



Mixed Methods Procedures

How would you write a mixed methods procedure section for your proposal? Up until this point, we have considered collected quantitative data and qualitative data. We have not discussed “mixing” or combining the two forms of data in a study. We can start with the assumption that both forms of data provide different types of information (open-ended data in the case of qualitative and closed-ended data in the case of quantitative). If we further assume that each type of data collection has both limitations and strengths, we can consider how the strengths can be combined to develop a stronger understanding of the research problem or questions (and, as well, overcome the limitations of each). This “mixing” or blending of data, it can be argued, provides a stronger understanding of the problem or question than either by itself. This idea is at the core of a reasonably new method called “mixed methods research.”

Conveying the nature of mixed methods research and what it is begins a good mixed methods procedure. Begin with the assumption that mixed methods is a new methodology in research and that the readers need to be educated as to the basic intent and definition of the design, the reasons for choosing the procedure, and the value it will lend to a study. Then, decide on a mixed methods design to use. There are many from which to choose and consider the different possibilities and decide which one is best for the proposed study. With this choice in hand, discuss the data collection, the data analysis, and the data interpretation and validation procedures within the context of the design. Finally, end with a discussion of potential ethical issues that need to be anticipated in the study, and suggest an outline for writing the final study. These are all standard methods procedures, but they are framed in this chapter as they apply to mixed methods research. Table 10.1 shows a checklist of the mixed methods procedures addressed in this chapter.

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

_____	Is a basic definition of mixed methods research provided?
_____	Are the reasons given for using both quantitative and qualitative data?
_____	Does the reader have a sense for the potential use of mixed methods research?
_____	Are the criteria identified for choosing a mixed methods design?
_____	Is the mixed methods design identified?
_____	Is a visual model presented that illustrates the research strategy?
_____	Is the proper notation used in presenting the visual model?
_____	Are procedures of data collection and analysis mentioned as they relate to the chosen design?
_____	Are the sampling strategies for both quantitative and qualitative data collection mentioned for the design?
_____	Are specific data analysis procedures indicated for the design?
_____	Are the procedures for validation mentioned for the design and for the quantitative and qualitative research?
_____	Is the narrative structure of the final dissertation or thesis mentioned, and does it relate to the type of mixed methods design being used?

COMPONENTS OF MIXED METHODS PROCEDURES

Mixed methods research has evolved into a set of procedures that proposal developers can use in planning a mixed methods study. In 2003, the *Handbook of Mixed Methods in the Social and Behavior Sciences* (Tashakkori & Teddlie, 2003) was published (and later added to in a second edition, see Tashakkori & Teddlie, 2010), providing a comprehensive overview of this approach. Now several journals emphasize mixed methods research, such as the *Journal of Mixed Methods Research*, *Quality and Quantity*, *Field Methods*, and the *International Journal of Multiple Research Approaches* while numerous others actively encourage this form of inquiry (e.g., *International Journal of Social Research Methodology*, *Qualitative Health Research*, *Annals of Family Medicine*). Numerous published research studies have incorporated mixed methods research in the social and human sciences in diverse fields such as occupational therapy (Lysack & Krefting, 1994), interpersonal communication (Boneva, Kraut, & Frohlich, 2001), AIDS prevention (Janz et al., 1996), dementia caregiving (Weitzman & Levkoff, 2000), occupational health (Ames, Duke, Moore, & Cunradi, 2009), mental health (Rogers, Day,

Randall, & Bentall, 2000 books arrive each year 2006; Creswell & Plan 2009; Plano Clark & Teddlie & Tashakkori, 2

Describe Mixed I

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Randall, & Bentall, 2003), and in middle school science (Houtz, 1995). New books arrive each year solely devoted to mixed methods research (Bryman, 2006; Creswell & Plano Clark, 2011; Greene, 2007; Morse & Niehaus, 2009; Plano Clark & Creswell, 2008; Tashakkori & Teddlie, 1998, 2010; Teddlie & Tashakkori, 2009).

Describe Mixed Methods Research

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

- Begin by defining mixed methods. Recall the definition provided in Chapter 1. Elements in this definition can now be enumerated so that a reader has a complete set of core characteristics that describe mixed methods (see a more expanded view of defining mixed methods research in Johnson, Onwuegbuzie, & Turner, 2007):
 - It involves the collection of both qualitative (open-ended) and quantitative (closed-ended) data in response to research questions or hypotheses.
 - It includes the analysis of both forms of data.
 - The procedures for both qualitative and quantitative data collection and analysis need to be conducted rigorously (e.g., adequate sampling, sources of information, data analysis steps).
 - The two forms of data are integrated in the design analysis through merging the data, connecting the data, or embedding the data.
 - These procedures are incorporated into a distinct mixed methods design that also includes the timing of the data collection (concurrent or sequential) as well as the emphasis (equal or unequal) for each database.
 - These procedures can also be informed by a philosophical worldview or a theory (see Chapter 3).
- Discuss that many different terms are used for this approach, such as *integrating*, *synthesis*, *quantitative and qualitative methods*, *multimethod*, and *mixed methodology* but that recent writings tend to use the term *mixed methods* (Bryman, 2006; Tashakkori & Teddlie, 2010).
- Educate the reader about the background of mixed methods by reviewing briefly this history of this approach to research. It can be seen as a new methodology originating around the late 1980s and early 1990s based on work from individuals in diverse fields such as evaluation, education, management, sociology, and health sciences. It has gone through several periods of development including the formative stage,

the philosophical debates, the procedural developments, and more recently reflective positions (noting controversies and debates) and expansion into different disciplines and into many countries throughout the world. Several texts outline these developmental phases (e.g., Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009). This section could also include a brief discussion about the importance or rise of mixed methods today through such indicators of federal funding initiatives, through dissertations, and through the discipline-specific discussions about mixed methods found in journals across the social and health sciences (see Creswell, 2010, 2011).

- Follow this section with statements about the value and rationale for the choice of mixed methods as an approach for the dissertation or thesis project. At a *general level*, mixed methods is chosen because of its strength of drawing on both qualitative and quantitative research and minimizing the limitations of both approaches. At a *practical level*, mixed methods provides a sophisticated, complex approach to research that appeals to those on the forefront of new research procedures. It also can be an ideal approach if the researcher has access to both quantitative and qualitative data. At a *procedural level*, it is a useful strategy to have a more complete understanding of research problems/questions, such as the following:

- Comparing different perspectives drawn from quantitative and qualitative data
- Explaining quantitative results with a qualitative follow-up data collection and analysis
- Developing better measurement instruments by first collecting and analyzing qualitative data and then administering the instruments to a sample
- Understanding experimental results by incorporating the perspectives of individuals
- Developing a more complete understanding of changes needed for a marginalized group through the combination of qualitative and quantitative data
- Having a better understanding the need for and impact of an intervention program through collecting both quantitative and qualitative data over time

- Indicate the type of mixed methods design that will be used in the study and the rationale for choosing it. A detailed discussion of the primary strategies available will be discussed shortly. Include a figure or diagram of these procedures.

- Note the challenges this form of research poses for the inquirer. These include the need for extensive data collection, the time-intensive nature of analyzing both qualitative and quantitative data, and the

requirement for the res qualitative forms of res clear, visual models to activities in this design.

