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An Expanded Typology for Classifying Mixed Methods Research Into Designs

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Editors' Introduction

Research designs are important because they provide road maps for how to rigorously conduct studies to best meet certain objectives. As illustrated in Chapters 4–6 of this volume, mixed methods scholars have devoted much attention to the issue of classifying mixed methods research designs. John W. Creswell, Vicki L. Plano Clark, Michelle Gutmann, and William E. Hanson represent educational backgrounds, including educational psychology and counseling psychology. They expanded the typology for classifying mixed methods research in their 2003 chapter.

Creswell et al. begin their discussion by presenting a historical perspective to the design classification typologies appearing in the mixed methods literature. They summarize the important typologies published before 2003 in a table that lists the authors, designs within the typology, and disciplinary field from which the typology has emerged. Creswell et al. then add to this ongoing discussion by describing a parsimonious set of mixed methods designs

that builds from these earlier works. They distill four criteria that are implicit within all mixed methods designs, including the phase of research in which “mixing” occurs (integration) and the use of a theoretical lens (for example, feminist research). These additional criteria make explicit new design characteristics that had not been emphasized in other discussions. They then present a set of six major designs found in the mixed methods literature using these criteria. Finally, the authors discuss the relationship of paradigms to designs and suggest that different paradigms may provide the foundation for different mixed methods designs.

Discussion Questions and Applications

1. Consider a mixed methods study such as reported by Victor, Ross, and Axford (Chapter 18 in this volume) or Milton, Watkins, Studdard, and Burch (Chapter 22 in this volume). Determine how Creswell et al.’s design criteria were implemented and the study’s overall design.
2. How would you identify if a mixed methods study used a theoretical perspective?
3. Compare and contrast Creswell et al.’s typology with those presented in Chapters 5 and 6. What advantages and/or disadvantages do you find with each?

Related References That Extend the Topic

Other recent mixed methods design typologies can be found in:

- Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.
- Tashakkori, A., & Teddlie, C. (2003). The past and future of mixed methods research: From data triangulation to mixed model designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 671–701). Thousand Oaks, CA: Sage.



Advanced Mixed Methods Research Designs

John W. Creswell

University of Nebraska–Lincoln

Vicki L. Plano Clark

University of Nebraska–Lincoln

Michelle L. Gutmann

University of Nebraska–Lincoln

William E. Hanson

University of Nebraska–Lincoln

One approach to learning about mixed methods research designs is to begin with a mixed methods study and explore the features that characterize it as mixed methods research. Although many such studies are available in the literature, we begin here with a study in education exploring the factors associated with parental savings for postsecondary education, a topic to which many people can relate. Hossler and Vesper (1993) conducted a study examining the factors associated with parental savings for children attending higher education campuses. Using longitudinal data collected from students and parents over a 3-year period, the authors examined factors most strongly associated with parental savings for postsecondary education. Their results indicated that parental support, educational expectations, and

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knowledge of college costs were important factors. Most important for our purposes, the authors collected information from parents and students on 182 surveys and from 56 interviews.

To examine this study from a mixed methods perspective, we would like to draw attention to the following:

- The authors collected “mixed” forms of data, including quantitative survey data and qualitative open-ended interview data.
- The authors titled the study “An Exploratory Study of the Factors Associated With Parental Savings for Postsecondary Education,” containing words suggestive of both quantitative and qualitative approaches. The word *exploratory* is often associated with qualitative research, while the word *factors* implies the use of variables in quantitative research.
- The authors advanced a purpose statement that included a rationale for mixing methods: “The interviews permitted us to look for emerging themes from both the survey and from previous interview data, which could then be explored in more depth in subsequent interviews” (p. 146).
- The authors reported two separate data analyses: first the quantitative results of the survey, followed by the findings from the qualitative interviews. An examination of these two sections shows that the quantitative analysis is discussed more extensively than the qualitative analysis.
- The authors ended the article with a discussion that compared the quantitative statistical results with the qualitative thematic findings.

Based on these features, we see the authors mixing quantitative and qualitative research in this study—mixed methods research. More specifically, with information from recent literature on mixed methods research designs, the “type” of mixed methods design used by Hossler and Vesper (1993) in their study might be called a “concurrent triangulation method design,” indicating a triangulation of data collection, separate data analysis, and the integration of databases at the interpretation or discussion stage of the report. Furthermore, their design gave priority to quantitative research.

To give their study a mixed methods name and to identify the characteristics of the design may not have affected whether it was accepted for publication or whether it was given enhanced status in the social science community. However, being able to identify the characteristics of the study that make it mixed methods and giving the design a specific name conveys to readers the rigors of their study. It also provides guidance to others who merge quantitative and qualitative data into a single study. If they were presenting it to journal editors, faculty committees, or funding agencies, the labeling of the design and an identification of its characteristics helps reviewers to decide the

criteria and the personnel most qualified to review the study. If Hossler and Vesper (1993) had created a visual representation or figure of their procedures, it would have enhanced the study's readability to audiences not used to seeing complex and interrelated data collection and analysis procedures.

Like many other studies of its kind, the Hossler and Vesper (1993) study falls into a category of research called mixed methods designs. Although these studies are frequently reported in the literature, they are seldom discussed as a separate research design. However, with an increasing number of authors writing about mixed methods research as a separate design, it is now time to seriously consider it as a distinct design in the social sciences. To do this calls for a review of disparate literature about mixed methods research designs found in journals across the social sciences as well as in chapters, books, and conference papers.

This chapter presents a synthesis of recent literature about mixed methods research as a separate design. It creates an analysis of the discussion today and its historical roots over the past 20 years. It then reviews four criteria that have emerged during the past few years that provide guidance for a researcher trying to identify the type of mixed methods design to use in a particular study. From these criteria emerge six core designs under which many types of design currently being discussed can be subsumed. We then review three issues in implementing the designs: the use of paradigm perspectives, the data analysis procedures used with each design, and the use of expanded visualizations and procedures. We end by returning to the Hossler and Vesper (1993) study to review how it might be presented and understood as a mixed methods design.

Mixed Methods Research as a Separate Design

There are a number of arguments for why mixed methods research might be considered a separate research design in the social sciences. By design, we mean a procedure for collecting, analyzing, and reporting research such as that found in the time-honored designs of quantitative experiments and surveys and in the qualitative approaches of ethnographies, grounded theory studies, and case studies. These arguments take several forms. Authors have increasingly recognized the advantages of mixing both quantitative and qualitative data collection in a single study. Numerous mixed methods studies have been reported in the scholarly journals for social scientists to see and use as models for their own studies. In addition, authors have delineated more carefully a definition for mixed methods research, although consensus has been slow to develop for a single definition recognized by all inquirers.

Finally, method and methodological authors who write about mixed methods research have identified procedures that point toward critical design elements such as a visual model of procedures, a notation system, the explanation of types of designs, and specific criteria useful in deciding what type of design to employ in a given study.

A Recognition of Advantages

The collection and combination of both quantitative and qualitative data in research has been influenced by several factors. Unquestionably, both quantitative and qualitative data are increasingly available for use in studying social science research problems. Also, because all methods of data collection have limitations, the use of multiple methods can neutralize or cancel out some of the disadvantages of certain methods (e.g., the detail of qualitative data can provide insights not available through general quantitative surveys) (Jick, 1979). Thus, there is wide consensus that mixing different types of methods can strengthen a study (Greene & Caracelli, 1997). Qualitative research has become an accepted legitimate form of inquiry in the social sciences, and researchers of all methodological persuasions recognize its value in obtaining detailed contextualized information. Also, because social phenomena are so complex, different kinds of methods are needed to best understand these complexities (Greene & Caracelli, 1997).

Published Mixed Methods Studies

Given these advantages, authors writing about mixed methods research have frequently analyzed published mixed methods studies in terms of their procedures. For example, Greene, Caracelli, and Graham (1989) reviewed 57 evaluation studies so as to develop a classification scheme of types of designs based on purpose and design characteristics. Creswell, Goodchild, and Turner (1996) discussed 19 mixed methods studies about postsecondary education and illustrated steps in the studies. The “box feature” was used extensively in Tashakkori and Teddlie’s (1998) book to illustrate examples of mixed methods research projects. In fact, a review of the many procedural discussions about mixed methods research [see Datta’s (1994) review of 18 methodological discussions about mixed methods research from 1959 to 1992] shows references to published studies across the social science disciplines.

