

# 5

## Designing a Mixed Methods Action Research Study

### OBJECTIVES

By the end of this chapter, the reader should be able to

- Describe current mixed methods design typologies and their relevance to an MMAR study design,
- Understand and explain key methodological dimensions of mixed methods designs and how they guide an MMAR study design,
- Explain MMAR designs and their methodological characteristics,
- Understand how MMAR designs can be applied in an MMAR study process,
- Understand strengths and challenges associated with the use of each MMAR design, and
- Be able to use the flowcharts to make informed decisions in applying MMAR designs to research problems addressing practical issues.

### INTRODUCTION

In Chapter 4, an MMAR Study Process Model was introduced and explained. This model reflects six phases in the action research cycle (diagnosing, reconnaissance, planning, acting, evaluation, monitoring) and outlines important methodological and procedural steps for each phase in an MMAR study. Conceptualization of

Refer to Chapter 4 and Figure 4.1 for the discussion and illustration of an MMAR Study Process Model and of procedural and action steps within each study phase.

Refer to Chapter 4 for the discussion of the first, diagnosing phase in an MMAR study process and the specifics of conceptualizing an MMAR study.

an MMAR study is the first step in the process and occurs during the diagnosing phase. As discussed in Chapter 4, this involves identification of the problem area that requires improvement, reviewing the literature on the topic and existing theories and practices, developing a study general research plan, specifying an overall study purpose, expected outcomes, objectives, and research questions, and addressing ethical issues.

Once a practical problem or issue is identified and the conceptualization process of an MMAR study is complete, practitioner-researchers move to the next, reconnaissance phase. During this phase a mixed methods study is designed and implemented to assess the problem or situation, identify the areas for improvement, and inform the development of the action/intervention plan. After the action/intervention is developed and implemented, an evaluation phase of an MMAR study is designed and conducted. The purpose of this phase is to collect evidence about the effectiveness of the action/intervention and to learn whether the action/intervention targets the identified problem areas, how the action/intervention is viewed and adopted by interested stakeholders, what needs to be changed in the initial plan to reach more effective outcomes, or whether the plan needs to be completely revised. In spite of the fact that the design of the reconnaissance and evaluation phases

in an MMAR study is guided by a different perspective, the research process in both phases follows the same procedural steps. These steps include the following:

- Developing the purpose statement and research questions for the reconnaissance study phase
- Selecting a mixed methods design to best address the purpose and answer the posted research questions
- Identifying the study sample and quantitative and qualitative types of data to be collected
- Collecting and analyzing the data
- Establishing credibility or validating the findings

Designing a study is a key methodological step in the study process because the study design guides other methodological procedures aimed at answering the posted research questions (Creswell, 2014). Selecting an appropriate study design does not only help researchers choose appropriate methods, but also helps “set the logic by which they [researchers] make interpretations at the end of their studies” (Creswell & Plano Clark, 2011, p. 53).

So, what mixed methods designs can be used to guide an MMAR study process, and how can they be informed by existing mixed methods designs and their typologies?

## CURRENT MIXED METHODS DESIGN TYPOLOGIES

To better understand how existing mixed methods designs can be adapted to an MMAR study process, it is necessary to acknowledge the existence of different mixed methods design typologies. Authors writing about mixed methods research have always tried to classify the designs based on some common methodological

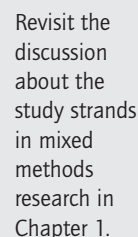
characteristics and procedural features. Teddlie and Tashakkori (2009) underscored the relative usefulness of such classifications, and argued that mixed methods design typologies help researchers choose the right direction for designing a study. They explained that typologies “provide a variety of paths, or ideal design types, that may be chosen to accomplish the goals of the study” (p. 139). Typologies also help with establishing a methodological structure of a mixed methods research approach, and with identifying the design features common to a group of mixed methods studies. Conversely, Creswell and Plano Clark (2011) considered mixed methods design typologies to be useful because they help select and adapt an existing design to a specific study purpose and research questions. Mixed methods design typologies can also be important for understanding the mechanism of combining quantitative and qualitative methods in a variety of ways within one study or program of inquiry.

