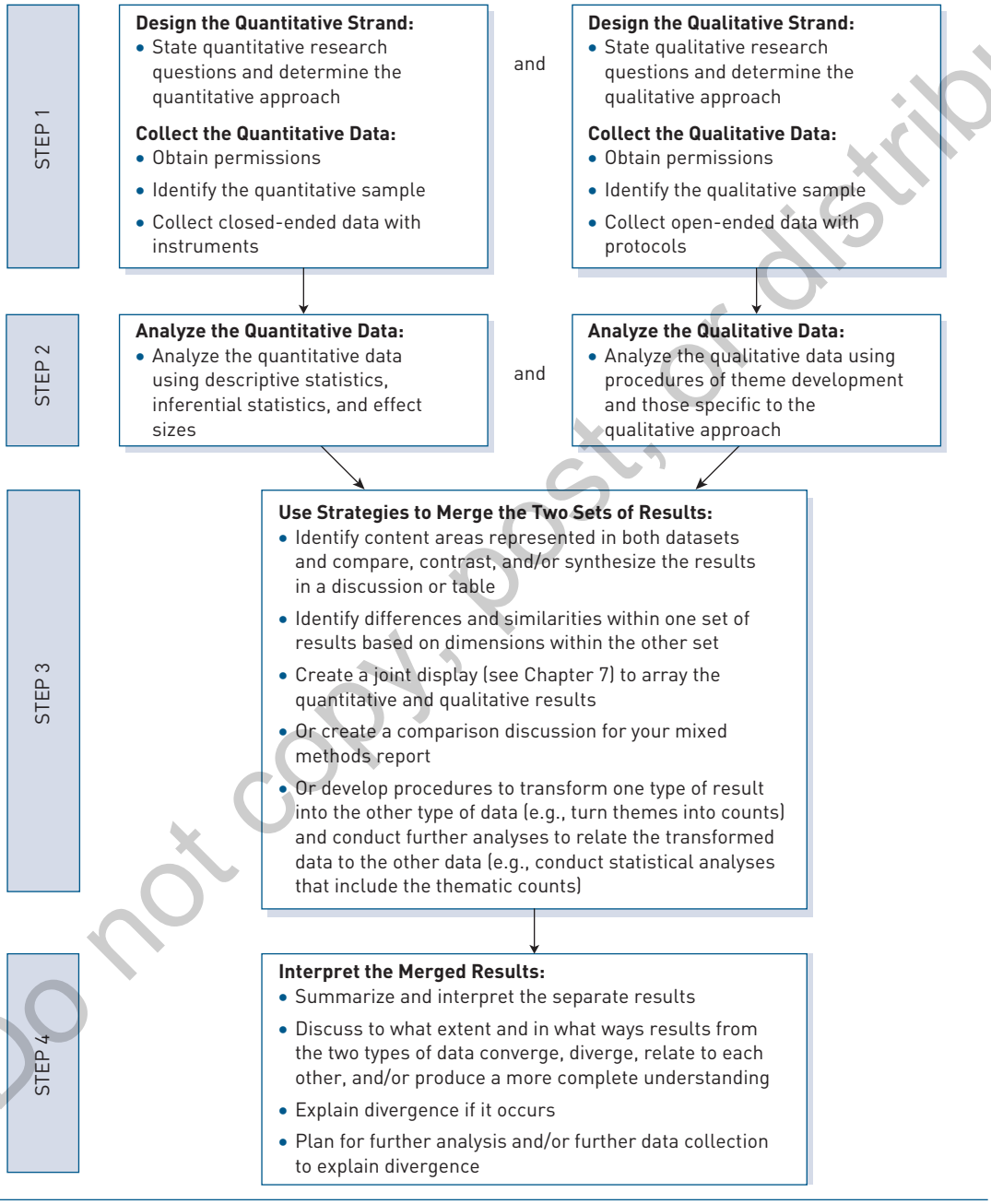
FIGURE 3.4 ■ Flowchart of the Basic Procedures in Implementing a Convergent Mixed Methods Design



Source: Adapted from Creswell & Plano Clark (2011).

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Integration in the convergent design. Integration in a convergent design involves merging or bringing together the quantitative results with the qualitative results. This comparison can be done with a table in which the results are included from both the quantitative and qualitative data. This is called a joint display table (as discussed further in Chapter 7 on data analysis). An alternative strategy would be to place the results in a graphical joint display, as is the case in geocoding where results are displayed according to spatial location with qualitative themes, codes, or quotes tied to different locations. The comparison can also be made when presenting the results of a study in passages organized by major topics. For example, a paragraph describing the results for a particular topic might be organized by presenting the quantitative results first and the qualitative results second (or vice versa). Further, the researcher would make statements about what is learned from making this comparison (were the results similar, different, contradictory, and so forth). Integration can also be accomplished by transforming the data. This typically involves transforming the qualitative results into counts and then merging the transformed qualitative database into the quantitative database. The counted qualitative results (e.g., counts of codes or themes) can then be used to create new quantitative variables (or measures) grounded in the qualitative views of participants. In this situation, the integration occurs when the new transformed variables based on qualitative results are added to the quantitative database and analyzed. No matter which strategies the researcher used to merge the two databases, a convergent design should include a discussion of the conclusions (also referred to as inferences) that the researcher draws based on the combined results.

In convergent design studies, it is helpful to have scripts for wording the integration statement in projects. In this design, the wording might be as follows: "The integration involved merging the results from the quantitative and qualitative data so that a comparison can be made and a more complete understanding emerge than that provided by the quantitative or the qualitative results alone." If the data are merged by data transformation, the wording might be as follows: "The integration involved merging the two databases by transforming the qualitative results (codes, themes) into quantitative variables (count, constructs, scales) and statistically analyzing these emergent variables with the quantitative database so that variables arising from the personal experiences of participants can be included in the analysis."

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.

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- Each type of data can be collected and analyzed separately and independently, using the techniques traditionally associated with each. This lends itself to team research in which the team can include individuals with both quantitative and qualitative expertise.
- The design facilitates the direct comparison of participants' perspectives gathered in an open-ended questioning format (e.g., semi-structured interview) with the perspectives drawn from the researchers' standpoint (e.g., on an instrument such as a survey chosen by the researcher) in close-ended questioning. Researchers are able to give voice to participants as well as report statistical trends.

Challenges in using the convergent design. Although this design is popular in mixed methods, it is a challenging one to use. Here are some of the challenges facing researchers using the convergent design as well as options for addressing them:

- Issues of different sample sizes—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 (i.e. quantitative generalization vs. qualitative in-depth description). Effective strategies, such as collecting large qualitative samples or using unequal sample sizes, are discussed in Chapter 6.
- The need to merge a text and a numeric database—It can be challenging to merge two sets of very different data (i.e., often one data set is text and the other is numbers) and their results in a meaningful way. It is best if researchers 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 joint displays, and using data transformation.
- The need to explain divergence when comparing results—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 four common variants of the convergent design found in the literature:

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- The **parallel-databases variant** is the common approach in which two parallel strands of data are collected and analyzed independently and are only brought together during the interpretation. The researcher uses the two types of data to examine facets of the same 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 activities within online virtual communities.