The Issue of Definition

Finding these published studies, however, requires some creative searching of the literature. The actual terms used to denote a mixed methods study

vary considerably in the procedural discussions of this design. Writers have referred to it as multitrait-multimethod research (Campbell & Fiske, 1959), integrating qualitative and quantitative approaches (Glik, Parker, Muligande, & Hategikamana, 1986–1987; Steckler, McLeroy, Goodman, Bird, & McCormick, 1992), interrelating qualitative and quantitative data (Fielding & Fielding, 1986), methodological triangulation (Morse, 1991), multimethodological research (Hugentobler, Israel, & Schurman, 1992), multimethod designs and linking qualitative and quantitative data (Miles & Huberman, 1994), combining qualitative and quantitative research (Bryman, 1988; Creswell, 1994; Swanson-Kauffman, 1986), mixed model studies (Datta, 1994), and mixed methods research (Caracelli & Greene, 1993; Greene et al., 1989; Rossman & Wilson, 1991). Central to all of these terms is the idea of combining or integrating different methods. The term *mixed methods* is perhaps most appropriate, although one; of the authors of this chapter has used others (Creswell, 1994; Creswell et al., 1996; Creswell & Miller, 1997). Mixing provides an umbrella term to cover the multifaceted procedures of combining, integrating, linking, and employing multi-methods.

To argue for mixed methods research as a specific research design requires not only an accepted term but also a common definition. Building on earlier definitions of mixed methods research (Fielding & Fielding, 1986; Greene et al., 1989), a mixed methods research design at its simplest level involves mixing both qualitative and quantitative methods of data collection and analysis in a single study (Creswell, 1999). A more elaborate definition would specify the nature of data collection (e.g., whether data are gathered concurrently or sequentially), the priority each form of data receives in the research report (e.g., equal or unequal), and the place in the research process in which “mixing” of the data occurs such as in the data collection, analysis, or interpretation phase of inquiry. Combining all of these features into a single definition suggests the following definition:

A mixed methods study involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research.

This definition, although a reasonable beginning point for considering mixed methods research designs, masks several additional questions that are developed further in this chapter. For example, this definition does not account for multiple studies within a sustained program of inquiry in which researchers may mix methods at different phases of the research. It also creates an artificial distinction between quantitative and qualitative methods of data collection that may not be as firmly in place as people think (see

Johnson and Turner's detailed discussion about types of data in Chapter 11 of this volume [Tashakkori & Teddlie, 2003]). Furthermore, it does not account for a theoretical framework that may drive the research and create a larger vision in which the study may be posed.

The Trend Toward Procedural Guidelines

The history of mixed methods research has been adequately traced elsewhere (see Creswell, 2002; Datta, 1994; Tashakkori & Teddlie, 1998). Central to this discussion is the development of procedural guidelines that argue for viewing mixed methods research as a separate design. The evolution of procedural guidelines for mixed methods studies is seen in the creation of visual models, a notation system, and the specification of types of designs.

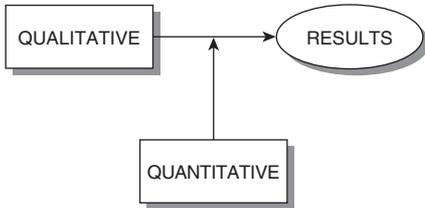
Visual Models. Procedures for conducting a mixed methods study first emerged from discussions in which authors described the flow of activities typically used by researchers when they conducted this type of study. For example, Sieber (1973) suggested the combination of in-depth case studies with surveys, creating a "new style of research" and the "integration" of research techniques within a single study (p. 1337). Patton (1990) identified several forms of research as "mixed forms" such as experimental designs, qualitative data and content analysis or experimental designs, qualitative data, and statistical data. Soon, writers began to draw procedures graphically and create figures that displayed the overall flow of research activities. A good example of these visuals is found in health education research. As shown in Figure 7.1, Steckler et al. (1992) provided four alternative procedures for collecting both quantitative and qualitative research and gave a brief rationale for the reason for combining methods. These models show both quantitative and qualitative methods (actually data collection) and use arrows to indicate the sequence of activities in the mixed methods study. Models 2 and 3 are similar except that the procedures begin with qualitative data in Model 2 and with quantitative data in Model 3.

Notation System. Models such as these provide a useful way for readers to understand the basic procedures used in mixed methods studies. Implied in these models is also the idea that a notation system exists to explain the procedures. In 1991, Morse, a nursing researcher, developed a notation system that has become widely used by researchers designing mixed methods studies (see also Morse's notation system as she discusses types of designs in Chapter 7 of this volume [Tashakkori & Teddlie, 2003]). As shown in Figure 7.2, Morse discussed several types of mixed methods studies and illustrated them with a plus (+) sign to denote the simultaneous collection of quantitative and

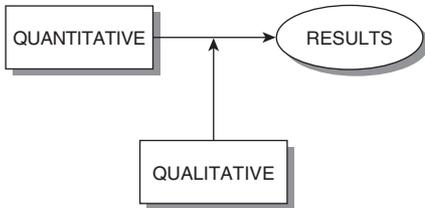
Model 1. Qualitative methods are used to help develop quantitative measures and instruments.



Model 2. Quantitative methods are used to embellish a primarily qualitative study.



Model 3. Qualitative methods are used to help explain quantitative findings.



Model 4. Qualitative and quantitative methods are used equally and in parallel.



Figure 7.1 Example of Visual Presentation of Procedures

SOURCE: Steckler, McLeroy, Goodman, Bird, and McCormick (1992).

qualitative data, an arrow (\rightarrow) to designate that one form of data collection followed another, uppercase letters to suggest major emphasis (e.g., QUAN, QUAL) on the form of data collection, and lowercase letters to imply less emphasis (e.g., quan, qual). It is also noteworthy that the terms *quantitative* and *qualitative* were now shortened to *quan* and *qual*, respectively, implying that both approaches to research are legitimate and of equal stature.

Types of Designs. As is apparent in Morse's (1991) notation system, she provided names for her approaches such as *simultaneous* and *sequential*. Terms such as these, and a few more, have now become types or variants of mixed

Approach	Type
QUAL + quan	Simultaneous
QUAL → quan	Sequential
QUAN + qual	Simultaneous
QUAN → qual	Sequential

Figure 7.2 Examples of Types of Designs Using Morse's (1991) Notation System

methods designs. As shown in Table 7.1, authors from diverse discipline fields, such as evaluation, nursing, public health, and education, have identified the types of designs that they believe capture the array of possibilities. A brief review of eight studies shown in the table indicates that Morse's simultaneous and sequential labels continue to be used routinely. However, new terms have also emerged such as a mixed methods study that is based on *initiation* or *development* (Greene et al., 1989), on *complementary* designs (Morgan, 1998), or on *mixed model* designs (Tashakkori & Teddlie, 1998). Unquestionably, authors have yet to reach consensus on the types of designs that exist, the names for them, or how they might be represented visually.

Criteria Implicit in the Designs

Although the variants of designs may be baffling, to distinguish among them is useful in choosing one to use for a study. To accomplish this requires examining the design's fundamental assumptions, a line of thinking already used by Morgan (1998). If one could understand the assumptions implicit within the designs, then a researcher could configure a procedure that best meets the needs of the problem and that includes the collection of both quantitative and qualitative data. Morgan identified two core assumptions: that the designs varied in terms of a sequence of collecting quantitative and qualitative data and that they varied in terms of the priority or weight given to each form of data. Other assumptions can be added as well. Tashakkori and Teddlie (1998) suggested that the design contain an integration of the data in different phases such as in the statement of the research questions, the data collection, the data analysis, and the interpretation of the results. Finally, in the recent writings of Greene and Caracelli (1997), we find that some mixed methods writers include a transformational value- or action-oriented dimension to their study. Thus, we have another assumption that needs to

Table 7.1 Classifications of Mixed Methods Designs

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

(Continued)

Table 7.1 (Continued)

<i>Author</i>	<i>Mixed Methods Designs</i>	<i>Discipline/Field</i>
Tashakkori & Teddlie (1998)	Mixed method designs Equivalent status (sequential or parallel) Dominant-less dominant (sequential or parallel) Multilevel use Mixed model designs I: Confirmatory/Qual Data/Statistical analysis and inference II: Confirmatory/Qual Data/Qualitative inferences III: Exploratory/Quant Data/Statistical analysis and inference IV: Exploratory/Qual Data/Statistical analysis and inference V: Confirmatory/Quant Data/Qualitative inferences VI: Exploratory/Quant Data/Qualitative inferences VII: Parallel mixed model VIII: Sequential mixed model	Educational research
Creswell (1999)	Convergence model Sequential model Instrument-building model	Educational Policy

be included in the matrix for typing and identifying forms of mixed methods designs. Four factors, as illustrated in Figure 7.3, help researchers to determine the type of mixed methods design for their study: the implementation of data collection, the priority given to quantitative or qualitative research, the stage in the research process at which integration of quantitative and qualitative research occurs, and the potential use of a transformational value- or action-oriented perspective in their study.