At the same time, no typology can capture all possible variations in designing and conducting mixed methods studies (Greene, 2007; Guest, 2013; Maxwell & Loomis, 2003). This is mostly due to the fact that a study design is driven by a unique research problem that requires exploration, and by the need to gather information to answer the posted research questions within the parameters of this problem. Consistent with Greene’s (2007) insightful observation that “methodology is ever the servant of purpose” (p. 97), complexity of a research situation may often lead to changes in the study design direction and blending of the research components in new and sometimes unexpected ways. Acknowledging the continuous evolution of mixed methods designs and a diversity of approaches to classifying mixed methods designs, Teddlie and Tashakkori (2009) proposed the term “families” with reference to mixed methods design groupings and types that researchers can creatively employ while addressing complex research problems. Alternatively, Creswell and Plano Clark (2011) referred to major mixed methods designs as prototypes.

Table 5.1 presents four recent mixed methods design typologies. Despite the observed differences in the designs’ names and the methodological characteristics used to classify these designs, these typologies have many common features and highlight common design elements that make mixed methods designs distinct and different from other quantitative and qualitative designs. For example, Teddlie and Tashakkori (2009) differentiated five families of mixed methods designs based on how quantitative and qualitative methods are mixed or integrated within a study. These designs typically consist of at least two study strands. Mixing or integrating the methods may occur at any or all these stages.

Creswell and Plano Clark (2011) proposed six prototypes of mixed methods designs based on four methodological decisions: level of interaction of quantitative and qualitative methods in the study, priority of the quantitative or qualitative method, timing or implementation of the quantitative and qualitative study strands, and mixing or integration of the quantitative and qualitative methods. They also suggested taking into account a theoretical framework, which may include a transformative lens and a “substantive framework” that inform the study design, or a “program-objective framework” that guides the integration of the quantitative and qualitative study components consistent with an overall program objective (p. 68).

Morse and Niehaus (2009) developed their mixed method design typology based on the role the two main components, quantitative and qualitative, play in the study. Depending on which role, core or supplementary, the researcher assigns to quantitative and qualitative study components, Morse and Niehaus suggested two major



Revisit the discussion about the study strands in mixed methods research in Chapter 1.

**TABLE 5.1 Recent Typologies of Mixed Methods Designs**

<i>Typology</i>	<i>Design</i>	<i>Description</i>
<b>Five Families of Mixed Methods Designs (Teddle &amp; Tashakkori, 2009)</b>	<ul style="list-style-type: none"> <li>Parallel-Mixed Designs</li> <li>Sequential Mixed Designs</li> </ul>	<ul style="list-style-type: none"> <li>Mixing of quantitative and qualitative methods occurs in a parallel manner, either simultaneously or with some time lapse.</li> <li>Mixing of quantitative and qualitative methods occurs across chronological quantitative and qualitative study phases; questions or procedures of one strand emerge from or depend on the previous strand.</li> </ul>
	<ul style="list-style-type: none"> <li>Conversion Mixed Designs</li> </ul>	<ul style="list-style-type: none"> <li>Mixing of quantitative and qualitative methods occurs when one type of data is transformed and analyzed both quantitatively and qualitatively.</li> </ul>
	<ul style="list-style-type: none"> <li>Multilevel Mixed Designs</li> </ul>	<ul style="list-style-type: none"> <li>Mixing of quantitative and qualitative methods occurs in a parallel or chronological manner across multiple levels of analysis, as quantitative and qualitative data from these levels is analyzed and integrated.</li> </ul>
	<ul style="list-style-type: none"> <li>Fully Integrated Mixed Designs</li> </ul>	<ul style="list-style-type: none"> <li>Mixing of quantitative and qualitative methods occurs in an interactive manner at all stages of the study; at each stage, one approach affects the formulation of the other.</li> </ul>
<b>Prototypes of Mixed Methods Designs (Creswell &amp; Plano Clark, 2011)</b>	<ul style="list-style-type: none"> <li>Convergent Parallel Mixed Methods Design</li> </ul>	<ul style="list-style-type: none"> <li>Concurrent timing is used to implement quantitative and qualitative strands during the same phase of the research process; two methods are equally prioritized; the strands are kept independent during the analysis; quantitative and qualitative results are mixed during the overall interpretation.</li> </ul>