There have been several mixed methods strategic posed mixed methods s several classification sys public health, education research. In these classific of designs, and a subst typologies. For purposes *three basic mixed methods* then briefly mention mo basic forms. Each appro the design, the forms of and validity challenges.

Convergent Parallel

Description of the de probably the most famili egies. Researchers new approach because they fe the quantitative and qua lects both quantitative ar then compares the result other (see Figure 10.1). qualitative and quantitat often detailed views of pa quantitatively—and toge builds off the historic co Campbell and Fiske (195 understood by gathering and Fiske conceptualizat methods researchers ext quantitative and qualitat

Data collection. The qu cussed in Chapter 8, suc

requirement for the researcher to be familiar with both quantitative and qualitative forms of research. The complexity of the design also calls for clear, visual models to understand the details and the flow of research activities in this design.

TYPES OF MIXED METHODS DESIGNS

There have been several typologies for classifying and identifying types of mixed methods strategies that proposal developers might use in their proposed mixed methods study. Creswell and Plano Clark (2011) identified several classification systems drawn from the fields of evaluation, nursing, public health, education policy and research, and social and behavioral research. In these classifications, authors used diverse terms for their types of designs, and a substantial amount of overlap of types existed in the typologies. For purposes of this discussion, I will identify and discuss the *three basic mixed methods designs* (as shown in Figures 10.1 and 10.2) and then briefly mention more advanced strategies that incorporate these three basic forms. Each approach will be discussed in terms of a description of the design, the forms of data collection and data analysis, interpretation, and validity challenges.

Convergent Parallel Mixed Methods Design

Description of the design. The convergent mixed methods approach is probably the most familiar of the basic and advanced mixed methods strategies. Researchers new to mixed methods typically first think of this approach because they feel that mixed methods only consists of combining the quantitative and qualitative data. In this approach, a researcher collects both quantitative and qualitative data, analyzes them separately, and then compares the results to see if the findings confirm or disconfirm each other (see Figure 10.1). The key assumption of this approach is that both qualitative and quantitative data provide different types of information—often detailed views of participants qualitatively and scores on instruments quantitatively—and together they yield results that should be the same. It builds off the historic concept of the multimethod, multitrait idea from Campbell and Fiske (1959), who felt that a psychological trait could best be understood by gathering different forms of data. Although the Campbell and Fiske conceptualization included only quantitative data, the mixed methods researchers extended the idea to include the collection of both quantitative and qualitative data.

Data collection. The qualitative data can assume any of the forms discussed in Chapter 8, such as interviews, observations, documents, and

Figure 10.1 Three Basic Mixed Methods Designs

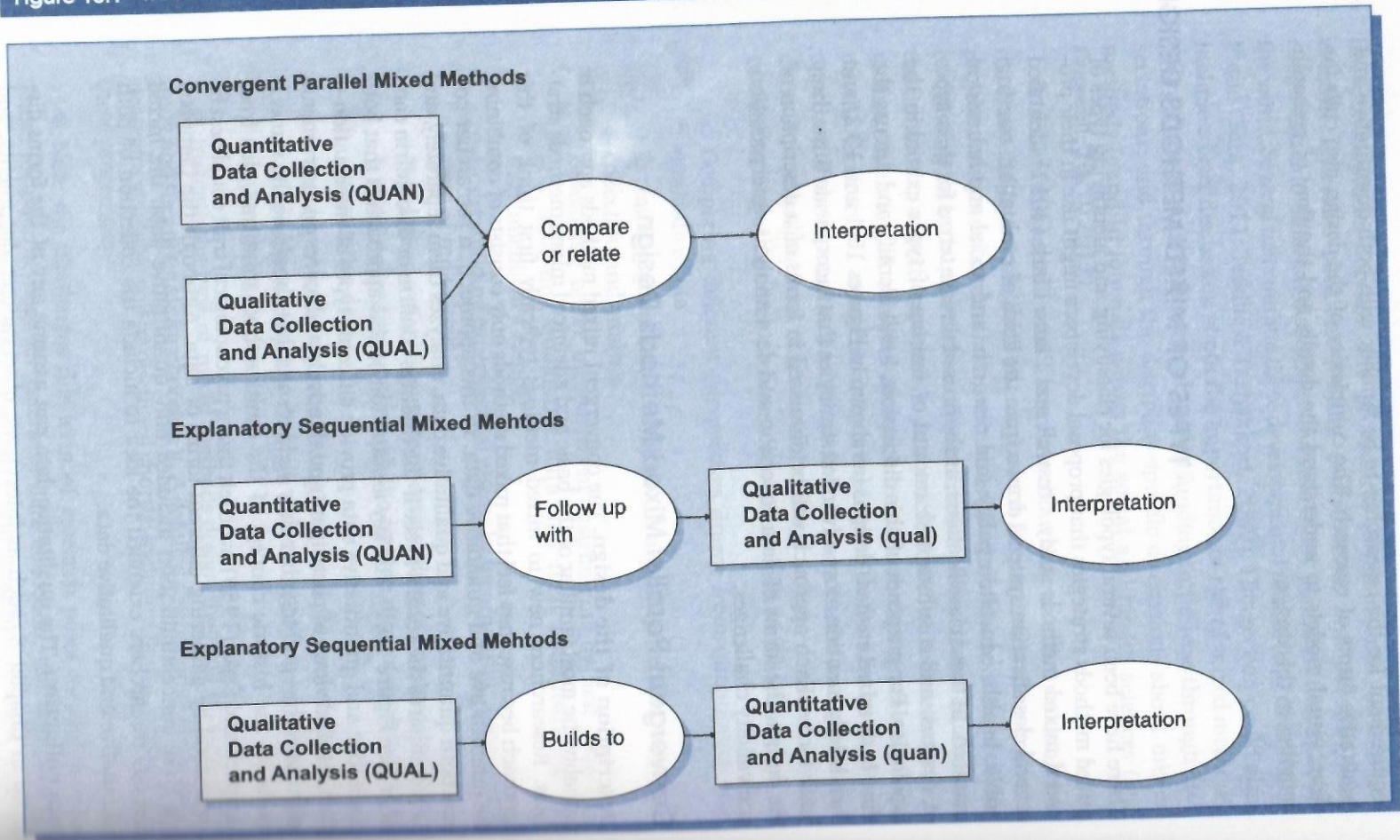
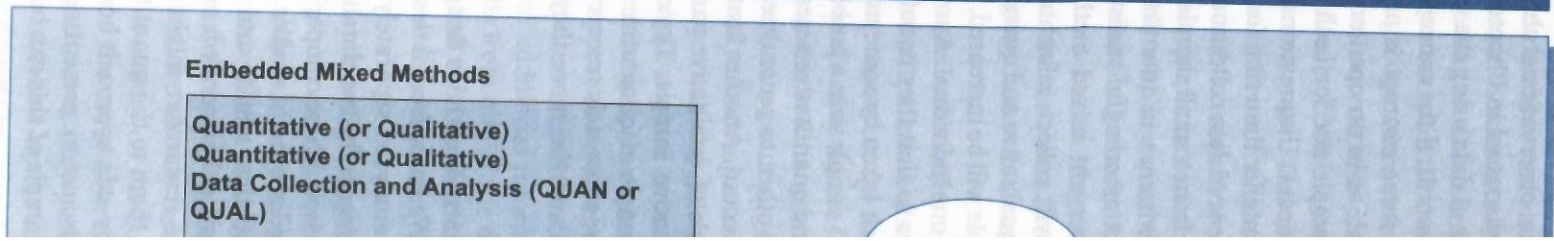