Implementation of Data Collection

Implementation refers to the sequence the researcher uses to collect both quantitative and qualitative data. Several authors have discussed this procedure

<i>Implementation</i>	<i>Priority</i>	<i>Integration</i>	<i>Theoretical Perspective</i>
No Sequence Concurrent	Equal	At Data Collection	Explicit
Sequential— Qualitative first		At Data Analysis	
	Sequential— Quantitative first	Qualitative	At Data Interpretation
Quantitative		With Some Combination	

Figure 7.3 Decision Matrix for Determining a Mixed Methods Design

in mixed methods research (Greene et al., 1989; Morgan, 1998; Morse, 1991). The options for implementation of the data collection consist of gathering the information at the same time (i.e., concurrently) or introducing the information in phases over a period of time (i.e., sequentially). When the data are introduced in phases, either the qualitative or the quantitative approach may be gathered first, but the sequence relates to the objectives being sought by the researcher in the mixed methods study. When qualitative data collection precedes quantitative data collection, the intent is to first explore the problem under study and then follow up on this exploration with quantitative data that are amenable to studying a large sample so that results might be inferred to a population. Alternatively, when quantitative data precede qualitative data, the intent is to explore with a large sample first to test variables and then to explore in more depth with a few cases during the qualitative phase. In concurrently gathering both forms of data at the

same time, the researcher seeks to compare both forms of data to search for congruent findings (e.g., how the themes identified in the qualitative data collection compare with the statistical results in the quantitative analysis).

The choice of implementation strategy has several consequences for the form of the final written report. When two phases of data collection exist, the researcher typically reports the data collection process in two phases. The report may also include an analysis of each phase of data separately and the integration of information in the discussion or conclusion section of a study. The implementation approach also raises an issue about iterative phases of a design where a researcher may cycle back and forth between quantitative and qualitative data collection. For instance, the research may begin with a qualitative phase of interviewing, followed by a quantitative phase of survey instrument design and testing with a sample, and continued on with a third qualitative phase of exploring outlier cases that emerge from the quantitative survey. The implementation decision also calls for clearly identifying the core reasons for collecting both forms of data in the first place and understanding the important interrelationship between the quantitative and qualitative phases in data collection. These reasons need to be clearly articulated in any mixed methods written report.

Priority

A less obvious issue, and one more difficult to make a decision about, is the priority given to quantitative and qualitative research in the mixed methods study (Morgan, 1998). Unlike the frame of reference of data collection in the implementation decision, here the focus is on the priority given to quantitative or qualitative research as it occurs throughout the data collection process. This process might be described as including how the study is introduced, the use of literature, the statement of the purpose of the study and the research questions, the data collection, the data analysis, and the interpretation of the findings or results (Creswell, 2002). The mixed methods researcher can give equal priority to both quantitative and qualitative research, emphasize qualitative more, or emphasize quantitative more. This emphasis may result from practical constraints of data collection, the need to understand one form of data before proceeding to the next, or the audience preference for either quantitative or qualitative research. In most cases, the decision probably rests on the comfort level of the researcher with one approach as opposed to the other.

Operationalizing the decision to give equal or unequal emphasis to quantitative or qualitative research translates is problematic. For instance, the study may begin with essentially a quantitative orientation with a focus on variables, specific research questions or hypotheses, and an extensive discussion of the literature that informs the questions. Another study might convey a

different priority through the length of discussions such as the inclusion of extensive discussions about the qualitative data collection with minimal information about the quantitative instruments used in the study. A project might be seen by readers as providing more depth for one method than for the other such as assessed by the number of pages given to quantitative research (e.g., as in the Hossler & Vesper [1993] article). A graduate student may of necessity delimit the study by including a substantive quantitative analysis and a limited qualitative data collection, a model referred to as the dominant-less dominant model (Creswell, 1994). A final example is that the published article provides equal emphasis on both quantitative and qualitative research as judged by separate sections of approximately equal length and treatment. Unquestionably, in each of these examples, researchers and readers make an interpretation of what constitutes priority, a judgment that may differ from one inquirer to another. On a practical level, however, we can see these different priorities in published mixed methods studies, and researchers need to make informed decisions about the weight or attention given to quantitative and qualitative research during all phases of their research.

Stage of Integration

Of the mixed methods design writers, it has been Tashakkori and Teddlie (1998) and Greene et al. (1989) who have emphasized the importance of considering the stage of the research process at which integration of quantitative and qualitative data collection takes place. Integration can be defined as the combination of quantitative and qualitative research within a given stage of inquiry. For example, integration might occur within the research questions (e.g., both quantitative and qualitative questions are presented), within data collection (e.g., open-ended questions on a structured instrument), within data analysis (e.g., transforming qualitative themes into quantitative items or scales), or in interpretation (e.g., examining the quantitative and qualitative results for convergence of findings). The decision that needs to be made relates to a clear understanding of the sequential model of the research process and approaches typically taken by both quantitative and qualitative researchers at each stage. (As a contrast, see the interactive model as advanced by Maxwell and Loomis in Chapter 9 of this volume [Tashakkori & Teddlie, 2003].)

Examine Table 7.2, which presents four stages in the process of research and approaches researchers take in both the quantitative and qualitative areas. In quantitative research, investigators ask questions that try to confirm hypotheses or research questions, with a focus on assessing the relationship or association among variables or testing a treatment variable. These questions or hypotheses are assessed using instruments, observations, or documents that

yield numerical data. These data are, in turn, analyzed descriptively or inferentially so as to generate interpretations that are generalizable to a population. Alternatively, in qualitative research, the inquiry is more exploratory, with a strong emphasis on description and with a thematic focus on understanding a central phenomenon. Open-ended data collection helps to address questions of this kind through procedures such as interviews, observations, documents, and audiovisual materials. Researchers analyze these databases for a rich description of the phenomenon as well as for themes to develop a detailed rendering of the complexity of the phenomenon, leading to new questions and personal interpretations made by the inquirers. Although both the quantitative and qualitative processes described here are oversimplifications of the actual steps taken by researchers, they serve as a baseline of information to discuss where integration might take place in a mixed methods study.

During the phases of problem/question specification, data collection, data analysis, and interpretation, it is possible for the mixed methods researcher

Table 7.2 Stages Integration and Quantitative and Qualitative Approaches

	<i>Research Problems/Data Questions</i>	<i>Data Collection/Method</i>	<i>Data Analysis/Procedure</i>	<i>Data Interpretation</i>
Quantitative	Confirmatory Outcome based	Instruments Observations Documents Score oriented Closed-ended process Predetermined hypotheses	Descriptive statistics Inferential statistics	Generalization Prediction based Interpretation of theory
Qualitative	Exploratory Process based Descriptive Phenomenon of interest	Interviews Documents Observations Audiovisual Participant-determined process Open-ended process Text/image oriented	Description Identify themes/categories Look for interconnectedness among categories/themes (vertically and horizontally)	Particularization (contextualizing) Larger sense-making Personal interpretation Asking questions

to integrate components of both quantitative and qualitative research. Unquestionably, the most typical case is the integration of the two forms of research at the data analysis and interpretation stages after quantitative data (e.g., scores on instruments) and qualitative data (e.g., participant observations of a setting) have been collected. For example, after collecting both forms of data, the analysis process might begin by transforming the qualitative data into numerical scores (e.g., themes or codes are counted for frequencies) so that they can be compared with quantitative scores. In another study, the analysis might proceed separately for both quantitative and qualitative data, and then the information might be compared in the interpretation (or discussion) stage of the research (see, e.g., Hossler & Vesper, 1993). Less frequently found in mixed methods studies is the integration at data collection. A good example of integration at this stage is the use of a few open-ended questions on a quantitative survey instrument. In this approach, both quantitative and qualitative data are collected and integrated in a single instrument of data collection. It is also possible for integration to occur earlier in the process of research such as in the problem/question stage. In some studies, the researcher might set forth both quantitative and qualitative questions in which the intent is to both test some relationships among variables and explore some general questions. This approach is seen in studies where a concurrent form of data collection exists and the researcher is interested in triangulating (Mathison, 1988) data from different sources as a major intent of the research. Finally, it should be noted that integration can occur at multiple stages. Data from a survey that contains both quantitative and qualitative data might be integrated in the analysis stage by transforming the qualitative data into scores so that the information can be easily compared with the quantitative scores.