- The **data-transformation variant** occurs when researchers implement the convergent design using an unequal priority, often placing greater emphasis on the quantitative strand, and use a merging process of data transformation. That is, after the initial collection and 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. The study comparing two approaches to rating English foreign language (EFL) student essays in Tunisia by Barkaoui (2007) represents the data-transformation model of mixed methods research. Barkaoui tested two methods of scoring essays—multitrait scoring and holistic scoring—by collecting quantitative scores from four teachers as they examined essay samples. They also collected qualitative reports based on "think aloud" data in which the teachers verbalized their thoughts and feelings about the essays and about their process of scoring. During analysis the qualitative reports were divided into decision-making statements and quantitatively counted, and then they were compared for the two scoring methods. In this way, a quantitative table emerged combining the quantitative assessment of teachers' verbalized thoughts and the quantitative scoring methods.

- The **questionnaire 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 rigorous context-based qualitative data set (in the last addition of this book, we called this approach "mixed methods light.") However, the qualitative database does provide the researcher with emergent themes and interesting quotes that can be used to validate and embellish the quantitative survey findings. For example, Bryanton and Weeks (2014) studied the support needs for older adults approaching the transition to becoming nondrivers.

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The researchers collected data on a survey instrument administered to Canadian adults over the age of 70 with a current driver's license. This instrument contained both multiple choice questions and open-ended questions to gain multiple perspectives on the transition issue and individuals' support needs.

- The **fully integrated variant** occurs when the quantitative and qualitative strands of a study interact with each other during the implementation instead of the researcher keeping them separate and independent. For example, the researcher may ask qualitative interview questions to a respondent based on that person's response to a survey item, and information gathered in the interviews may suggest new constructs to add to the quantitative data collection. In this variant the researcher often is gathering data at multiple points, and the intent is to gather more complete information about the complexity of a topic; the interactions occurring between the different forms of data provide insight into that complexity. Sammons, Davis, Day, and Gu (2014) used a fully integrated variant in their study of school improvement in England. They discussed how they combined data gathered from national surveys with data from several different surveys of school personnel and students, school documents, and stakeholder interviews to gain a more complete understanding of what helps schools be effective.

Example of the convergent design. The convergent design involves collecting and analyzing two independent strands of qualitative and quantitative data in a single phase, merging the results of the two strands, and then looking for convergence, divergence, contradictions, or relationships between the two databases. The Wittink et al. (2006) study (see Appendix A) illustrates the major features of this design.

Wittink et al. (2006) were interested in the contexts surrounding the determination of patients' depression status by primary care physicians with a focus on the patients' views of the interactions with their physicians. The purpose of their study was to develop a better understanding of concordance and discordance between patient and physician assessments of a patient's depression status for older adults.

To address their study's purpose, the researchers selected a sample made up of all participants in a larger research study (the Spectrum Study) who self-identified as depressed ($N = 48$). The databases assembled for this study then included quantitative and qualitative data collected for each of these 48 individuals. In terms of the quantitative data, the researchers gathered three measures of participant depression status: a physician's rating, a patient's self-rating, and the participant's score on a standardized measure of depressive symptoms (known as the CES-D). The researchers also gathered several other measures from each participant, including demographic characteristics and assessments of anxiety, hopelessness, health status, and cognitive functioning. When analyzing the

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quantitative data, the researchers identified whether the patient and physician ratings were concordant (agreed with each other) or discordant (disagreed with each other) for each participant and then calculated descriptive statistics and group comparisons to see whether significant differences existed for the concordant and discordant groups in terms of the other variables of interest.

The researchers also included qualitative semi-structured interviews about patient perceptions of their encounters with their physicians. The interviews were transcribed, and the research team analyzed the texts using constant comparative strategies for theme development. This analysis was independent from the quantitative analysis, as the researchers purposefully did not have access to the quantitative information as they completed the qualitative analysis. Four major themes emerged to describe the patients' interactions with their physicians: (1) My doctor just picked it up, (2) I'm a good patient, (3) They just check out your heart and things, and (4) They'll just send you to a psychiatrist. These themes provided a typology for classifying participants based on how they discussed the interactions.

Wittink et al. (2006) stated they needed both types of data in order to develop a more complete understanding. When explaining their mixed methods approach, they wrote, "This design allowed us to link the themes regarding how patients talk to their physicians with personal characteristics and standard measures of distress" (p. 303). Therefore, in order to relate these two different types of information, they selected and analyzed their quantitative and qualitative data sets concurrently and separately from each other. Both types of data appeared equally important for addressing the study's purpose. After the initial separate analyses, they merged the two sets of results in an interactive way so that the point of interface occurred during the analysis and the interpretation. They further analyzed the data to develop a matrix (see Table A.3 in Appendix A, which we refer to in Chapter 7 as a joint display) that brought together the qualitative findings (four groups derived from the qualitative themes) with the quantitative results (concordance of depression ratings and other important variables). The information contained within the cells of the table shows the descriptive statistics of the variables for each of the qualitatively derived groups for purposes of comparison among the different qualitative perspectives. The researchers concluded with a brief discussion of how the comparisons across the two data sets provided a better understanding of the study's topic.

This study is an example of a convergent mixed methods design. The notation of the study's design can be written as QUAN + QUAL = complete understanding. Although the authors did not provide a diagram of their procedures, we developed one, and it is presented in Figure 3.5. The quantitative data collection and analysis appear on the left side of the figure, and the qualitative data collection and analysis appear on the right side. As shown in this diagram, the quantitative and qualitative strands were implemented

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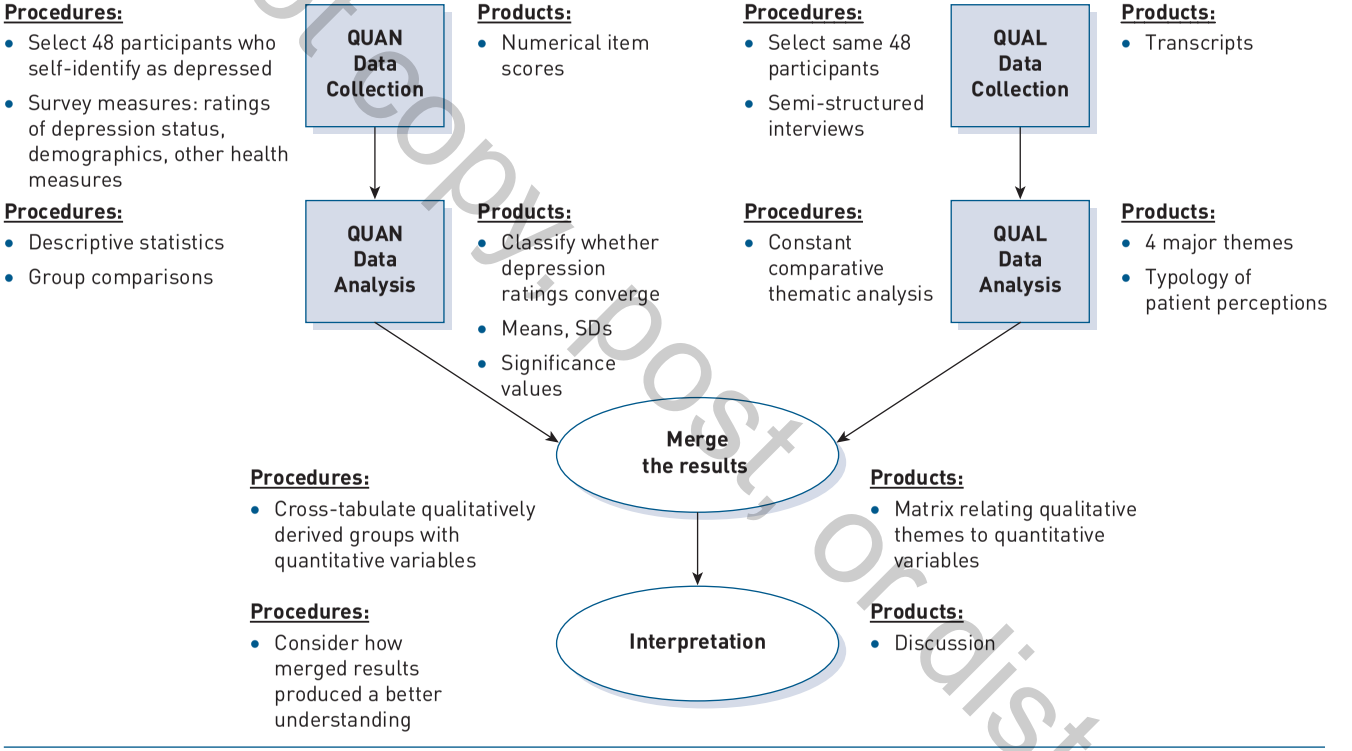
FIGURE 3.5 ■ Diagram for a Study That Used the Convergent Design



Source: Diagram based on Wittink et al. (2006).