Figure 10.2 Advanced Mixed Methods Designs



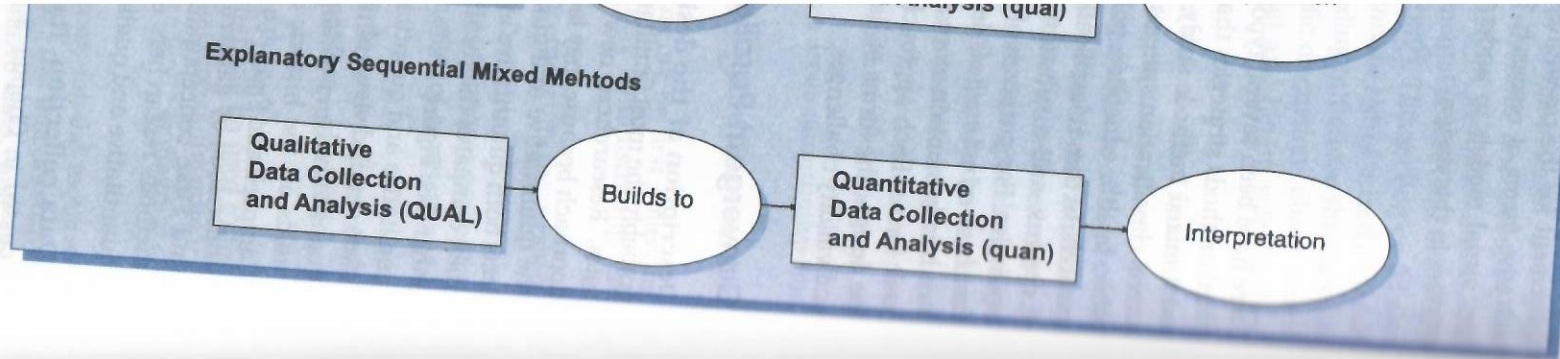
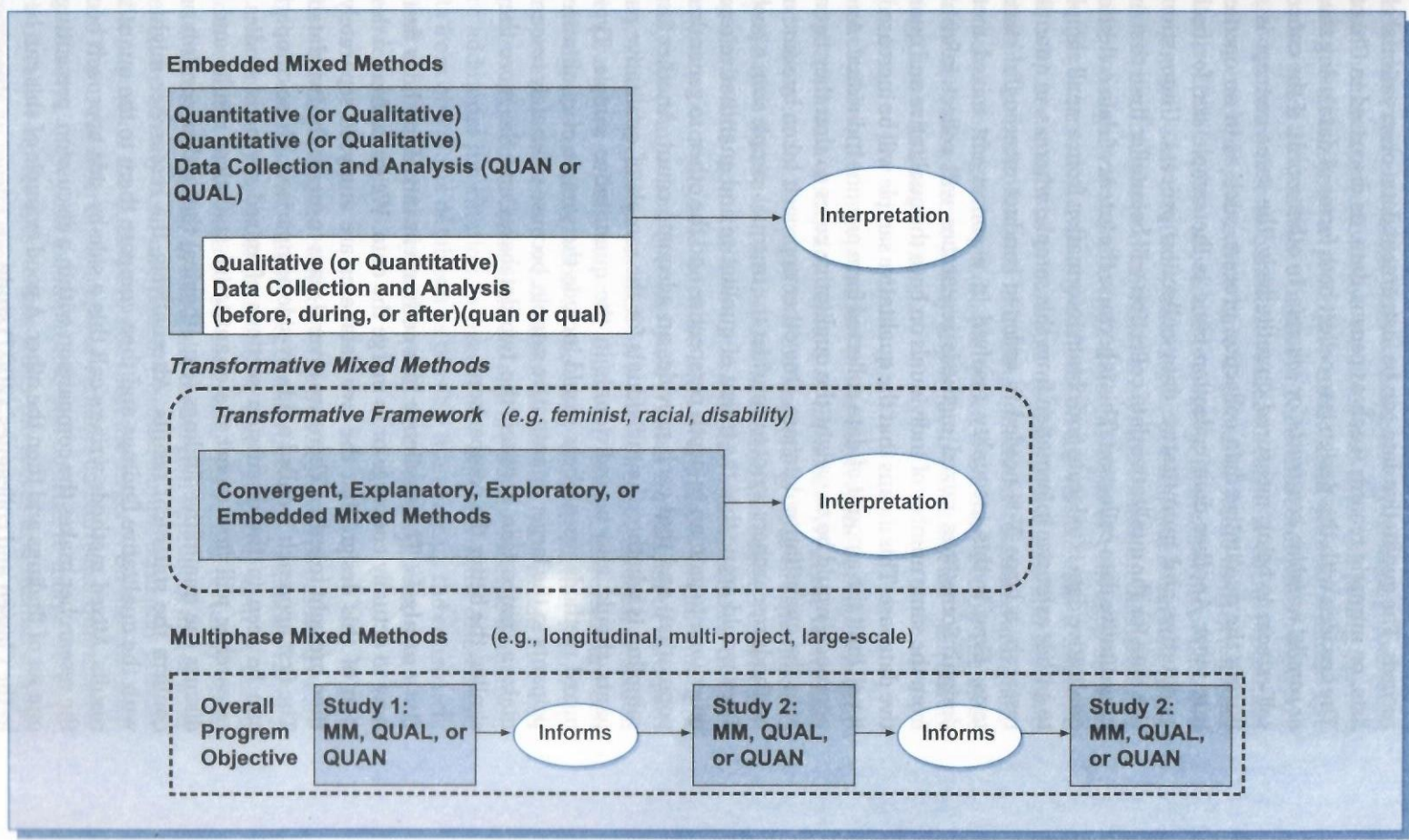


Figure 10.2 Advanced Mixed Methods Designs



records. The qualitative data can be instrument data, observational checklists, or numeric records, such as census data, as discussed in Chapter 7. The key idea with this design is to collect both forms of data using the *same or parallel variables, constructs, or concepts*. In other words, if the concept of self-esteem is being measured quantitatively, the same concept is asked during the qualitative data collection process, such as in an open-ended interview. Another data collection issue is the sample size for both the qualitative and quantitative data collection process. Unquestionably, the data for the qualitative data collection will be smaller than that for the quantitative data collection. This is because the intent of data collection for qualitative data is to locate and obtain information from a small sample but to gather extensive information from this sample; whereas, in quantitative research, a large N is needed in order to conduct meaningful statistical tests. How is this inequality resolved in a convergent mixed methods design? Sometimes mixed methods researchers will collect information from the same number of individuals on both the qualitative and quantitative database. This means that the qualitative sample will be increased, and it will limit the amount of data collected from any one individual. Another approach would be to weight the qualitative cases so that they equal the N in the quantitative database. One other approach taken by some mixed methods researchers is not to consider the unequal sample sizes a problem. They would argue that the intent of qualitative and quantitative research differ (one to gain an in-depth perspective and the other, to generalize to a population) and that each provides an adequate count. Another issue in sampling is whether the individuals for the sample of qualitative participants should also be individuals in the quantitative sample. Typically, mixed methods researchers would include the sample of qualitative participants in the larger quantitative sample, because ultimately researchers make a comparison between the two databases and the more they are similar, the better the comparison.