Deciding on the stage or stages to integrate depends on the purpose of the research, the ease with which the integration can occur (e.g., data collection integration is easier and cleaner than data analysis integration), the researcher's understanding of the stages of research, and the intent or purpose of a particular study. What clouds this decision is the permeability of the categories displayed in Table 7.2. Data collection is a good case in point. What constitutes quantitative or qualitative data collection is open to debate; indeed, LeCompte and Schensul (1999), and many ethnographers, consider both quantitative and qualitative data collection as options for field data. A similar concern might be raised about the fine distinctions being made between quantitative and qualitative research problems and questions. Many inquirers actually go back and forth between confirming and exploring in any given study, although qualitative inquirers refrain from specifying variables in their questions and attempt to keep the study as open as possible to best learn from participants. Despite these potential issues that need to be

considered, the mixed methods researcher needs to design a study with a clear understanding of the stage or stages at which the data will be integrated and the form this integration will take.

Theoretical Perspectives

One question raised by qualitative researchers in the social sciences, especially during the 1990s (Creswell, 2002), is that all inquiry is theoretically driven by assumptions that researchers bring to their studies. At an informal level, the theoretical perspective reflects researchers' personal stances toward the topics they are studying, a stance based on personal history, experience, culture, gender, and class perspectives. At a more formal level, social science researchers bring to their inquiries a formal lens by which they view their topics, including gendered perspectives (e.g., feminist theory), cultural perspectives (e.g., racial/ethnic theory), lifestyle orientation (e.g., queer theory), critical theory perspectives, and class and social status views.

Only recently have these theoretical perspectives been discussed in the mixed methods research design literature. As recently as 1997, Greene and Caracelli discussed the use of a theoretical lens in mixed methods research. They called such a lens the use of transformative designs that "give primacy to the value-based and action-oriented dimensions of different inquiry traditions" (p. 24). Greene and Caracelli (1997) further explicated the nature of transformative designs when they wrote,

Designs are transformative in that they offer opportunities for reconfiguring the dialog across ideological differences and, thus, have the potential to restructure the evaluation context. . . .Diverse methods most importantly serve to include a broader set of interests in the resulting knowledge claims and to strengthen the likely effectiveness of action solutions. (p. 24)

The commonality across transformative studies is ideological, such that no matter what the domain of inquiry, the ultimate goal of the study is to advocate for change. The transformative element of the research can either be experienced by the participants as they participate in the research or follow the study's completion when the research spawns changes in action, policy, or ideology. Transformative designs are found in evaluative research as well as in health care. Issues as diverse as class, race, gender, feminist scholarship, and postmodernist thinking often inform transformative designs. To illustrate how this design might work, a researcher might examine the inequity that exists in an organization's salary structure that marginalizes women in

the organization. The issue of inequity frames the study, and the inquirer proceeds to first gather survey data measuring equity issues in the organization. This initial quantitative phase is then followed by a qualitative phase in which several in-depth cases studies are developed to explore in more detail the quantitative results. These case studies might examine the issue of inequality from the standpoint of managers, middle managers, and workers on an assembly line. In the end, the researcher is interested in bringing about change in the salary structure and in using the research as evidence for needed change and to advocate for change. Also, through the research, the dialogue among organizational members is “transformed” to focus on issues of inequity.

The use of a theoretical lens may be explicit or implicit within a mixed methods study. Those espousing transformative model encourage researchers to make the lens explicit in the study, although Greene and Caracelli (1997) were not specific about how this might be done. However, examining the use of a theoretical or an ideological lens within other studies, we can see that it often informs the purpose and questions being asked. These purposes may be to promote equity and justice for policies and practices so as to create a personal, social, institutional, and/or organizational impact (as addressed by Newman, Ridenour, Newman, & DeMarco in Chapter 6 of this volume [Tashakkori & Teddlie, 2003]) or to address specific questions related to oppression, domination, alienation, and inequality. A transformative model would also indicate the participants who will be studied (e.g., women, the marginalized, certain groups that are culturally and ethnically diverse), how the data collection will proceed (e.g., typically collaboratively so as not to marginalize the study participants further), and the conclusion of the study for advocacy and change to improve society or the lives of the individuals being studied. In summary, the nature of transformative mixed research methodology is such that in both perspective and outcomes, it is dedicated to promoting change at levels ranging from the personal to the political. Furthermore, it is possible to conduct any quantitative, qualitative, or mixed methods study with a transformative or advocacy purpose.

Six Major Designs

The four criteria—implementation, priority, integration, and theoretical perspective—can be useful in specifying six different types of major designs that a researcher might employ. This short list of designs might not be as inclusive of types as those identified by other writers (see the types introduced in Table 7.1), but arguably, all variants of designs might be subsumed within these six types. Moreover, by identifying a small number of generic

types, it can be suggested that the mixed methods researcher has the flexibility to choose and innovate within the types to fit a particular research situation. These six types build on the four decision criteria and integrate them into specific designs with a label that we believe captures the variants of the design. An overview of the types of designs by the four criteria is seen in Table 7.3. For each design, we identify its major characteristics, examples of variants on the design, and strengths and weaknesses in implementing it. In addition, a visual presentation is made for each design type and annotated with specific steps to be undertaken in the process of research. The visuals are shown in Figures 7.4 and 7.5.

Sequential Explanatory Design

The sequential explanatory design is the most straightforward of the six major mixed methods designs. It is characterized by the collection and analysis of quantitative data followed by the collection and analysis of qualitative data. Priority is typically given to the quantitative data, and the two methods are integrated during the interpretation phase of the study. The steps of this design are pictured in Figure 7.4a. The implementation of this design may or may not be guided by a specific theoretical perspective.

The purpose of the sequential explanatory design is typically to use qualitative results to assist in explaining and interpreting the findings of a primarily quantitative study. It can be especially useful when unexpected results arise from a quantitative study (Morse, 1991). In this case, the qualitative data collection that follows can be used to examine these surprising results in more detail. In an important variation of this design, the qualitative data collection and analysis is given the priority. In this case, the initial quantitative phase of the study may be used to characterize individuals along certain traits of interest related to the research question. These quantitative results can then be used to guide the purposeful sampling of participants for a primarily qualitative study.

The straightforward nature of this design is one of its main strengths. It is easy to implement because the steps fall into clear separate stages. In addition, this design feature makes it easy to describe and report. In fact, this design can be reported in two distinct phases with a final discussion that brings the results together. The sequential explanatory design is also useful when a quantitative researcher wants to further explore quantitative findings. Furthermore, the implementation of qualitative data collection and analysis within this design framework can be comfortable for quantitative researchers, and therefore it can provide an effective introduction to qualitative research methods to researchers unfamiliar with the techniques. The main weakness of

Table 7.3 Types of Designs by Four Criteria

<i>Design Type</i>	<i>Implementation</i>	<i>Priority</i>	<i>Stage of Integration</i>	<i>Theoretical Perspective</i>
Sequential explanatory	Quantitative followed by qualitative	Usually quantitative; can be qualitative or equal	Interpretation phase	May be present
Sequential exploratory	Qualitative followed by quantitative	Usually qualitative; can be quantitative or equal	Interpretation phase	May be present
Sequential transformative	Either quantitative followed by qualitative or qualitative followed by quantitative	Quantitative, qualitative or equal	Interpretation phase	Definitely present (i.e., conceptual framework, advocacy, empowerment)
Concurrent triangulation	Concurrent collection of quantitative and qualitative data	Preferably equal; can be quantitative or qualitative	Interpretation phase or analysis phase	May be present
Concurrent nested	Concurrent collection of quantitative and qualitative data	Quantitative or qualitative	Analysis phase	May be present
Concurrent transformative	Concurrent collection of quantitative and qualitative data	Quantitative, qualitative, or equal	Usually analysis phase; can be during interpretation phase	Definitely present (i.e., conceptual framework advocacy, empowerment)

this design is the length of time involved in data collection to complete the two separate phases. This is especially a drawback if the two phases are given equal priority. Therefore, a sequential explanatory design giving equal priority to both qualitative and quantitative methods may be a more applicable approach for a research program than for a single study.