Note: SDs indicates standard deviations.

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during the same phase of the research process and appeared to have an equal emphasis within the study. These two data types and their results were then merged with a comparison matrix and into one overall interpretation, as depicted in the two ovals, which indicate these points of interface between the strands.

The Explanatory Sequential Design

For several years, writings about mixed methods designs have emphasized sequential approaches, using design names such as sequential model (Tashakkori & Teddlie, 1998), sequential triangulation (Morse, 1991), a qualitative follow-up approach (Morgan, 1998), and the 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 et al., 2003). The explanatory sequential design is a mixed methods design in which the researcher begins by conducting a quantitative phase and follows up on specific results with a subsequent qualitative phase to help explain the quantitative results (refer back to Figure 3.3b). The qualitative phase is implemented for the purpose of explaining the initial results in more depth, and the name of the design—explanatory—reflects how the qualitative data help explain the quantitative results.

Intent of the explanatory sequential design. The primary intent of this design is to use a qualitative strand to explain initial quantitative results. 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 or confusing results (Bradley et al., 2009; Morgan, 2014; 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 (Morgan, 1998, 2014; Tashakkori & Teddlie, 1998). It also can be used to explain the mechanisms through qualitative data that shed light on why the quantitative results occurred and how they might be explained.

Choice of the explanatory sequential design. In addition to considering if the intent of an explanatory design best fits a particular study, there are other factors researchers may want to take into account when choosing this design. The explanatory sequential design is most useful when

- the researcher and the research problem are more quantitatively oriented and thus it makes sense to start the procedures with a quantitative phase,

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- 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, and
- the researcher has limited resources (perhaps the researcher is the sole investigator) and needs a design in which only one type of data is being collected and analyzed at a time.

Philosophical assumptions and theory use in an explanatory sequential design. As introduced in Chapter 2, different philosophical assumptions are possible to guide the use of an explanatory design. Since this design 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 may begin from the perspective of postpositivism to select 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. In this way, the overall philosophical assumptions in the design can change and shift from postpositivist to constructivist as researchers use multiple philosophical positions. The final interpretation of the two sets of results could then be based on one set of assumptions or on a dialectic involving both sets of assumptions.

Further, following the postpostivist logic, theory (or a conceptual framework) often informs the first phase of the design—the quantitative phase. The theory can help to identify the questions that need to be asked, the variables and measures to be collected, and the potential relationships that should emerge when the first phase is completed. The theory use follows closely a quantitative approach to theory as an explanation, prediction, or hypothesis about what the researcher will likely find in the initial quantitative phase of the study. The application of theory can also be useful as an orienting stance for how the researcher approaches the qualitative phase, such as using the theory to focus the researcher's attention during coding, and for interpreting the combined results at the end of the study, such as by using the theory to organize the quantitative results and corresponding qualitative explanations.

The explanatory sequential design procedures. The explanatory sequential design is probably the most straightforward of the mixed methods designs. Figure 3.6 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 phase

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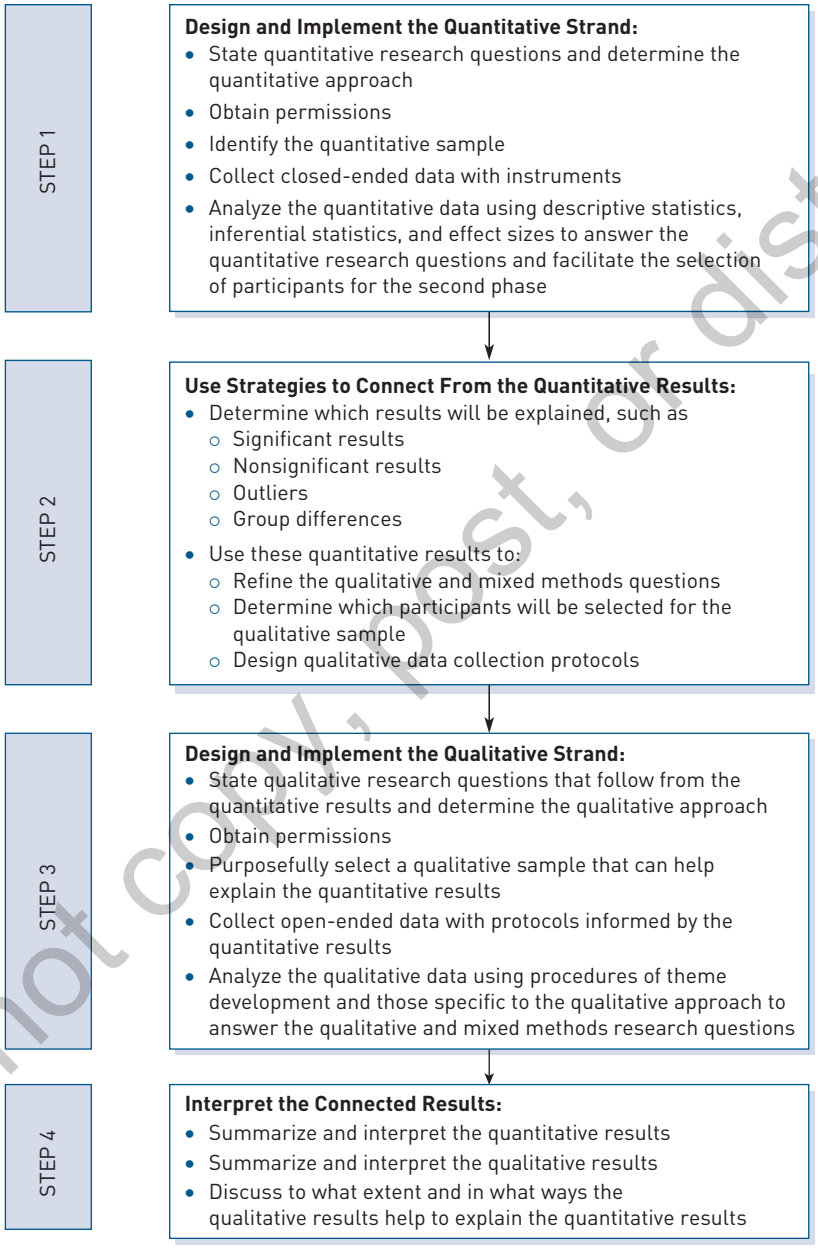
FIGURE 3.6 ■ Flowchart of the Basic Procedures in Implementing an Explanatory Sequential Mixed Methods Design



Source: Adapted from Creswell & Plano Clark (2011).

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that includes collecting and analyzing quantitative data. In the second step, the researcher connects to a second phase—the point of integration 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 is connected to and 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.