Data analysis. The challenge in a convergent mixed methods design is how to actually converge or to merge the data. We know from a description of this design that the two databases are analyzed separately and then brought together. There are several ways to merge the two databases. The first approach is called a side-by-side comparison. These comparisons can be seen in the discussion sections of mixed methods studies. The researcher will first report the quantitative statistical results and then discuss the qualitative findings (e.g., themes) that either confirm or disconfirm the statistical results. Alternatively, the researcher might start with the qualitative findings and then compare them to the quantitative results. Mixed methods writers call this a side-by-side approach because the researcher makes the comparison within a discussion, presenting first one set of findings and then the other. A good example of this can be seen in the Classen and colleagues' (2007) study.

Researchers can also codes or themes into quantitative databases—researcher takes the qualitatively groups them) to form that mixed methods research and Leech (2006). A final table or a graph. This is different forms. It might be axis and a categorical variable nurses, physician assistants a table with key questions columns on the horizontal quantitative results to the conclusion idea is for the researcher merging them—in a single

Interpretation. The informationally written into a discussion section report on the findings and qualitative databases comparing the results from convergence or divergence. Typically the comparison situation, and the differences. When divergence occurs state divergence as a limitation. This approach represents researchers can return to collect additional information results from one of the databases were not valid quantitative open-ended questions).

Validity. Validity using triangulating both quantitative (e.g., triangulation) for methods validity that potential threats to validity of these have already been less of a picture on the qualitative side. The use of different and qualitative, may yield. A lack of follow-up on conclusions also represents an invalid

Researchers can also merge the two databases by changing qualitative codes or themes into quantitative variables and then combining the two quantitative databases—a procedure called data transformation. The researcher takes the qualitative themes or codes and counts them (and possibly groups them) to form quantitative measures. Some useful procedures that mixed methods researchers have used can be found in Onwuegbuzie and Leech (2006). A final procedure is to merge the two forms of data in a table or a graph. This is called a joint display of data, and it can take many different forms. It might be a table that arrays the themes on the horizontal axis and a categorical variable (e.g., different types of providers such as nurses, physician assistants, and doctors) on the vertical axis. It might be a table with key questions or concepts on the vertical axis and then two columns on the horizontal axis indicating qualitative responses and quantitative results to the concepts (Li, Marquart, & Zercher, 2000). The basic idea is for the researcher to jointly display both forms of data—effectively merging them—in a single visual.

Interpretation. The interpretation in the convergent approach is typically written into a discussion section of the study. Whereas the results section report on the findings from the analysis of both the quantitative and qualitative databases, the discussion section includes a report comparing the results from the two databases and notes whether there is convergence or divergence between the two sources of information. Typically the comparison does not yield a clean convergent or divergent situation, and the differences exist on a few concepts, themes, or scales. When divergence occurs, steps for follow-up exist. The researcher can state divergence as a limitation in the study without further follow-up. This approach represents a weak solution. Alternatively, mixed methods researchers can return to the analyses and further explore the databases, collect additional information to resolve the differences, or discuss the results from one of the databases as possibly limited (e.g., the constructs were not valid quantitatively or the qualitative themes did not match the open-ended questions).

Validity. Validity using the convergent approach should be based on establishing both quantitative validity (e.g., construct) and qualitative validity (e.g., triangulation) for each database. Is there a special form of mixed methods validity that needs to be addressed? There are certainly some potential threats to validity in using the convergent approach, and several of these have already been mentioned. Unequal sample sizes may provide less of a picture on the qualitative side than the larger *N* on the quantitative side. The use of different concepts or variables on both sides, quantitative and qualitative, may yield incomparable and difficult to merge findings. A lack of follow-up on conclusions when the scores and themes diverge also represents an invalid strategy of inquiry.

Explanatory Sequential Mixed Methods Design

Description of the design. The explanatory sequential mixed methods approach is a design in mixed methods that appeals to individuals with a strong quantitative background or from fields relatively new to qualitative approaches. It involves a two-phase project in which the researcher collects quantitative data in the first phase, analyzes the results, and then uses the results to plan (or build on to) the second, qualitative phase. The quantitative results typically inform the types of participants to be purposefully selected for the qualitative phase and the types of questions that will be asked of the participants. The overall intent of this design is to have the qualitative data help explain in more detail the initial quantitative results. A typical procedure might involve collecting survey data in the first phase, analyzing the data, and then following up with qualitative interviews to help explain the survey responses.

Data collection. The data collection proceeds in two distinct phases with rigorous quantitative sampling in the first phase and with purposeful sampling in the second, qualitative phase. One challenge in this strategy is to plan adequately what quantitative results to follow up on and what participants to gather qualitative data from in the second phase. The key idea is that the qualitative data collection builds directly on the quantitative results. The quantitative results that then are built on may be extreme or outlier cases, significant predictors, significant results relating variables, insignificant results, or even demographics. For example, when using demographics, the researcher could find in the initial quantitative phase that individuals in different socioeconomic levels respond differently to the dependent variables. Thus, the follow-up qualitatively may group respondents to the quantitative phase into different categories and conduct qualitative data collection with individuals representing each of the categories. Another challenge is whether the qualitative sample should be individuals that are in the initial quantitative sample. The answer to this question should be that they are the same individuals, because the intent of the design is to follow up the quantitative results and explore the results in more depth. The idea of explaining the mechanism—how the variables interact—in more depth through the qualitative follow-up is a key strength of this design.

Data analysis. The quantitative and the qualitative databases are analyzed separately in this approach. The quantitative results are then used to plan the qualitative follow-up. One important area is that the quantitative results cannot only inform the sampling procedure but it can also point toward the types of qualitative questions to ask participants in

the second phase. The questions, are general, independently for each phase perhaps easier to access database builds on the over time.

Interpretation. The results in a discussion form of first reporting qualitative, second phase third form of interpretation the quantitative results researchers is to merge helpful, the intent of provide more depth, in the interpretation general quantitative and that specifies how the quantitative results. Beyond the scope of the quantitative databases (as in the collection of variables or concepts

Validity. As with all mixed methods, to establish the validity of the overall findings may be to consider and weigh all of the results. Attention may also contribute to for each phase of the building on the other. quantitative side of the challenges than need explanatory sequential

Exploratory Sequential Mixed Methods Design

Description of the design. The exploratory sequential mixed methods approach and start with the qualitative phase, we have an ex

Methods Design

sequential mixed methods design appeals to individuals in fields relatively new to research in a project in which the first phase, analyzes the data, build on to) the second phase, typically inform the types of questions the qualitative phase and the needs of participants. The overall design helps explain in a typical procedure might be to use, analyzing the data, to help explain the

in two distinct phases: the first phase and with purpose. One challenge in using qualitative results to follow up on quantitative data from in the first phase is that the data collection builds on the quantitative results that then identify significant predictors, significant results, or even demographics, the researcher asks individuals in different categories of dependent variables. Respondents to the quantitative data conduct qualitative data to explore the categories. The sample should be individual. The answer to this question is individuals, because the goal is to explore the results and explore the mechanism—through the qualitative

two databases are analyzed. The results are then used to explore the area is that the quantitative procedure but it can also be to ask participants in

the second phase. These questions, like all good qualitative research questions, are general and open-ended. Because analysis proceeds independently for each phase, this design is useful for student research and perhaps easier to accomplish (than the convergent design) because one database builds on the other and the data collection can be spaced out over time.