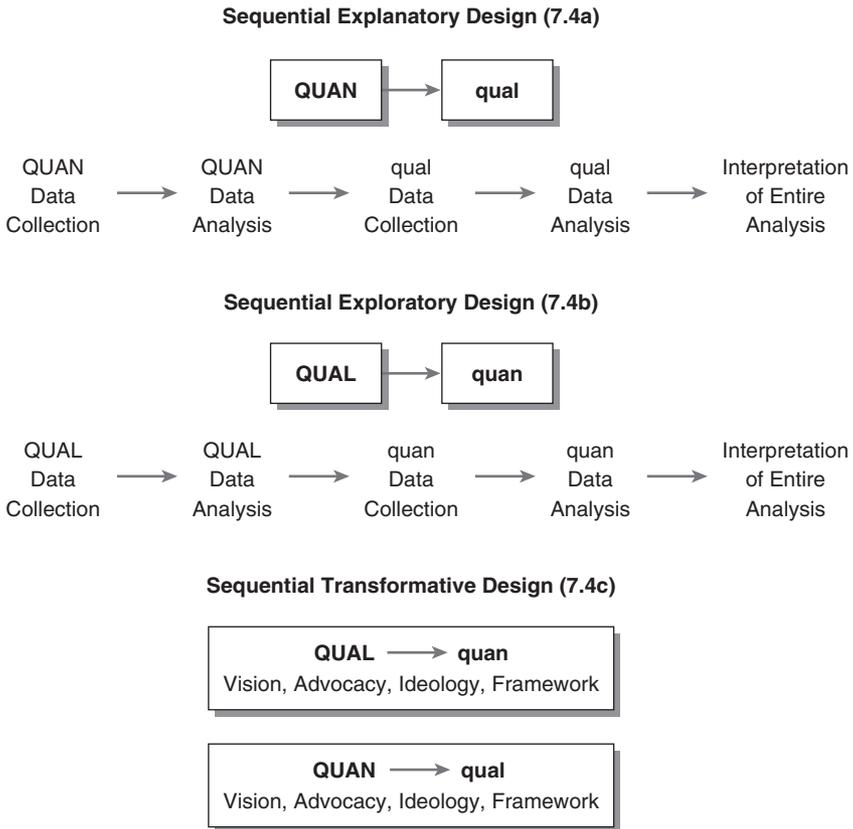


Figure 7.4 Sequential Designs
 (a) Sequential Explanatory Design
 (b) Sequential Exploratory Design
 (c) Sequential Transformative Design

Sequential Exploratory Design

The sequential exploratory design has many features similar to the sequential explanatory design. It is conducted in two phases, with the priority generally given to the first phase, and it may or may not be implemented within a prescribed theoretical perspective (see Figure 7.4b). In contrast to the sequential explanatory design, this design is characterized by an initial phase of qualitative data collection and analysis followed by a phase of quantitative data collection and analysis. Therefore, the priority is given to the qualitative aspect of the study. The findings of these two phases are then integrated during the interpretation phase (see Figure 7.4b).

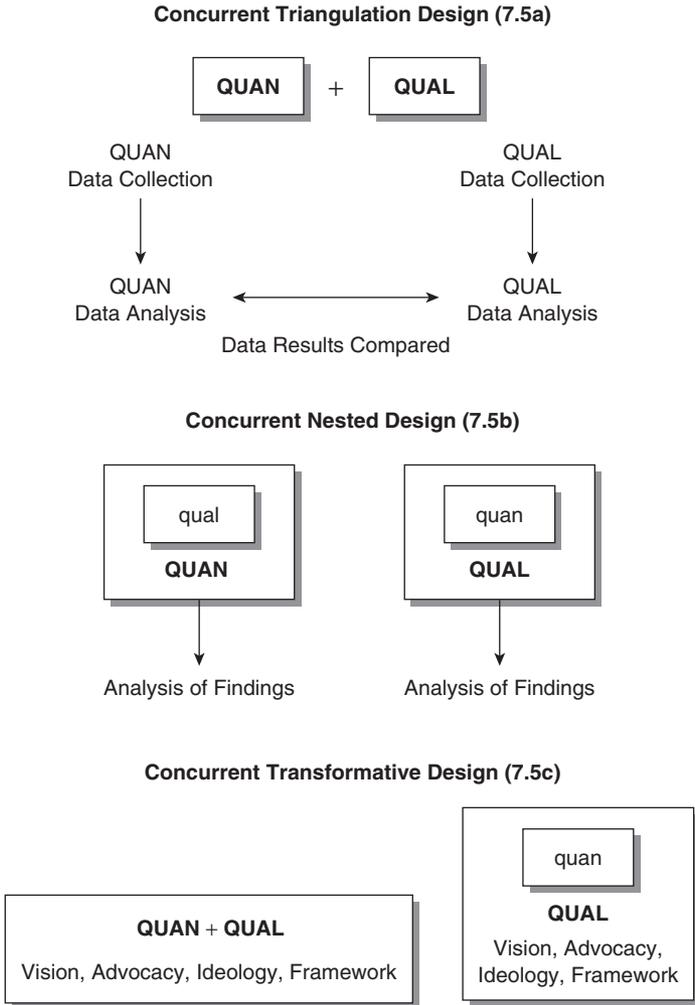


Figure 7.5 Concurrent Designs
 (a) Concurrent Triangulation Design
 (b) Concurrent Nested Design
 (c) Concurrent Transformative Design

At the most basic level, the purpose of this design is to use quantitative data and results to assist in the interpretation of qualitative findings. Unlike the sequential explanatory design, which is better suited to explaining and interpreting relationships, the primary focus of this design is to explore a phenomenon. Morgan (1998) suggested that this design is appropriate to use

when testing elements of an emergent theory resulting from the qualitative phase and that it can also be used to generalize qualitative findings to different samples. Similarly, Morse (1991) indicated that one purpose for selecting this design would be to determine the distribution of a phenomenon within a chosen population. Finally, the sequential exploratory design is often discussed as the design used when a researcher develops and tests an instrument (see, e.g., Creswell, 1999). One possible variation on this design is to give the priority to the second quantitative phase. Such a design might be undertaken when a researcher intends to conduct a primarily quantitative study, but it needs to begin with initial qualitative data collection so as to identify or narrow the focus of the possible variables. In addition, it is possible to give equal weight to the quantitative and qualitative phases, but such an approach may be too demanding for a single study due to time constraints, resource limitations, and the limitations of a researcher's experience.

The sequential exploratory design has many of the same advantages as the sequential explanatory design. Its two-phase approach makes it easy to implement and straightforward to describe and report. It is useful to a researcher who wants to explore a phenomenon but also wants to expand on the qualitative findings. This design is especially advantageous when a researcher is building a new instrument. In addition, this design could make a largely qualitative study more palatable to a quantitatively oriented adviser, committee, or research community that may be unfamiliar with the naturalistic tradition.

As with the sequential explanatory design, the sequential exploratory design also requires a substantial length of time to complete both data collection phases, which can be a drawback for some research situations. In addition, the researcher may find it difficult to build from the qualitative analysis to the subsequent quantitative data collection.

Sequential Transformative Design

As with the previously described sequential designs, the transformative sequential design has two distinct data collection phases, one following the other (see Figure 7.4c). However, in this design, either method may be used first, and the priority may be given to either the quantitative or the qualitative phase (or even to both if sufficient resources are available). In addition, the results of the two phases are integrated together during the interpretation phase. Unlike the sequential exploratory and explanatory designs, the sequential transformative design definitely has a theoretical perspective present to guide the study. The aim of this theoretical perspective, whether it be a conceptual framework, a specific ideology, or advocacy, is more important in guiding the study than the use of methods alone.