Integration in the explanatory sequential design. There are two points where integration occurs in an explanatory sequential design. First, integration occurs between the quantitative data analysis in the first phase of the research and the qualitative data collection in the second phase. The researcher analyzes the quantitative data and comes up with results. Some of these results need further explanation, so the researcher launches a qualitative phase to explore the results in more depth with a few individuals. The integration occurs by connecting the quantitative results to the qualitative data collection. The quantitative results point toward specific results that need to be further explained through qualitative questioning and suggest which individuals will best be able to explain the results. A script for an integration statement in an explanatory mixed methods project might read: "Integration in this explanatory sequential study involved connecting the results from the initial quantitative phase to help plan the follow-up qualitative data collection phase. This plan includes what questions need to be further probed and what individuals can be sampled to best help explain the quantitative results." Second, once the qualitative phase is complete, the researcher then integrates the two sets of connected results and draws integrated conclusions about how the qualitative results explain and extend specific quantitative results.

Strengths of the explanatory sequential 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 structure makes it straightforward to implement because the researcher conducts the two phases—quantitative, then qualitative—separately and collects only one type of data at a time. This means single researchers can find this to be a manageable design to conduct.

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- 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 in which the second phase can be designed based on what is learned from the initial quantitative phase.

Challenges in using the explanatory sequential design. Although the explanatory design is straightforward, researchers choosing this approach still need to anticipate challenges specific to it. These challenges include the following:

- Extended time needed for completion—This design requires a lengthy amount of time for implementing the two phases, and participants must be accessible over an extended period. Researchers should also 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 it.
- The qualitative phase cannot be fully specified in advance—It can be difficult to secure institutional review board (IRB) approval for studies using this design because the researcher cannot specify with precision the participants to be selected for the second phase or the questions that will be asked in the follow-up qualitative phase until the initial quantitative findings are obtained. This issue can be addressed by tentatively framing the qualitative phase of participant selection and the questions to be asked for the IRB while acknowledging the potential need to revise these decisions and possibly submit an addendum once the quantitative phase has been completed.
- Quantitative results to follow up on must be identified—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 will be discussed in Chapters 6 and 7.
- The need to specify who can best provide the explanation—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, using groups in comparisons during the quantitative phase, and using individuals who vary on select predictors.

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

- The prototypical **follow-up explanations variant** is the most common approach for using the explanatory sequential design. The researcher places 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 **case-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 preliminary quantitative input design (Morgan, 2014). 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, Bradley et al. (2012) collected quantitative data to identify primary care health units in rural Ethiopia that had demonstrated different types of performance over time (i.e., consistently high performance, improved performance, and consistently low performance). They then completed an in-depth qualitative comparison study of how these three types of units functioned.

Example of the explanatory sequential design. The explanatory sequential design is implemented in two distinct phases. The first phase involves collecting and analyzing quantitative data. Based on a need to further understand the quantitative results, the researcher implements a subsequent qualitative phase that is designed to help explain the initial quantitative results. The study by Ivankova and Stick (2007) (see Appendix B) illustrates the major features of the explanatory sequential design.

Ivankova and Stick (2007) studied the issue of student persistence within the field of higher education. Building on three major theories about student persistence, they chose to study doctoral students in one distributed doctoral program in educational leadership. Specifically, their purpose was to identify factors that contributed to student persistence in the program and to explore participant views about these factors.

The researchers implemented their study in two phases, starting with a quantitative strand. First, they approached all 278 students who had been or were currently enrolled

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in the program, and 207 agreed to participate in the study. Using a cross-sectional survey design, the researchers developed and administered an online questionnaire to the participants that measured nine predictor variables suggested by theories of student persistence. The responding students represented four groups related to persistence in the program: beginning, matriculated, graduated, and withdrawn or inactive. The analysis of the quantitative data resulted in descriptions of the demographic characteristics of the four groups and identified five variables that significantly discriminated the four different groups defined by their level of persistence.

The researchers conducted a subsequent qualitative phase after completing the quantitative phase. Using the quantitative results, they identified individuals within the sample that had scores typical of the average scores for each group. They purposefully selected four "typical" individuals (one per group) and conducted an in-depth case study of each person's experiences in and perceptions of the program. The primary form of data collection was one-on-one interviews using a protocol developed to explore the factors found to be significant in the quantitative phase. Other forms of qualitative data gathered included electronic interview transcriptions, written responses, and documents. The analysis first examined the data for descriptions and themes within each case, and this was followed by a cross-case analysis to identify important themes about persistence across the four cases.

Ivankova and Stick (2007) noted that one method alone is not sufficient to capture the trends and details of complex situations such as student persistence in this program. They went on to describe the purpose for their mixing in the following statement: "The quantitative data and results provided a general picture of the research problem, while the qualitative data and its analysis refined and explained those statistical results by exploring the participants' views regarding their persistence in more depth" (p. 97).

The researchers needed to first identify the general picture and statistically significant results before they knew what quantitative results needed to be further explored with a qualitative strand. As such, the study used sequential timing, with the quantitative methods being implemented in the first phase and the qualitative methods following in a second phase. The authors noted the qualitative phase was prioritized because "it focused on in-depth explanations of the results obtained in the first, quantitative, phase, and involved extensive data collection from multiple sources and two-level case analysis" (p. 97). The primary point of interface occurred with the qualitative data collection during the second phase. The authors connected the phases by using the results of the quantitative phase to inform the sampling plan and interview protocol used in the qualitative phase. They also connected the results during the interpretation by discussing a major quantitative result and then how a follow-up qualitative result helped to explain the quantitative result in more depth.

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Based on the implemented design features, the notation for the study can be written as quan → QUAL = explain significant factors. Since the study was conducted in two phases with the qualitative phase dependent on the results of the initial quantitative phase, this study is an example of the explanatory sequential mixed methods design. Its two-phase timing and points of mixing are highlighted in the diagram developed by the authors and reproduced in Figure 3.7. The data collection and analysis procedures of the initial quantitative phase are described in the first two rectangular boxes. The connections to the qualitative phase through case selection and interview protocol development are shown in the oval (the first point of interface). Then, the procedures in the second, qualitative phase are described in the next two rectangular boxes. The diagram concludes with another oval indicating the second point of interface and how the authors interpreted the overall mixed methods results.

The Exploratory Sequential Design

As depicted in Figure 3.3c, the exploratory sequential design is a three-phase mixed methods design in which the researcher starts with the collection and analysis of qualitative data that is then followed by a development phase of translating the qualitative findings into an approach or tool that is tested quantitatively. This means that the approach or tool will be grounded in the views of participants. This emphasis on exploring before the development phase 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. Alternatively, researchers may design new variables, new measures (or a survey), new experimental activities, or an app or digital tool during the development phase. When used to develop an instrument, this design has been referred to as the instrument development design (Creswell, Fetters, & Ivankova, 2004).