Interpretation. The mixed methods researcher interprets the follow up results in a discussion section of the study. This interpretation follows the form of first reporting the quantitative, first-phase results and then the qualitative, second phase results. However, this design then employs a third form of interpretation: how the qualitative findings help to explain the quantitative results. A common misstep at this point by beginning researchers is to merge the two databases. While this approach may be helpful, the intent of the design is to have the qualitative data help to provide more depth, more insight into the quantitative results. Accordingly, in the interpretation section, after the researcher presents the general quantitative and then qualitative results, a discussion should follow that specifies how the qualitative results help to expand or explain the quantitative results. Because the qualitative database questions narrows the scope of the quantitative questions, a direct comparison of the two databases (as in the convergent design) means an inadequate comparison of variables or concepts.

Validity. As with all mixed methods studies, the researcher needs to establish the validity of the scores from the quantitative measures and to discuss the validity of the qualitative findings. In the explanatory sequential mixed methods approach, additional validity concerns arise. The accuracy of the overall findings may be compromised because the researcher does not consider and weigh all of the options for following up on the quantitative results. Attention may focus only on personal demographics and overlook important explanations that need further understanding. The researcher may also contribute to invalidate results by drawing on different samples for each phase of the study. This minimizes the importance of one phase building on the other. The sample size may also be inadequate on either the quantitative side of the study or the qualitative side. These are a few of the challenges that need to be built into the planning process for a good explanatory sequential mixed methods study.

Exploratory Sequential Mixed Methods Design

Description of the design. If we reverse the explanatory sequential approach and start with a qualitative phase first followed by a quantitative phase, we have an exploratory sequential approach. An exploratory

sequential mixed methods is a design in which the researcher first begins by exploring with qualitative data and analysis and then uses the findings in a second quantitative phase. Like the explanatory sequential approach, the second database builds on the results of the initial database. The intent of the strategy is to develop better measurements with specific samples of populations and to see if data from a few individuals (in qualitative phase) can be generalized to a large sample of a population (in quantitative phase). For example, the researcher would first collect focus group data, analyze the results, develop an instrument based on the results, and then administer it to a sample of a population. In this case, there may not be adequate instruments measuring the concepts with the sample that the investigator wishes to study. In effect, the researcher employs a three-phase procedure with the first phase as exploratory, the second as instrument development, and the third as administering the instrument to a sample of a population.

Data collection. In this strategy, the data collection would occur in two phases with the initial qualitative data collection followed by the second quantitative data collection. The challenge is how to use the information from the initial phase in the second phase. Several options exist. The qualitative data analysis can be used to develop an instrument with good psychometric properties (i.e., validity, reliability). The qualitative data analysis will yield quotes, codes, and themes (see Chapter 8). The development of an instrument can proceed by using the quotes to write items for an instrument, the codes to develop variables that group the items, and themes that group the codes into scales. This is a useful procedure for moving from the qualitative data analysis to scale development. Scale development also needs to follow good procedures for instrument design, and the steps for this including such ideas as item discrimination, construct validity, and reliability estimates (see DeVellis, 2012). Developing a good psychometric instrument that fits the sample and population under study is not the only use of this design. A researcher can analyze the qualitative data to develop new variables, to identify the types of scales that might exist in current instruments or to form categories of information that will be explored further in a quantitative phase. The question arises if the sample for the qualitative phase is the same for the quantitative phase. This cannot be, because the qualitative sample is typically much smaller than a quantitative sample needed to generalize from a sample to a population. Sometimes mixed methods researchers will use entirely different samples for the qualitative and quantitative components of the study (unlike the explanatory sequential design). However, a good procedure is to draw both samples from the same population but make sure that the individuals for both samples are not the same. To have individuals help develop an instrument and then to survey them in the quantitative phase would introduce confounding factors into the study.

Data analysis. In this strategy, the researcher would analyze the data separately and uses the findings from the qualitative phase to build into quantitative phase. The researcher should pay careful attention to the findings from the qualitative phase to *what findings to build into theory* (see Chapter 9), and then use the findings to build a model to be tested in the quantitative phase. The findings from the study can yield different variables in the second quantitative phase.

Interpretation. Researchers should discuss the findings in the discussion section of a study. The researcher should discuss the qualitative findings, the development of an instrument, and then the quantitative findings. The researcher should make sense to compare the findings from the qualitative phase (drawn from different samples) and the intent of the study. The findings can be generalized to a large population.

Validity. Researchers using mixed methods should use qualitative data as well as quantitative data. Validity concerns arise, however, when the researcher proposed development of an instrument. The researcher should use appropriate steps to develop a good instrument. Another concern is that the researcher should ensure that the instruments that do not take advantage of the qualitative data. This occurs when the researcher uses the qualitative data at the theme level without the findings from the qualitative design. For case study procedures, the findings from the qualitative phase should be used to introduce undue duplication. The researcher should ensure that participants provide information that is not to also be the individual findings from the qualitative phase.

Several Advanced

Three advanced mixed methods designs are the convergent, explanatory sequential, and embedded designs. Once one has chosen a design, they can be included in the overall design. The findings from the qualitative phase should be included in the overall design (Plano Clark, 2011). The

Data analysis. In this strategy the researcher analyzes the two databases separately and uses the findings from the initial exploratory database to build into quantitative measures. This means that the researcher needs to pay careful attention to the qualitative data analysis steps and determine what findings to build on. If, for example, the researcher uses grounded theory (see Chapter 9), the theoretical model generated may provide a model to be tested in the second, quantitative phase. A qualitative case study can yield different cases that become the focus on important variables in the second quantitative phase.

Interpretation. Researchers interpret the mixed methods results in a discussion section of a study. The order of interpretation is to first report the qualitative findings, the use of the qualitative results (e.g., the development of an instrument, the development of new quantitative measures), and then the quantitative results of the final phase of the study. It does not make sense to compare the two databases, because they are typically drawn from different samples (as noted above in the data collection discussion) and the intent of the strategy is to determine if the qualitative themes can be generalized to a larger sample.

Validity. Researchers using this strategy need to check for the validity of the qualitative data as well as the validity of the quantitative scores. Special validity concerns arise, however, in using this design that need to be anticipated by the proposal developer. One concern is that the researcher may not use appropriate steps to develop a good psychometric instrument. Developing a good instrument is not easy, and adequate steps need to be put in place. Another concern is that a researcher may develop an instrument or measures that do not take advantage of the richness of the qualitative findings. This occurs when the qualitative data lacks rigor or occurs simply at the theme level without the further data analysis steps associated with using one of the qualitative design-types, such as ethnography, grounded theory, or case study procedures. Finally, as previously mentioned, the sample in the qualitative phase should not be included in the quantitative phase as this will introduce undue duplication of responses. It is best to have the qualitative participants provide information for scale, instrument, or variable design but not to also be the individuals completing the follow-up instruments.