The purpose of a sequential transformative design is to employ the methods that will best serve the theoretical perspective of the researcher. By using two phases, a sequential transformative researcher may be able to give voice to diverse perspectives, to better advocate for participants, or to better understand a phenomenon or process that is changing as a result of being studied. The variations of this design would be best described by the diverse range of possible theoretical perspectives instead of the range of possible methodological choices.

The sequential transformative design shares the same methodological strengths and weaknesses as the other two sequential mixed methods designs. Its use of distinct phases facilitates its implementation, description, and sharing of results, although it also requires the time to complete two data collection phases. More important, this design places mixed methods research within a transformative frame-work. Therefore, this design may be more appealing and acceptable to those researchers already using a transformative framework within one distinct methodology such as qualitative research. It will also include the strengths typically found when using a theoretical perspective in other research traditions. Unfortunately, because to date little has been written on this design, one weakness is that there is little guidance on how to use the transformative vision to guide the methods. Likewise, it may be unclear how to move from the analysis of the first phase to the data collection of the second phase.

Concurrent Triangulation Design

The concurrent triangulation design is probably the most familiar of the six major mixed methods designs (see Figure 7.5a). It is selected as the design when a researcher uses two different methods in an attempt to confirm, cross-validate, or corroborate findings within a single study (Greene et al., 1989; Morgan, 1998; Steckler et al., 1992). This design generally uses separate quantitative and qualitative methods as a means to offset the weaknesses inherent within one method with the strengths of the other method. In this case, the quantitative data collection and qualitative data collection are concurrent, happening during one phase of the research study. Ideally, the priority would be equal between the two methods, but in practical application, the priority may be given to either the quantitative or the qualitative approach. This design usually integrates the results of the two methods during the interpretation phase. This interpretation either may note the convergence of the findings as a way to strengthen the knowledge claims of the study or must explain any lack of convergence that may result.

This traditional mixed methods design is advantageous because it is familiar to most researchers and can result in well-validated and substantiated findings. In addition, the concurrent data collection results in a shorter data collection

time period as compared with that of the sequential designs. This design also has a number of limitations. It requires great effort and expertise to adequately study a phenomenon with two separate methods. It can also be difficult to compare the results of two analyses using data of different forms. In addition, it may be unclear to a researcher how to resolve discrepancies that arise in the results.

Other variations of this design also exist. For example, it would be possible for a researcher to integrate the two methods earlier in the research process such as during the analysis phase. This would require the transformation of the data from a quantitative to a qualitative form or from a qualitative to a quantitative form. While such transformations have been discussed in the literature (see, e.g., Caracelli & Greene, 1993; Tashakkori & Teddlie, 1998), there is still limited guidance for how to conduct and analyze such transformations in practice.

Concurrent Nested Design

Like the concurrent triangulation design, the concurrent nested design can be identified by its use of one data collection phase during which quantitative and qualitative data both are collected simultaneously (see Figure 7.5b). Unlike the traditional triangulation design, a nested design has a predominant method that guides the project. Given less priority, a method (quantitative or qualitative) is embedded, or nested, within the predominant method (qualitative or quantitative). This nesting may mean that the embedded method addresses a question different from that addressed by the dominant method or that the embedded method seeks information from different levels [the analogy to hierarchical analysis in quantitative research is helpful in conceptualizing these levels (see Tashakkori & Teddlie, 1998)]. The data collected from the two methods are mixed during the analysis phase of the project. This design may or may not have a guiding theoretical perspective.

The concurrent nested design may be used to serve a variety of purposes. Often, this design is used so that a researcher may gain broader perspectives from using the different methods as opposed to using the predominant method alone. For example, Morse (1991) noted that a primarily qualitative design could embed some quantitative data to enrich the description of the sample participants. Likewise, she described how qualitative data could be used to describe an aspect of a quantitative study that cannot be quantified. In addition, a concurrent nested design may be employed when a researcher chooses to use different methods to study different groups or levels within a design. For example, if an organization is being studied, then employees could be studied quantitatively, managers could be interviewed qualitatively, entire divisions could be analyzed with quantitative data, and so forth. Tashakkori

and Teddlie (1998) described this approach as a multilevel design. Finally, one method could be used within a framework of the other method such as if a researcher designed and conducted an experiment but used case study methodology to study each of the treatment conditions.

This mixed methods design has many strengths. A researcher is able to simultaneously collect the data during one data collection phase. It provides a study with the advantages of both quantitative and qualitative data. In addition, by using the two different methods in this fashion, a researcher can gain perspectives from the different types of data or from different levels within the study. There are also limitations to consider when choosing this design. The data need to be transformed in some way so that they can be integrated within the analysis phase of the research. There has been little written to date to guide a researcher through this process. In addition, there is little advice to be found for how a researcher should resolve discrepancies that occur between the two types of data. Because the two methods are unequal in their priority, this design also results in unequal evidence within a study, and this may be a disadvantage when interpreting the final results.

Concurrent Transformative Design

As with the sequential transformative design, the concurrent transformative design is guided by the researcher's use of a specific theoretical perspective (see Figure 7.5c). This perspective can be based on ideologies such as critical theory, advocacy, participatory research, and a conceptual or theoretical framework. This perspective is reflected in the purpose or research questions of the study (see Newman et al., Chapter 6, this volume [Tashakkori & Teddlie, 2003]). It is the driving force behind all methodological choices such as defining the problem; identifying the design and data sources; and analyzing, interpreting, and reporting results throughout the research process (see Mertens, Chapter 5, this volume [Tashakkori & Teddlie, 2003]). The choice of a concurrent design (whether it is triangulation or a nested design) is made to facilitate this perspective. For example, the design may be nested so that diverse participants are given a voice in the change process of an organization that is studied primarily quantitatively. It may involve a triangulation of both quantitative and qualitative data to best converge information so as to provide evidence for an inequality of policies in an organization.

Thus, the concurrent transformative design may take on the design features of either a triangulation or nested design. That is, the two types of data are collected at the same time during one data collection phase and may have equal or unequal priority. The integration of these different data would most often occur during the analysis phase, although integration during the

interpretation phase would be a possible variation. Because the concurrent transformative design shares common features with the triangulation and nested designs it also shares their specific strengths and weaknesses. However, this design also has the added advantage of positioning mixed methods research within a transformative framework, and this may make it especially appealing to those qualitative or quantitative researchers already using a transformative framework to guide their inquiry.

Issues in Implementing Designs

Although there are several discussions currently under way among those writing about mixed design applications, issues related to implementation fall into three categories: whether the design needs to be lodged within a paradigm perspective; how data analysis varies by design and the use of computer programs that handle both quantitative and qualitative data; and the placement of design procedures within a study, especially the elaboration of visual presentations of the procedures.

Paradigms and Designs

Substantial discussion has taken place in the mixed methods literature about the “compatibility” of quantitative and qualitative research and whether paradigms of research and methods can be mixed. For example, can a qualitative philosophical perspective, such as the existence of multiple realities, be combined with a quantitative study that uses a closed-ended survey to gather data and restrict the perspectives of the participants? The linking of paradigms and methods has been referred to as the “paradigm debate” (Cook & Reichardt, 1979; Reichardt & Rallis, 1994). Although this debate has largely subsided due to the use of multiple methods regardless of paradigm perspective, the discussion helped to raise the issue of whether philosophical perspectives should be explicitly stated and acknowledged in mixed methods studies. More specifically to the point of this chapter is this question: Should a philosophical position be embraced by the author of a mixed methods study, and will this position vary by types of design? Several authors (e.g., Patton, 1990; Rossman & Wilson, 1985; Tashakkori & Teddlie, 1998) have suggested that pragmatism is the foundation for these designs. This philosophy, drawn from Deweyan ideas and most recently articulated by Cherryholmes (1992), maintains that researchers should be concerned with applications, with what works, and with solutions to problems. In light of this, the authors have called for the use of both quantitative and qualitative methods to best understand research problems.