Intent of the exploratory sequential design. As with the explanatory design, the intent of the exploratory sequential design is that the results of the first, qualitative method can help develop or inform the second, quantitative method (Greene et al., 1989). Specifically, the primary intent of the exploratory design is to develop and apply a quantitative measure, survey, intervention, digital tool, or new variables that are grounded in the qualitative data. By this we mean that the quantitative feature is based on the culture or setting of participants rather than pulled "off the shelf" for use. With the culture-specific development of the measure or instrument, the likelihood increases that it will be seen as relevant to the group being studied. Because this design begins qualitatively, it is best suited for exploring a phenomenon. Such an exploration is needed for one of several reasons: (1) measures, instruments, or experimental activities are not available; (2) the variables

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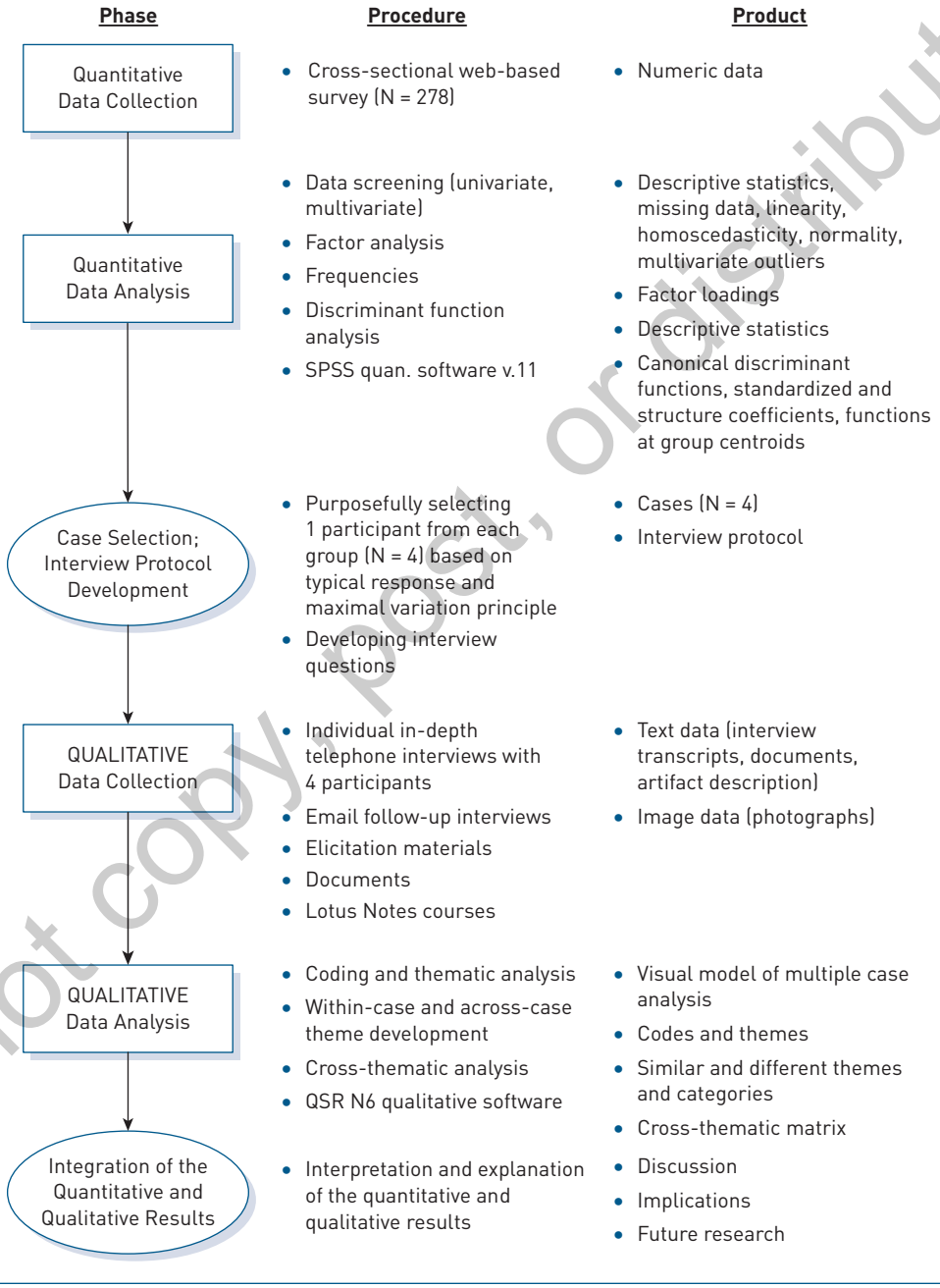
FIGURE 3.7 ■ Diagram for a Study That Used the Explanatory Sequential Design



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are unknown; (3) there is no guiding framework or theory; or (4) there is a need to make an existing quantitative measure or instrument as specific to the participants or culture as possible. 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 assess the generalizability of qualitative results to different groups (Morgan, 2014); 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.

Choice of the exploratory sequential design. In addition to considering if the intent of an exploratory design best fits a particular study, there are other factors researchers may want to take into account when choosing this design. It is most useful when

- the researcher and the research problem are more qualitatively oriented and therefore it makes sense to start with a more inductive approach;
- the researcher needs to develop a product (e.g., an instrument, intervention materials, or a digital tool) that is substantively relevant and culturally sensitive;
- the researcher has the necessary time to conduct the research in three phases: qualitative, development, and quantitative;
- the researcher is interested in the transferability and generalizability of a newly developed product; and
- the researcher identifies new emergent research questions based on small-sample qualitative results that can be best tested with a large quantitative sample.

Philosophical assumptions and theory use in the exploratory sequential design. Since the exploratory design begins qualitatively, the research problem and purpose often call for the qualitative strand to have greater emphasis within the design. Therefore, researchers often work from constructivist principles during the first phase of the study to value multiple perspectives and obtain deep understanding. When the researcher moves to the quantitative phase, the underlying assumptions may shift to those of a postpositivist philosophical stance 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. The final interpretation of the two sets of connected results may be based on one set of assumptions or a dialectical perspective involving both stances.

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Theory (or conceptual framework) in an exploratory design may be inductively developed in the initial phase of the study where qualitative data results may lead to a theoretical model, as in grounded theory. This model, grounded in the views of participants, can then contribute to the variables assessed and the relationships examined in the follow-up quantitative phase of the study. Alternatively, the theory may come into the study in the phase of developing an instrument, a new measure, or a specific application to be tested (e.g., a website). In this case, the qualitative results may be combined with a theory from the literature to inform this study phase of the project.

The exploratory sequential design procedures. The four major steps of the exploratory design are summarized in Figure 3.8. 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 integration in mixing, the researcher identifies the results on which the quantitative feature will be built. The researcher undertakes a development phase by developing an instrument, identifying variables, designing intervention (experimental) activities, or coming up with an app or website intervention to test. 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 or intervention with a new sample of participants. Finally, the researcher interprets in what ways and to what extent the quantitative results generalize or extend the initial qualitative findings.

Integration in the exploratory sequential design. Integration in an exploratory design involves using the initial qualitative results to build a new quantitative feature—for example, an instrument, new intervention, new measure, or new web-based application—that will be tested quantitatively. The actual integration is from the qualitative results to the development of the quantitative entity that will follow the initial qualitative phase. In this process of building or connecting, the researcher needs to make key decisions about what aspect of the qualitative findings to build on and the nature of the quantitative entity to be built (e.g., if a new, contextualized instrument is to be built, then this process will involve several stages of work). When stating the integration for this design, the researcher might use this script: "Integration involves using the qualitative results (e.g., themes and significant statements) to build a new quantitative feature that is grounded in the culture and perspectives of participants. This new feature is then quantitatively tested." Once the final quantitative phase is complete, the researcher integrates the two sets of connected results and draws integrated conclusions about how the quantitative results built on the qualitatively informed instrument or materials.