Several Advanced Mixed Methods Designs

Three advanced mixed methods designs incorporate the elements of the convergent, explanatory sequential, and exploratory sequential approaches. Once one has the foundation of the three basic approaches, they can be included into more advanced strategies that add further elements into the overall procedures (see Figure 10.2) (see also Creswell & Plano Clark, 2011). The **embedded mixed methods** design nests one

or more forms of data (quantitative or qualitative or both) within a larger design (e.g., a narrative study, an ethnography, an experiment). For example, within an experiment, the researcher can collect qualitative data and collect it during the experiment (convergent) or before the experiment begins (sequentially) or after the experiment ends (sequentially). It is a popular design within the health sciences and when investigators test an intervention or program in an applied setting (e.g., in a school). A second strategy is to incorporate elements of the convergent, explanatory sequential, or exploratory sequential approaches within a social justice framework to help a marginalized group. This design is called **transformative mixed methods**, and the researcher uses a social justice theory as a framework for a mixed methods study. This theory (e.g., feminist, racial) frames many aspects of the mixed methods study, such as the research problem, the questions, the data collection and analysis, interpretation, and the call for action. It is popular in studying marginalized groups in various countries, especially third world countries, throughout the world and in the United States (e.g., indigenous populations, females, racial and ethnic groups, disabled individuals). Finally, another advanced design is the **multiphase mixed methods** in which researchers conduct several mixed methods projects, sometimes including mixed methods convergent or sequential approaches, sometimes including only quantitative or qualitative studies in a longitudinal study with a focus on a common objective for the multiple projects. This form of research is popular in the evaluation or program implementation fields in which multiple phases of the project stretch over time. These projects may go back and forth between quantitative, qualitative, and mixed methods studies, but they build on each other to address a common program objective.

Mixed Methods Notation in the Figures

In Figures 10.1 and 10.2, we see that some notation and labels are used to convey the procedures in mixed methods strategies. Over the years, these shorthand labels have become popular in the mixed methods field. **Mixed methods notation** provides shorthand labels and symbols that convey important aspects of mixed methods research, and they provide a way that mixed methods researchers can easily communicate their procedures (see Table 10.2). Morse (1991) first developed the notation, and it has been added to by writers such as Tashakkori and Teddlie (1998) and Plano Clark (2005) who suggest the following:

- QUAL and QUAN capitalization indicates an emphasis or priority on the quantitative or qualitative data, analysis, and interpretation in the study. In a mixed methods study, the qualitative and quantitative data

may be equally emphasized. Capitalization is used to indicate emphasis. Lowercase indicates

- Quan and Qual stand for quantitative and qualitative data. They use the same notation for both forms of data.
- A plus sign—+—indicates a convergent collection—with both quantitative and qualitative data at the same time.
- An arrow—→—indicates a sequential form (e.g., qualitative data followed by quantitative data).
- Parentheses—()—indicate a design embedded within another design.
- Double arrows—↔—indicate a recursive design.
- Also in the figures, brackets—[]—indicate a study with multiple phases or series of elements of the design.

Table 10.2 Notation Used in Mixed Methods Research

Notation	What It Indicates
Uppercase letters	Greater emphasis on a method
Lowercase letters	Lesser emphasis on a method
+	Convergent methods
→	Sequential methods
()	Embedded design or framework
↔	Recursive
[]	Study with multiple series

may be equally emphasized, or one may be more emphasized than the other. Capitalization indicates that an approach or method is emphasized. Lowercase indicates lesser priority or emphasis on the method.

- Quan and Qual stand for quantitative and qualitative, respectively, and they use the same number of letters to indicate equality between the forms of data.
- A plus sign—+—indicates a convergent or merging integration of data collection—with both quantitative and qualitative data collected at same time.
- An arrow—→—indicates a sequential form of data collection; one form (e.g., qualitative data) builds or connects with the other (e.g., quantitative data).
- Parentheses—()—indicate that one form of data collection is embedded within another or embedded within a larger design.
- Double arrows—→←—mean that the flow of activities can go both ways.
- Also in the figures we see boxes that highlight important major components of the design— such as data collection or data analysis.

Table 10.2 Notation Used in Mixed Methods Research

Notation	What It Indicates	Example	Citation Establishing Notation
Uppercase letters	Greater emphasis given to a method	QUAN, QUAL	Morse (1991)
Lowercase letters	Lesser emphasis given to a method	quan, qual	Morse (1991)
+	Convergent methods	QUAN + QUAL	Morse (1991)
→	Sequential methods	QUAL →quan	Morse (1991)
()	Embed within a design or framework	QUAN(qual)	Plano Clark (2005)
→←	Recursive	QUAL→←QUAN	Nastasi et al. (2007)
[]	Study within a series	QUAL → [QUAN + qual]	Morse & Niehaus (2009)

in published mixed methods studies, but it should go into the thinking about choosing a mixed methods strategy.

Choice Based on the Emphasis Placed on Each Database

Like timing, the **emphasis placed on each database** in mixed methods research is also somewhat difficult to determine and to apply to the question of choice. A mixed methods study can illustrate an equal emphasis (or priority or weight) on both databases, or an unequal emphasis. For example, a mixed methods project can stress the qualitative phase of the research and give minimal attention to the quantitative phase. How can we tell? We can look at the number of pages in a study to determine emphasis, how the study begins (e.g., with a strong quantitative theory orientation or personal qualitative stories), the amount of depth and sophistication given to the qualitative and quantitative data collection and analysis, or even the background training of the investigator. As mentioned earlier in the section on notation, capital letters are used in the notation for greater emphasis (e.g., QUAN) and lowercase letters for less emphasis (e.g., quan). The emphasis can help determine the choice of a mixed methods strategy. Typically if the researcher seeks to emphasize both databases, a convergent approach is best. Alternatively, if a stronger emphasis is sought for the quantitative approach, then an explanatory sequential strategy is used because it began with the quantitative component of the study. If a qualitative approach is to be emphasized, then an exploratory sequential strategy is chosen. These are not firm guidelines, but they may play into the overall decision about a choice of strategy.

Choice Based on Type of Design Most Suited for a Field

On a practical level, the choice of a strategy depends on the inclination of fields toward certain designs. For quantitatively oriented fields, the explanatory sequential approach seems to work well because the study begins (and perhaps is driven) by the quantitative phase of the research. In qualitatively oriented fields, the exploratory sequential approach may be more appealing because it begins with an exploration using qualitative research. However, in this approach, an outcome may be a measurement instrument that is tested so that the outcome, a quantitative outcome, outweighs in importance how the study began. In some fields, the choice of approach may be dependent on collecting data efficiently, and this would argue for a convergent mixed methods study in which both quantitative and qualitative data are typically collected at roughly the same time rather than at different times that require more visits to the research site.