However, as applied to the six designs advanced in this chapter, a single philosophical framework does not work with all designs. If one takes the perspective that the mixed methods researcher should be explicit about the paradigm or philosophy behind his or her design, then a number of philosophical perspectives can enter into the study. Today, multiple paradigms exist for our inquiries such as positivism, postpositivism, interpretivism, and participatory/advocacy perspectives (Denzin & Lincoln, 2000). In a sequential explanatory design, strongly based on quantitative research, the paradigm stated may be postpositivist, while in a sequential exploratory design, with the lead taken by qualitative research, the paradigm may be more interpretive or participatory/advocacy oriented. A triangulation design may use several paradigms as a framework for the study. A transformative design may employ qualitative, quantitative, or mixed methods so long as the ideological lens of advocacy or participation is a central element in shaping the purpose, the questions, the collaborative nature of data collection and analysis, and the interpreting and report of results (see Mertens's chapter in this volume [Chapter 5, Tashakkori & Teddlie, 2003]). While Greene and Caracelli (1997) recommended that researchers employing mixed methods research be explicit about their paradigms, we can now extend this suggestion to a consideration of what paradigm is best given the choice of a design for the mixed methods study.

Data Analysis and Designs

Approaches to data analysis also need to be sensitive to the design being implemented in a mixed methods study. Different analysis approaches have been suggested for integrating quantitative and qualitative data that explore how the information might be transformed or analyzed for outlier cases (Caracelli & Greene, 1993). Further approaches to analyzing data are also found in Tashakkori and Teddlie (1998), Creswell (2002), and Onwuegbuzie and Teddlie's chapter in this volume (Chapter 13 [Tashakkori & Teddlie, 2003]). When the six types of designs are considered, we see in the sequential designs that the data analysis typically proceeds independently for both the quantitative and qualitative phases. The researcher relies on standard data analysis approaches (e.g., descriptive and inferential analysis of quantitative data, coding and thematic analysis of qualitative data). Alternatively, in the concurrent designs, the analysis requires some data transformation so as to integrate and compare dissimilar databases (e.g., quantitative scales are compared with qualitative themes, qualitative themes are converted into scores). Other options exist as well, as seen in Table 7.4, which shows the relationship among data analysis approaches as well as a description of each approach and its relationship to each of the six designs.

Table 7.4 Type of Mixed Methods Design and Data Analysis/Interpretation Procedures

<i>Type of Mixed Methods Design</i>	<i>Examples of Analytic Procedures</i>
Concurrent (triangulation, nested, transformative)	<ul style="list-style-type: none"> • Quantify qualitative data: Code qualitative data, assign numbers to codes, and record the number of times codes appear as numeric data. Descriptively analyze quantitative data for frequency of occurrence. Compare the two data sets. • Qualifying quantitative data: Factor-analyze the quantitative data from questionnaires. These factors then become themes. Compare these themes to themes analyzed from qualitative data. • Comparing results: Directly compare the results from qualitative data collection to the results from quantitative data collection. Support statistical trends by qualitative themes or vice versa. • Consolidating data: Combine qualitative and quantitative data to form new variables. Compare original quantitative variables to qualitative themes to form new quantitative variables. (Caracelli & Greene, 1993) • Examining multilevels: Conduct a survey at the student level. Gather qualitative data through interviews at the class level. Survey the entire school at the school level. Collect qualitative data at the district level. Information from each level builds to the next level. (Tashakkori & Teddlie, 1998)
Sequential (explanatory, exploratory, transformative)	<ul style="list-style-type: none"> • Following up on outliers or extreme cases: Gather quantitative data and identify outlier or residual cases. Collect qualitative data to explore the characteristics of these cases. (Caracelli & Greene, 1993) • Explaining results: Conduct a quantitative survey to identify how two or more groups compare on a variable. Follow up with qualitative interviews to explore the reasons why these differences were found. • Using a typology: Conduct a quantitative survey, and develop factors through a factor analysis. Use these factors as a typology to identify themes in qualitative data such as observations and interviews. (Caracelli & Greene, 1993) • Locating an instrument: Collect qualitative data and identify themes. Use these themes as a basis for locating instruments that use parallel concepts to the qualitative themes.

*Type of Mixed**Methods Design Examples of Analytic Procedures*

- Developing an instrument: Obtain themes and specific statements from individuals that support the themes. During the next phase, use these themes and statements to create scales and items in a questionnaire. Alternatively, look for existing instruments that can be modified to fit the themes and statements found in the qualitative exploratory phase of the study. After developing the instrument, test it out with a sample of a population.
 - Forming categorical data: Site-level characteristics (e.g., different ethnic groups) gathered in an ethnography during the first phase of a study become a categorical variable during a second-phase correlational or regression study. (Caracelli & Greene, 1993)
 - Using extreme qualitative cases: Qualitative data cases that are extreme in a comparative analysis are followed by quantitative surveys during a second. (Caracelli & Greene, 1993)
-

SOURCE: Adapted from Creswell (2002).

A related issue is whether a computer program should be used in mixed methods research and what programs are amenable to the analysis of both quantitative and qualitative data (see Bazeley's discussion of computer data analysis in Chapter 14 of this volume [Tashakkori & Teddlie, 2003]). Several qualitative data analysis programs allow for the import and export of quantitative data in table, formats (Creswell & Maietta, 2002). Programs such as ETHNOGRAPH 5, HyperRESEARCH 2.5, Classic NUD.IST Versions 4 and 5, NVIVO, ATLAS.ti, and WinMAX allow the user to move to and from quantitative and spreadsheet packages with direct links into document identification numbers. For example, it is now possible to create a numerical SPSS file at the same time that a text file is being developed and to merge the data using qualitative software computer packages.

Procedures and Designs

With the discussion of mixed methods research designs have emerged additional questions about how researchers should conceptualize and present their discussions about designs and how they can articulate them so that proposal reviewers, editorial board reviewers, and conference attendees can easily understand the procedures involved in the mixed methods discussions. With the complex features often found in these designs, it is not surprising that writers have presented figures in their studies that portray the general

flow of procedures such as those advanced by Steckler et al. (1992) and shown in Figure 7.1. But such visualizations do not go far enough. Added to these visual models can also be the procedures employed by the researcher, so that readers see the visual picture and learn about the accompanying procedures involved in each step. Thus, the discussion in the mixed methods literature about visual models (see Steckler et al., 1992) and the steps in the research process (as discussed by Creswell, 1999) can be combined.

Such a combination of ideas in a single figure is illustrated in Figure 7.6. In this figure, we see a two-phase mixed methods study. There are three levels introduced in the visualization of procedures. First, readers find the phases to be organized into qualitative research followed by quantitative research for each year of the project. Then, the more general procedures of data collection and analysis are presented in the circles and boxes on the left and, finally, the more specific procedures are identified on the right. Arrows help readers to see how the two phases are integrated into a sequential process of research. Although Figure 7.6 is only for the sequential exploratory model in our designs, one can extrapolate the basic design features to the other design possibilities and emerge with visualizations of designs that are both useful and clear to readers and reviewers of mixed methods studies.

Returning to the Hossler and Vesper Mixed Methods Study

The Hossler and Vesper (1993) study that began our discussion can now be advanced in a visual diagram and assessed in terms of the four criteria and the six types of designs. As mentioned earlier, we can now see the Hossler and Vesper study as a concurrent triangulation design with priority given to quantitative research. The study began with quantitative questions (i.e., “To what extent are parents saving for postsecondary education? What factors are associated with parental savings? Do certain kinds of information appear to influence parental savings?” [p. 141]), but the data were collected concurrently in the form of surveys and interviews. The authors then analyzed the survey data separately from the interview data. Their intent was to triangulate the findings, which readers will find in the discussion section. They did not use a theoretical framework to frame the study, and they did not provide a visualization their research procedures. If they had incorporated this, visualization, then it might have looked like the representation shown in Figure 7.7, where there are simultaneous quantitative and qualitative data collection and analysis and an interpretation in which they converged the data. If the data were presented in a “box text” diagram as shown in Box 7.1, as is used by writers of mixed methods research designs