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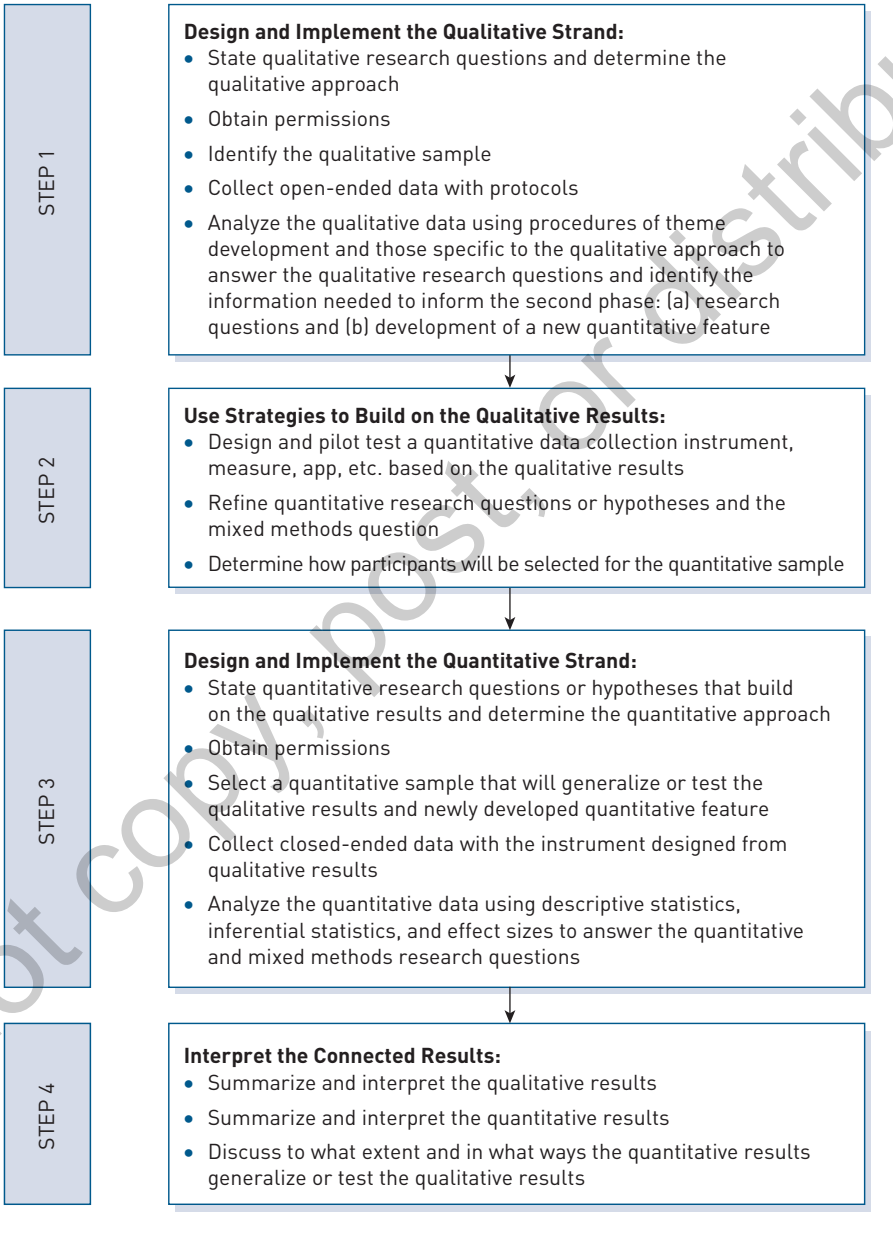
FIGURE 3.8 ■ Flowchart of the Basic Procedures in Implementing an Exploratory Sequential Mixed Methods Design



Source: Adapted from Creswell & Plano Clark (2011).

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Strengths of the exploratory sequential design. Due to the fact that only one type of data is collected at a time, the exploratory design has several of the same advantages as the explanatory design. Its specific advantages include the following:

- Separate phases make the exploratory sequential 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 first, qualitative phase.
- The researcher can produce a new instrument (or measure, variable, set of intervention activities, or digital tool) as one of the potential products of the research process.

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

- The researcher must plan for extended time to complete—This sequential approach requires considerable time to implement, potentially including time for a third phase to develop a feature (e.g., new instrument). Researchers need to recognize this factor and build time into their study's plan.
- The quantitative phase must be tentatively specified in advance—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.
- Two different samples might need to be identified—Researchers should consider using a small, purposeful sample in the first phase and a large sample of different participants in the second phase to enhance the generalization of the quantitative results (see the discussion of sampling in Chapter 6). Thus, ideally both samples should be from the same population, but the number of individuals in the quantitative phase would typically be much larger than the individuals in the qualitative phase and include different individuals.
- The researcher must determine which qualitative results to use—When developing a new feature after the qualitative phase, the researcher needs to decide which

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results to use from the qualitative phase to build the quantitative feature and how to use these results to generate quantitative measures or materials. In Chapter 6 we will discuss procedures for using qualitative themes, codes, and quotes to generate aspects of quantitative instruments.

- The researcher must be skilled—This design requires expanded skills on the part of the researcher because proficiency in qualitative research, quantitative research, mixed methods research, and instrument development (or digital tool development) will be needed. Procedures need to be undertaken to ensure that the scores developed on the instrument or intervention materials developed are high quality. In Chapter 6 we will review rigorous steps of instrument and scale development for this process.

Exploratory sequential design variants. In contrast to the explanatory sequential design, in an exploratory project there are three phases: a qualitative phase; a quantitative feature phase (developing a variable, instrument, intervention, digital tool); and a final quantitative test phase. Therefore, the variants are often distinguished by what is developed in the middle phase of the design.

- In the **new variable development variant**, the researcher identifies new variables or a new conceptual or theoretical framework in the initial qualitative phase of the research. This new variable is then used in a subsequent quantitative analysis. Writers have identified this process as developing 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. They then conducted a quantitative path analysis study to test these qualitatively identified variables and relationships.

- In the **survey-development variant**, the initial qualitative phase plays a role in helping to define the measures and the questions on a survey instrument. Then, after development of the instrument, it is administered to a representative sample. In a mixed methods study examining participant reaction to research on violence in Jordan, Clark et al. (2012) first gathered qualitative focus group data, next constructed a survey instrument with dichotomous questions, and then administered the survey to a large sample.

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- Researchers can also develop intervention activities for a second-phase trial or experiment based on the qualitative results. In the **intervention-development variant**, the researcher collects qualitative data to help develop an intervention (or an experiment) that would work with the participants and be meaningful to them. To this end, qualitative data collection focuses on activities or pre- and posttest measures that might be included in the intervention and potentially make a difference in the outcome. In a mixed methods study of war-affected youth in Sierra Leone in Africa, Betancourt et al. (2014) conducted key informant interviews with war-affected youth, caregivers, and experts from youth-serving organizations. Using the qualitative data key themes, they designed a group-based mental health intervention and then conducted a qualitative assessment of satisfaction with the intervention.

- Researchers can use this design to help develop digital tools and test them out. In the **digital tool development variant**, a project begins with a qualitative exploration to understand what questions and measures need to be asked of participants. Then this qualitative data is used to help design a digital tool that will hopefully work. Finally the tool is tested in practice. This approach was used in a video game study in medical education reported by Kron, Gjerde, Sen, and Fetters (2010). The authors first developed a prototype of the video game using virtual reality environments and qualitative interviews and then administered and tested the use of the game with a survey instrument. A table indicating their qualitative to quantitative procedures can be seen at the NIH best practices website (https://obssr.od.nih.gov/training/mixed-methods-research/).