Choice Based on a Single Researcher or Team

A final practical reason for a choice of a strategy depends on whether a single researcher (e.g., graduate student) conducts the study or a team of researchers (e.g., funded long-term investigation). If the investigator is a

single researcher, the sequential exploratory sequential approach is divided into two managed analysis procedures. The researcher rather than collecting multiple convergent approach. When thinking about an embedded model, a recognized research design (a minor, secondary form of some of the participants) size and rigor enables the researcher to find the time and resources to find a published mixed methods model to introduce it to advisers and a model to understand the mixed methods research in a field will help to create the idea that it is a feasible or other audiences. If a forms of data collection are possible, such as in a single researcher can control the nature of collecting data typically suggests more of an investigator.

Examples of Mixed

Illustrations follow of initial and concurrent strate

Example 10.1 A C

Classen et al. (2007) s promotion intervention cle crashes with older convergent mixed meth identified in the abstract:

This study provided a tion of possible cause factors, and empirica to promote older driv able to compare and with perspectives of

single researcher, the sequential strategies of an explanatory sequential or exploratory sequential approach are best because the investigation can be divided into two manageable tasks rather than multiple data collection and analysis procedures. The study can be projected out over a period of time rather than collecting multiple forms of data at the same time as in a convergent approach. When time is a problem, I encourage students to think about an embedded model of design. This model emphasizes the use of a recognized research design (e.g., an experiment), and it includes within it a minor, secondary form of data collection (e.g., a few interviews with some of the participants). The fact that both forms of data are not equal in size and rigor enables the study to be reduced in scope and manageable for the time and resources available. For students, I recommend that they find a published mixed methods journal article that uses their design and introduce it to advisers and faculty committees so that they have a working model to understand the design. Since we are at the early stage of adopting mixed methods research in many fields, a published example of research in a field will help to create both legitimacy for mixed methods research and the idea that it is a feasible approach to research for graduate committees or other audiences. If a research team is conducting the study, multiple forms of data collection at the same time or over a long period of time are possible, such as in an embedded or a multiphase design. Although a single researcher can conduct a transformative study, the labor-intensive nature of collecting data in the field involving participants as collaborators typically suggests more of a team approach than the inquiry by a single investigator.

Examples of Mixed Methods Procedures

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

Example 10.1 A Convergent Parallel Mixed Methods Design

Classen et al. (2007) studied older driver safety in order to develop a health promotion intervention based on modifiable factors influencing motor vehicle crashes with older drivers (age 65 and older). It was a good example of a convergent mixed methods study. The central purpose of the study was identified in the abstract:

This study provided an explicit socio-ecological view explaining the interrelation of possible causative factors, an integrated summary of these causative factors, and empirical guidelines for developing public health interventions to promote older driver safety. Using a mixed methods approach, we were able to compare and integrate main findings from a national crash dataset with perspectives of stakeholders. (p. 677)

This purpose statement identified the use of both quantitative (i.e., a national crash data set) and a qualitative (i.e., stakeholders' perspectives) data. From one of the research questions in the study, we learned that the authors compared the qualitative stakeholder perspectives, needs, and goals for safe and unsafe driving with the quantitative results of the factors that influenced driving injuries. So the expected outcome was to compare the findings. The method section commented on the quantitative national data set, the statistical analysis of this data set, and then the qualitative data set and its analysis. Although not stated explicitly, the data were used together to form results, not used for one database to build on another, and the timing was to look at both databases concurrently. A diagram illustrated the procedures involved in both collecting and analyzing the information. A results section first reported the quantitative results and then the qualitative results. More emphasis was given to the quantitative results, leading to the conclusion that this study favored the quantitative research. However, these reports on the results from the two databases were followed by an analysis of key findings in which the quantitative and qualitative results were compared for supportive and nonsupportive findings. In this discussion section, the researchers merged the two databases in a side-by-side comparison. Looking more broadly at the topic and the authors, we saw that the quantitative emphasis would probably be better accepted in the field of occupational therapy than qualitative research. Also, a scan of the authors' biographical sketches showed that this mixed methods study was completed by a team of researchers drawn from individuals with quantitative and qualitative expertise.

Example 10.2 *An Explanatory Sequential Mixed Methods Design*

In 2007, Banyard and Williams conducted an explanatory sequential mixed methods study examining how women recover from childhood sexual abuse. The quantitative component of the study consisted of structured interviews (with 136 girls in 1990 and a subset of 61 girls in 1997) looking at resilience, correlates of resilience, over time across 7 years of early adulthood. The qualitative aspect consisted of interviews with a subset of 21 girls about their life events, coping, recovery, and resilience. The intent of the mixed methods study was to use the qualitative interviews to "explore and make sense" of the quantitative findings (p. 277). Here was the purpose statement:

Multiple methods are used to examine aspects of resilience and recovery in the lives of female survivors of child sexual abuse (CSA) across 7 years of early adulthood. First quantitative changes in measures of resilience over time were examined. To what extent did women stay the same, increase, or

decrease in functional adulthood? Next, the resilience and coping were examined. Finally, the focus of much research from a subset of participants about recovery and women's own words

As suggested by this study, it is projected to be a detailed study of the survivors as learning. It is intended to probe the quantitative through the qualitative method approach, with the other. Also, with this approach, collection followed the whether this study placed a qualitative component of the longitudinal phase with extensive data. The authors detail findings illustrated many women. These themes include the concept of resilience and the ongoing nature of recovery. The study was conducted by national justice and supportive

Example 10.3 *A Qualitative First Phase Design*

A good example of a qualitative first phase design is found in research to adapt to Rwanda. The investigators facing HIV-affected communities used a qualitative thematic review of the literature

of both quantitative (i.e., a stakeholders' perspectives) study, we learned that the perspectives, needs, and qualitative results of the factors and outcome was to compare in the quantitative national t, and then the qualitative explicitly, the data were used use to build on another, and currently. A diagram illustrating and analyzing the information and quantitative results and then to the quantitative results. In the quantitative research. Two databases were followed quantitative and qualitative supportive findings. In this two databases in a side-by-side topic and the authors, we may be better accepted in the research. Also, a scan of this mixed methods study from individuals with

decrease in functioning in a variety of sphere across 7 years during early adulthood? Next, the role of re-traumatization as an impediment to ongoing resilience and correlates of growth or increased well-being over time were examined. Finally, because resilient processes in adulthood have not been the focus of much research and require further description, qualitative data from a subset of participants was used to examine survivors' own narratives about recovery and healing to learn about key aspects of resilience in women's own words. (p. 278)

As suggested by this statement, the expected outcome of the study was projected to be a detailed picture of resilience and the personal perspectives of the survivors as learned through qualitative data. Also, the authors intended to probe the quantitative findings, to explain them in more detail through the qualitative data. With this intent, the study set up as a sequential approach, with the two databases connected and one building on the other. Also, with this approach, the timing illustrated the qualitative data collection followed the quantitative results. It was difficult to discern whether this study placed greater emphasis on the quantitative or qualitative component of the project. The project began with a quantitative longitudinal phase with extensive discussions of the measures used to gather data. The authors detailed the quantitative results. However, the qualitative findings illustrated many themes that emerged from the interviews with the women. These themes pointed toward new issues that helped to develop the concept of resilience, such as the turning points in the women's lives, the ongoing nature of recovery, and the role of spirituality in recovery. The study was conducted by a team of researchers from psychology and criminal justice and supported by the National Institutes of Health (NIH).