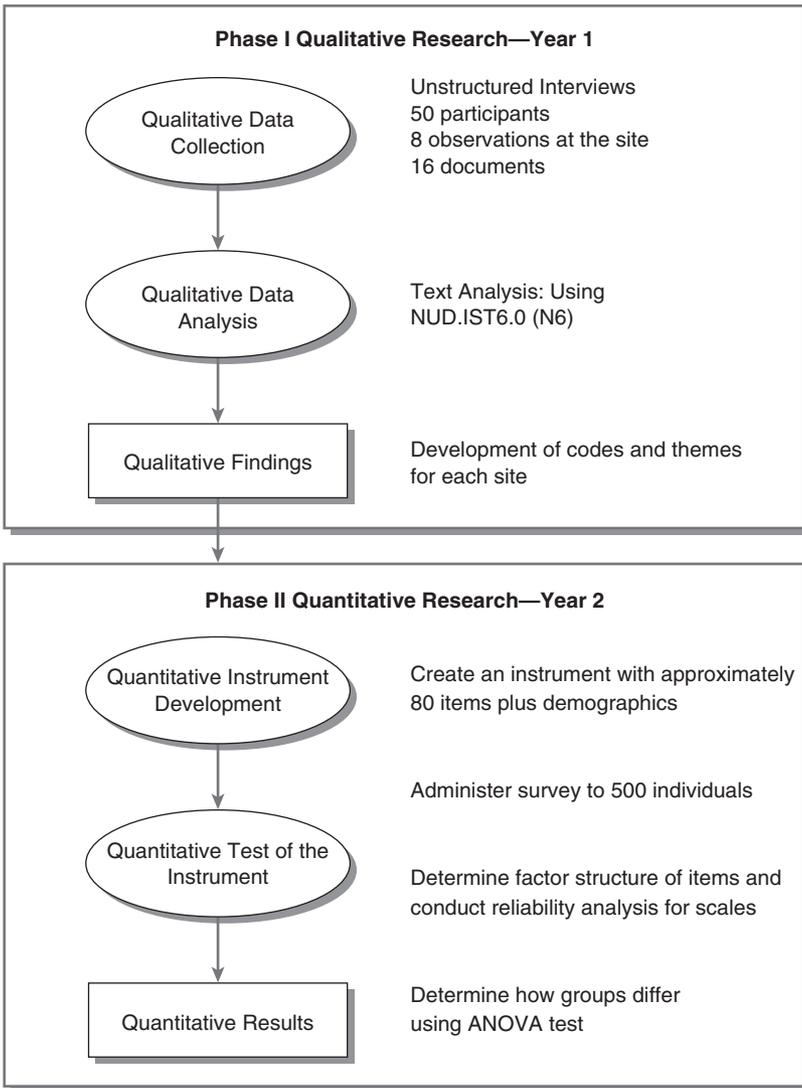


Figure 7.6 Elaborated Visualization for Mixed Methods Procedures

(e.g., see Tashakkori & Teddlie, 1998), then the essential information about the study that marks it as a mixed methods project could be illustrated through information about the methodology, aspects about the participants and data collection, the data analysis, and the discussion. Further information could be supplied about the four decision criteria made by the researchers.

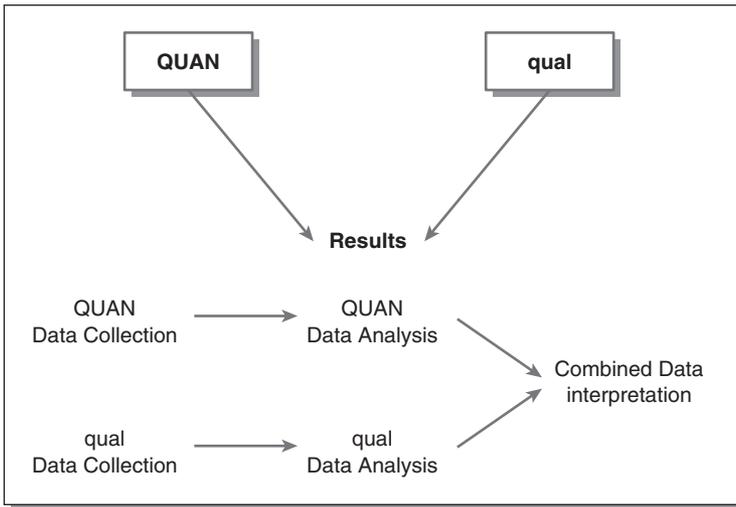


Figure 7.7 Proposed Visualization of the Concurrent Triangulation Design Used in Hossler and Vesper (1993)

Box 7.1 Summary of the Hossler and Vesper Study

Hossler, D., & Vesper, N. (1993). An exploratory study of the factors associated with parental saving for postsecondary education. *Journal of Higher Education*, 64(2), 140–165.

This article provides an example of how qualitative and quantitative methods can be combined in educational research. As the title of the article suggests, two methodologies are used, and rationales for the use of each method are provided to readers. The primary goal of the research is to add information to the dearth of extant research in this area.

The principal methodology of this study was quantitative with a strong qualitative complement. Student and parent data garnered from a longitudinal study involving multiple surveys over a 3-year time line served as the basis for logistic regression that was used to identify the specific factors most strongly associated with parental saving for post-secondary education. Additional insights into the phenomenon of interest were gained from interviews of a small subsample of students and parents who were interviewed five times during the 3-year duration of the study. Interviews were used both to explore emerging themes in greater detail and to triangulate findings.

Components of data collection:

A total of 182 students and parents participated.

All participants completed surveys 10 times over a 4-year span.

A total of 56 students and their parents from eight high schools in the sample participated in interviews four times each year while the students were in their junior and senior years in high school.

Development of both the surveys and the interview protocols was an iterative process.

Data analysis:

Quantitative data were statistically analyzed via logistic regression, with significant discussion of coding of independent and dependent variables.

Qualitative data were analyzed via thematic analysis, with data being unitized and categorized.

Discussion and inferences:

Both quantitative and qualitative results were discussed jointly in the discussion section of the article. Significant factors identified by the logistic regression were corroborated with the theme that had emerged from the interviews. Areas of overlap between the analyses were discussed, although there was little mention of any inconsistencies in the data.

Triangulating the results from the survey and interview data allowed the authors to posit a model of parental saving.

Priority: QUANTITATIVE

Sequence: qual + QUAN simultaneously

Integration: data collection, data analysis, and inference stages

Transformative: not present

Strengths: Combining methods of data collection and analysis allowed for the construction of more sensitive survey instruments as well as a better and broader understanding of the phenomenon of interest. Directions for intervention and policy development were identified and discussed.

Weaknesses: It was difficult to separate the quantitative and qualitative components in the discussion section. Implementing a mixed method design would be difficult if contradictory quantitative and qualitative data were found.

This review of the Hossler and Vesper study highlights how discussions about mixed methods designs need to consider the underlying decisions that go into selecting a design; the type of design being used; and issues related to paradigms, data analysis, and the delineation of procedures using visuals.

Undoubtedly, more issues will emerge about designing mixed methods studies, and a periodic assessment needs to provide an ongoing synthesis of the literature. In this way, we can continue to explore the methodology of mixed methods research and present additional guidelines for both novice and experienced researchers as they continue to develop, write, and publish these studies.

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John W. Creswell (Ph.D., University of Iowa) is Professor of Educational Psychology in the Graduate Program of Quantitative and Qualitative Methods in Education at the University of Nebraska–Lincoln. He specializes in research methods and design, qualitative inquiry, and mixed methods research, and he has authored eight books and numerous chapters and journal articles. His most recent three books address quantitative and qualitative research design, qualitative inquiry, and educational research.

Michelle L. Gutmann (M.S., C.C.C.-S.L.P.) is a speech-language pathologist with 10 years of clinical experience in augmentative and alternative communication. Throughout this time, she has worked with both adults and children across a variety of settings. She is currently pursuing her doctorate in speech pathology and is interested in outcome measures and in-depth study of specific clinical populations.

William E. Hanson (Ph.D., Arizona State University, M.A., University of Minnesota) is Assistant Professor in the Department of Educational Psychology at the University of Nebraska–Lincoln. He teaches in the Counseling Psychology Program. He specializes in psychological assessment, psychotherapy process and outcome research, and counselor training/supervision.

Vicki L. Plano Clark (M.S., Michigan State University) is Laboratory Manager in the Department of Physics and Astronomy, as well as a doctoral candidate in quantitative and qualitative methods in education, at the University of Nebraska–Lincoln. In addition to her doctoral work, which emphasizes mixed methods research, she has focused on curriculum development that incorporates computer-based technologies into introductory physics teaching laboratory courses. She has been a co-principal investigator on three National Science Foundation grants as well as the leader of numerous faculty development workshops at regional and national professional society meetings.