Example of the exploratory sequential design. The exploratory design is a three-phase mixed methods project in which the researcher begins by collecting and analyzing qualitative data. From the initial exploratory results, the researcher builds to a second development phase in which the qualitative results are used to inform the development of a specific feature. In the third phase, the researcher collects and analyzes quantitative data to test or generalize the initial qualitative findings. Enosh, Tzafrir, and Stolovy's (2015) study (see Appendix C) is an example of applying the phases of the exploratory design to study a research problem.

Enosh and colleagues are researchers in the discipline of social work and human services. The topic of their 2015 study was social workers' exposure to different forms of violence perpetrated by clients. The authors stated that client violence is important to study because it can lead to numerous negative effects on social workers and noted the inadequacy of current instruments to study this issue. Therefore, the overall purpose of their study was to explore social workers' experiences with client violence, develop an

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instrument for measuring client violence, and obtain generalized information about client violence for social workers across different contexts.

Regarding study design, Enosh et al. (2015) reported that their exploratory sequential mixed methods study unfolded in "distinct stages of research" (p. 283). They began their study with a qualitative exploration of social workers' experiences with client violence. During this phase, they conducted one-on-one, semi-structured interviews with 38 participants who had experienced client violence on the job in the past year. The researchers transcribed the interviews and used thematic analytic procedures to identify and describe four distinct experiences of violence from the qualitative data set.

In the second stage of the study, the researchers developed the Client Violence Questionnaire (CVQ). They developed a set of 32 items that represented the four thematically defined dimensions, based directly on the content of the interview data. Using an expert review process, they gathered information on the fit and relevance of the items from social workers and used the expert feedback to reduce the number of items to the 14 most relevant.

Once the instrument was developed, Enosh and colleagues initiated the final quantitative phase of the exploratory design. They implemented two different survey procedures to apply and test the developed instrument. The first survey was aimed at ensuring the validity of the instrument. They administered the CVQ along with additional measures hypothesized as being related to exposure to client violence (e.g., Brief Symptoms Inventory). This survey was administered to 189 social workers across diverse settings. The questionnaire responses were analyzed in two different ways: analyzing scale internal reliability and testing of convergent validity by correlating items with measures of psychological distress. The authors administered a second survey to 645 participants across 34 agencies in order to further test the quality of the scale. Using this quantitative data set, they examined the factor structure of the instrument using confirmatory factor analysis and tested divergent validity by relating the instrument scores to other measures of general aggression.

The authors explained no instrument existed that provided a measure of exposure to client violence that could be applied across different types of social workers' settings. They needed to first explore this phenomenon with qualitative data before they could measure it quantitatively to validate the findings with a larger sample. Therefore, they needed both types of data to create and subsequently test an instrument. The researchers conducted the study in three sequential phases: first to explore a phenomenon, second to develop an instrument for the phenomenon, and third to measure the phenomenon. The development and quantitative phases were dependent on the results of the initial qualitative phase. A point of interface occurred when the authors connected their initial qualitative phase to the quantitative phase by developing an instrument to measure client violence. Building from their qualitative findings, the authors developed 14 survey items

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to represent the four dimensions of client violence. This instrument was then implemented in the final phase. In the article, the authors noted that their use of this design made it possible for them to achieve both depth of understanding about social workers' experiences and breadth of understanding in generalized, quantitative outcomes. Because of the authors' emphasis on developing and validating a quantitative instrument, this study emphasized the quantitative aspects, thus demonstrating the overall priority of the quantitative data in this study.

The notation for this study can be written as qual → development → QUAN = validate exploratory dimensions by developing and testing an instrument. The authors used three connected phases to implement this study's methods in an exploratory mixed methods design. As depicted in Figure 3.9, the design began with qualitative data collection and analysis to explore a phenomenon (the first two boxes of the diagram). From this initial phase, an instrument was developed at a point of interface (note the "develop an instrument" oval in Figure 3.9). The researchers used this instrument to collect quantitative data in a third phase (the next two boxes in the diagram) and concluded by interpreting what was learned across the phases.

ADDITIONAL CONSIDERATIONS IN CHOOSING A CORE DESIGN

How does a person decide which one of the three core designs to use? As we have already discussed, the most important consideration in choosing a mixed methods design is the *intent* for mixing, which differs among the three designs. However, there are additional considerations for choosing a design that reflect the contexts of the study (Plano Clark & Ivankova, 2016). One such consideration is the researcher's familiarity with the designs used in his or her field of study. A related concept would be the expertise possessed by the individual researchers or the teams in conducting a mixed methods study. Another important consideration is the amount of time available for accessing participants as the core designs vary in the time required to conduct the research. Finally, we will consider the complexity of the designs because they vary in terms of the number of phases and the number of procedures used to conduct them.

Intent of the Design

In discussing intent it is important to establish the difference between the intent to use mixed methods research and the intent of choosing one of the three basic designs. In this passage we will discuss the intent for choosing a design and reserve for Chapter 5 the discussion about justifying the uses of mixed methods.

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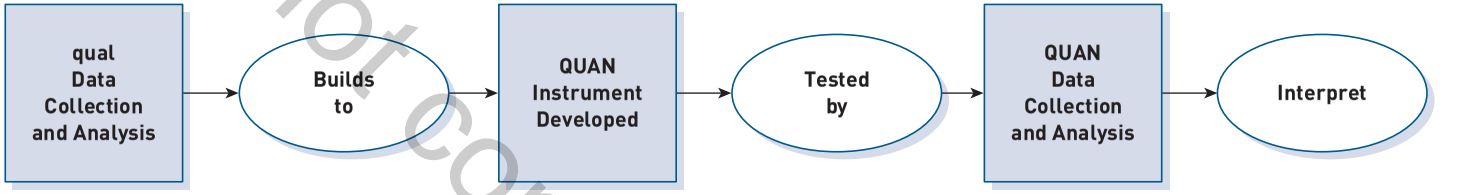
FIGURE 3.9 ■ Diagram for a Study That Used the Exploratory Sequential Design



Procedures:
- Purposive sampling ($N = 38$)
- One-on-one semi-structured interviews
- Coding and thematic analysis

Products:
- Transcripts
- Four themes

Procedures:
- Use qualitative findings to inform the development of the quantitative instrument

Procedures:
- Consider 4 themes as content areas
- Write 32 items that represent the areas
- Expert review and pretest of items

Products:
- 14 items across 4 areas (CVQ instrument)

Procedures:
- Plan quantitative tests of the CVQ's reliability and validity

Procedures:
- 189 social workers
- Scale reliability
- Convergent validity
- 645 social service employees
- Intercorrelations
- Factor structure
- Divergent validity

Products:
- Correlations
- Measures of fit
- Refined instrument

Procedures:
- Discuss extent to which the qualitative phase enhanced the validity of the instrument and the extent to which the qualitatively informed instrument is an effective and efficient measure

Products:
- Validated instrument to measure social workers' exposure to client violence

Source: Diagram based on Enosh, Tzafrir, and Stolovy (2015).

Note: CVQ indicates Client Violence Questionnaire.

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We have already pointed out the different intents for using the convergent, explanatory sequential, and exploratory sequential designs. The reason for using each of these designs differs and becomes the overarching decision factor in the choice of a core design. Clearly the intent to compare or validate quantitative and qualitative responses pushes a researcher in the direction of a convergent design. When explanation of specific quantitative results becomes necessary, an explanatory sequential design will work well because the researcher can follow up with individuals (through the qualitative phase) to explore further important or surprising results. When the intent is to explore an issue with some participants (e.g., through qualitative interviews) before engaging a larger number of participants in a quantitative phase, such as having those participants take part in an experiment, complete a survey, or use a digital tool, an exploratory sequential design makes sense. This design is ideal because it allows for the in-depth probing of participant perspectives, a necessary antecedent to conducting the follow-up quantitative phase.