Mixed Methods

atory sequential mixed childhood sexual abuse. structured interviews (1997) looking at resiliency of early adulthood. subset of 21 girls about the intent of the mixed to "explore and make the purpose statement:

ilience and recovery (SA) across 7 years of resiliency over the same, increase, or

Example 10.3 An Exploratory Sequential Mixed Methods Design

A good example of an exploratory sequential study with an experimental test outcome is found in Betancourt et al. (2011). This study used mixed methods research to adapt and evaluate a family strengthening intervention in Rwanda. The investigators sought to examine the mental health problems facing HIV-affected children in Rwanda. They first began with an exploratory, qualitative first phase of interviews with children and their caregivers. From a qualitative thematic analysis of the data, they then performed an extensive review of the literature to locate standardized measures that matched their

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qualitative findings. They found some measures and added some new ones to develop a survey instrument. This instrument went through several refinements following rigorous procedures of instrument-scale development (e.g., backward and forward translations, a discussion of items, reliability and validity) to develop good construct validity for the measures. These measures (e.g., family communication, good parenting, and others) then became the pretest and posttest assessments in an experimental (intervention) study. For the intervention in the study, the researchers were led to a strengths-based, family-based prevention program that was hypothesized to be related to the measures. The final step in the mixed methods process was to use the validated measures within a program that featured the prevention program. At various points in this study, the researchers also collaborated with stakeholders to help to develop good measures. Thus, this study illustrated a good, complex mixed methods project with an initial qualitative phase, an instrument development phase, and an experimental phase. It shows how an initial exploration qualitatively can be used to support a later quantitative testing phase. They stated the purpose of the study as follows:

In the multi-step process used in this mental health services research, we aimed to (1) carefully unpack locally-relevant indicators of mental health problems and protective resources using qualitative methods; (2) apply qualitative findings to the adaptation of mental health measures and the development of a locally-informed intervention; (3) validate the selected mental health measures; and (4) apply the measures to rigorous evaluation research on the effectiveness of the intervention chosen through the mixed methods process. (p. 34)

In this mixed methods study, the expected outcome was clearly to develop good psychometric measures and then to use the measures as outcomes in an experimental project. It was also to use the qualitative data to develop hypotheses that might be tested using the intervention in the experiment. The initial phase qualitative data collection was connected to the subsequent quantitative measures and their rigorous testing for scores on validity and reliability. The entire project was timed for the quantitative phase to follow the qualitative phase, and the quantitative phase could be stated as the development of the measures (and survey) and the experimental intervention study. If I were to diagram this project, it would be $qual \rightarrow QUAN \rightarrow QUAN$. As this notation shows, the emphasis in the project favored quantitative research, and the project could be seen as pointing toward the program intervention test at the end of the article. Recognizing that the researchers came from public health, an organization called

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 trated both the core exploratory sequential design and the more advanced
 embedded experimental design with a sequential focus. To conduct such a
 complex project, the study involved a team of researchers both in the
 United States and in Rwanda.

Example 10.4 A Transformative Design

The final example is a feminist study using a transformative explanatory sequential mixed methods study by Hodgkin (2008). This study investigated the concept of social capital for men and women in households in a regional city in Australia. Social capital described norms and networks that enabled people to work collectively together to address and resolve common problems (e.g., through social activities, the community, and civic participation). The basic mixed methods approach was an explanatory sequential design with an initial survey, a quantitative phase, followed by an interview, qualitative phase. As stated by the author, "the qualitative study elaborated on and enhanced some of the results from the quantitative study" (p. 301). In addition, the author declared that this was a feminist mixed methods project. This means that Hodgkin used a feminist framework (see Chapter 3) to encase the entire mixed methods project. She also referred to the Merten's transformative research paradigm (Mertens, 2007) that gave voice to women, used a range of data collection methods, and bridged the subjective and objective ways of knowing (see the epistemology discussion in Chapter 3). The purpose of the study was this:

The author will provide examples of quantitative data to demonstrate the existence of different social capital profiles for men and women. Stories will also be presented to provide a picture of gender inequality and expectation. The author will conclude by arguing that despite reluctance on the part of feminists to embrace quantitative methods, the big picture accompanied by the personal story can bring both depth and texture to a study. (p. 297)

Thus, in this mixed methods study, the expected outcome for the study was to help explain the initial survey results in more depth with qualitative interview data. Added to this would be the transformative perspective of seeking to provide a picture of gender inequality and expectations. The databases were used sequentially with the qualitative interviews following and expanding on the quantitative surveys. While the surveys were sent to both men and women in households ($N = 1431$), the interviews included only women in the survey sample ($N = 12$). The women interviewed were

of different ages, they varied in terms of their work activities (inside and outside the home), they were mothers, and they varied in their educational level of attainment. The timing of the data collection was in two phases with the second-phase qualitative interviews building on the results from the first-phase quantitative surveys. In fact, the survey data indicated that men and women differed in terms of their level of social participation in groups, and in community group participation. The emphasis in this study seemed to be equal between the quantitative and qualitative components, and clearly the sole author of the study sought to provide a good example of mixed methods research that used a feminist framework. How was this framework used? The author announced at the beginning of the study that "the aim of this article is to demonstrate the use of mixed methods in feminist research" (p. 296). Then the author discussed the lack of qualitative research in the empirical studies of social capital and noted the White, middle-class notion of community that dominated the discussions of social capital. Further, the author talked about lifting up the voices of those disenfranchised by gender and engaged in a study that first pointed out gender differences in social, community, and civic participation within a large sample of men and women, and then focused a qualitative follow-up on only women to understand the women's role in more depth. The qualitative findings then addressed themes that influence women's participation, such as wanting to be a "good mother," wanting to avoid isolation, and wanting to be a good citizen. A summary of the qualitative findings indicates specifically how the qualitative data helped to enhance the findings of the initial survey results. Unlike many feminist mixed methods studies, the conclusion did not indicate a strong call for action to change the inequality. It only mentioned in passing that the mixed methods study provided a powerful voice to gender inequality.

SUMMARY

In designing the procedures for a mixed methods discussion, begin by defining mixed methods research and its core characteristics, briefly mentioning its historical evolution; discuss your chosen mixed methods design; and note the challenges in using the design. Convey a diagram of your procedures that includes good notation to help the reader understand the flow of activities. As you discuss your design, convey the elements that go into it, such as the procedures used in a convergent parallel, an explanatory sequential, or an exploratory sequential mixed methods study. Also consider whether you will overlay your project with a more advanced procedure that embeds the data or mixed methods within a larger design; uses a transformative framework that advocates for social justice; or strings together multiple quantitative, qualitative, or mixed methods studies into a

longitudinal line of investigation. Finally, consider factors that influence design. These involve considering the integration of the data on each database, the conduct of the project ei

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1. Design a component that employs two phases and explain why the phases are chosen.
 2. Design a component that gives emphasis to qualitative data collection, writing the introduction, and the specific procedures.
 3. Develop a figure of a theoretical lens and procedures of either an explanatory or transformative study. Use appropriate notation.

ADDITIONAL READING

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