Familiarity of the Designs Used Within the Field

As interest in mixed methods has grown, numerous fields have adopted mixed methods practices that can be seen in books and articles and even in federal policy statements. This means mixed methods has developed in different ways across subdisciplines in the social, behavioral, and health sciences. The choice of a core design may be influenced by which ones are used frequently in the discipline literature and which ones are embraced by authors of major mixed methods studies in the field. For example, in global health, the exploratory sequential design is popular because of the need to explore an issue first so the researcher can develop an understanding of the culture of the study participants. This will allow the researcher to choose an instrument available in the literature that is suitable for a specific population. As another example, in the field of trauma research, the emphasis has been on explanatory sequential designs (Creswell & Zhang, 2009). In family medicine many designs are used, but in researching change in primary care practices, the design of choice is often a convergent design within a comparative case study (Crabtree et al., 2011; Shaw et al., 2013).

Expertise of the Researcher

Another consideration is the skills possessed by the researcher. Even if they meet the basic requirements of having both quantitative skills and qualitative skills, researchers vary in their levels of expertise when it comes to different mixed methods designs. The explanatory sequential design, for example, starts with a strong quantitative phase, which suggests giving primacy to quantitative research and its skill set. The exploratory sequential design begins with a qualitative exploratory phase, which calls for individuals with strong qualitative skills. One solution to a lack of skills in either quantitative or qualitative

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research would be to join a mixed methods team in conducting the project; a substantial literature has emerged in the mixed methods field about the optimal composition of such a team, how projects might be organized, and the leadership required for effective team organization (e.g., Curry et al., 2012; Johnson, Onwuegbuzie, Tucker, & Icenogle, 2014).

Amount of Time to Conduct the Study

The core designs also vary in the length of time needed to conduct their procedures. The sequential designs—explanatory and exploratory—take more time because multiple phases are involved. The explanatory design generally uses the same participants in both phases, which means that the researcher needs to be able to access those participants over an extended time period. The exploratory design requires the most time because of its three phases and the necessary interim phase of developing or designing a quantitative feature, such as a website, a set of intervention activities, or new measures or variables. Some researchers (e.g., busy health providers or students wanting to graduate by a certain date) simply do not have adequate time to gather and analyze both quantitative and qualitative data over phases, and it is more convenient for them to gather all of the necessary data in one field outing. These individuals often use a convergent design.

Complexity of the Design

Finally, due to the varied phases of the three core designs, some are more complex to conduct than others. Graduate students often lean toward the explanatory sequential design because it evolves in two distinct phases with clear-cut data collection in each phase, usually involving the same individuals, which is manageable for single researchers. On the other hand, because of the skills required and the multiple phases, the exploratory sequential design is one of the more complex designs. Although it is a single-phase approach, the convergent design can be complex because of the number of data collection and analysis activities occurring concurrently and because it may require follow-up procedures to understand divergence in results when they occur. Added complexity is also introduced when these core designs are applied within frameworks (e.g., an experiment or a participatory approach); these complexities will be addressed in Chapter 4.

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

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the design when writing about a study in a proposal or research report. This overview paragraph generally is placed at the beginning of the methods discussion and should address several topics. The paragraph should identify the type of mixed methods design and provide its definition and variant, the design's intent, the reason for choosing that particular design, and how the design relates to theory or conceptual framework. The paragraph should also note the basic procedures in conducting the study, including where integration occurs, and the challenges in using the chosen design. An example of such a paragraph for an explanatory sequential design is available in Figure 3.10. Note that this overview paragraph includes many of these components: it names the design, identifies the phases, discusses the integration, provides a reason for using the design, and cites methodological references.

FIGURE 3.10 ■ A Sample Paragraph for Writing a Mixed Methods Design Into a Report

Explanatory Sequential Mixed Methods

Design Passage

The mixed methods sequential explanatory design consists of two distinct phases:	Names the design
quantitative followed by qualitative (Creswell, Plano Clark, et al., 2003). In this design, a researcher first collects and analyzes the quantitative (numeric) data. The qualitative (text) data are collected and analyzed second in the sequence and help explain, or elaborate on, the	Discusses the phases
quantitative results obtained in the first phase. The second, qualitative, phase builds on the first, quantitative, phase, and the two phases are connected in the intermediate stage in the study.	Discusses integration
The rationale for this approach is that the quantitative data and their subsequent analysis provide a general understanding of the research problem. The qualitative data and their analysis refine and explain those statistical results by exploring participants' views in more depth	Discusses reason for using the design
(Rossman & Wilson, 1985; Tashakkori & Teddlie, 1998; Creswell, 2003).	Cites methodological references

Source: Ivankova, Creswell, and Stick (2006, p. 5).

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SUMMARY

Research designs represent an organizing logic for collecting, analyzing, interpreting, and reporting data in mixed methods projects. Like quantitative and qualitative research approaches, mixed methods research encompasses several different designs. Mixed methods designs can be fixed from the start and/or emerge as the study is underway. The researcher's approach to designs can be methods focused—based on types (or a typology) of designs—or it can be research-process focused where the methods become part of an interactive process of goals, conceptual framework, research questions, validity considerations, and larger contextual factors. The approach taken in this book is the typology approach because we find that researchers new to mixing methods benefit from having a range of basic methods options from which to plan their studies. The typology that we advance here is a set of three core designs that represent the state-of-the-art considerations for mixing methods followed by more complex uses of the core designs within a series of approaches and frameworks (as discussed in Chapter 4).

Researchers can choose among three core mixed methods designs: convergent, explanatory sequential, and exploratory sequential. The convergent design is a mixed methods design in which the researcher collects and analyzes two separate databases—quantitative and qualitative—and then merges the two databases for the purpose of comparing the results or adding transformed qualitative data as numeric variables into the quantitative database. The explanatory sequential 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, qualitative phase to help explain the initial quantitative results. The exploratory sequential design is a three-phase design in which the researcher starts by qualitatively exploring a topic. The design then builds to a second, quantitative development phase, and the final phase involves testing the quantitatively the feature designed in the second phase. These three core designs can be differentiated in terms of intent of the design, reasons for choosing the design, philosophical assumptions and theory use, procedures, points of integration in the procedures, strengths and challenges, and the variants of each type of design.

The choice of one of the three core designs is based on the intent of the study but also on factors related to the popularity of a specific design within a field or discipline, the research skills of the investigator, the time allocated for the mixed methods project, and the investigator's understanding of the complexity of the design. Regardless of the design chosen, it needs to be described in some detail in the written mixed methods project. This requires naming the design, identifying the phases in the design, noting the integration of the data, and describing the reasons for choosing the design.

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Activities

1. Reflect on whether your mixed methods project is fixed or emergent. Also consider whether your approach is based more on types of designs or on the process of research. 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 three core designs discussed in this chapter.
3. Which of the core design types will you use in your study? Write a one-paragraph overview that names this design, defines the design, indicates how the data will be integrated, and specifies why this design was chosen for your particular project.
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, CA: Jossey-Bass.
- Maxwell, J. A., Chmiel, M., & Rogers, S. E. (2015). Designing integration in multimethod and mixed methods research. In S. N. Hesse-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research inquiry* (pp. 223–229). Oxford, UK: Oxford University Press.
- Morgan, D. L. (2014). *Integrating qualitative & quantitative methods: A pragmatic approach*. Thousand Oaks, CA: Sage.
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