*(Continued)*

Typology	Design	Description
	<ul style="list-style-type: none"> <li>Explanatory Sequential Mixed Methods Design</li> </ul>	<ul style="list-style-type: none"> <li>Sequential timing is used to implement quantitative and qualitative strands or phases; quantitative data collection and analysis occurs first and is prioritized; qualitative data collection and analysis occurs next and follows from the quantitative results; qualitative findings are interpreted to help explain the initial quantitative results.</li> </ul>
	<ul style="list-style-type: none"> <li>Exploratory Sequential Mixed Methods Design</li> </ul>	<ul style="list-style-type: none"> <li>Sequential timing is used to implement quantitative and qualitative strands or phases; qualitative data collection and analysis occurs first and is prioritized; quantitative data collection and analysis occurs next to test or generalize the initial qualitative findings; quantitative results are interpreted to show how they build on the initial qualitative findings.</li> </ul>
	<ul style="list-style-type: none"> <li>Embedded Mixed Methods Design</li> </ul>	<ul style="list-style-type: none"> <li>Both quantitative and qualitative data are collected and analyzed concurrently or sequentially within a traditional quantitative or qualitative design; the supplemental data strand is added to enhance the overall design.</li> </ul>
	<ul style="list-style-type: none"> <li>Transformative Mixed Methods Design</li> </ul>	<ul style="list-style-type: none"> <li>A transformative theoretical framework shapes timing, interaction, priority, and mixing decisions.</li> </ul>
	<ul style="list-style-type: none"> <li>Multiphase Mixed Methods Design</li> </ul>	<ul style="list-style-type: none"> <li>Concurrent and sequential strands are combined over a period of time within an overall program-objective framework.</li> </ul>
<b>Mixed Method Design Typology (Morse &amp; Niehaus, 2009)</b>	<ul style="list-style-type: none"> <li>Qualitatively Driven Mixed Method Designs               <ul style="list-style-type: none"> <li>Qualitatively Driven Simultaneous Designs</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Quantitative supplemental component is added simultaneously during the qualitative core component implementation or on the completion of the core component data analysis to compensate for its information inadequacy.</li> </ul>

**TABLE 5.1** Continued

<i>Typology</i>	<i>Design</i>	<i>Description</i>
	<ul style="list-style-type: none"> <li>○ Qualitatively Driven Sequential Designs</li> </ul>	
	<ul style="list-style-type: none"> <li>• Quantitatively Driven Mixed Method Designs               <ul style="list-style-type: none"> <li>○ Quantitatively Driven Simultaneous Designs</li> <li>○ Quantitatively Driven Sequential Designs</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Qualitative supplemental component is added simultaneously during the quantitative core component implementation or on the completion of the core component data analysis to compensate for its information inadequacy.</li> </ul>
	<ul style="list-style-type: none"> <li>• Complex Mixed and Multiple Method Designs               <ul style="list-style-type: none"> <li>○ Qualitatively Driven</li> <li>○ Quantitatively Driven</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Multiple supplemental quantitative and qualitative components are added in different combinations to the theoretical core project to form a series of linked mixed methods studies.</li> </ul>
<b>Interactive-Independent Dimension Design Clusters (Greene, 2007)</b>	<ul style="list-style-type: none"> <li>• Component Mixed Methods Designs               <ul style="list-style-type: none"> <li>○ Convergence</li> <li>○ Extension</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Quantitative and qualitative methods are used to measure the same phenomenon; methods are of equal weight; implementation is concurrent; linking or connection of the methods is through comparison of quantitative and qualitative results.</li> </ul>
		<ul style="list-style-type: none"> <li>• Quantitative and qualitative methods are used to measure different phenomena; methods are of varied weight; implementation is variable; linking of the methods is either</li> </ul>

Typology	Design	Description
		absent, or through connection of quantitative and qualitative results.
	<ul style="list-style-type: none"> <li>• Integrated Mixed Methods Designs</li> </ul>	
	<ul style="list-style-type: none"> <li>○ Iteration</li> </ul>	<ul style="list-style-type: none"> <li>• The results of one method, quantitative or qualitative, are used to inform the development of another method; methods are preferably of equal weight; implementation is sequential; methods are integrated through quantitative and qualitative data representation.</li> </ul>
	<ul style="list-style-type: none"> <li>○ Blending</li> </ul>	<ul style="list-style-type: none"> <li>• Quantitative and qualitative methods are used to assess varied facets of the same phenomenon; methods are of equal weight; implementation is concurrent; methods are integrated through joint analysis of connection between quantitative and qualitative data during analysis.</li> </ul>
	<ul style="list-style-type: none"> <li>○ Nesting or Embedding</li> </ul>	<ul style="list-style-type: none"> <li>• A supplementary quantitative or qualitative method is embedded or nested in the study's primary methodology; methods are of unequal weight; implementation is concurrent; methods are integrated through joint analysis or connection between quantitative and qualitative data during analysis.</li> </ul>
	<ul style="list-style-type: none"> <li>○ Mixing for Reasons of Substance or Values</li> </ul>	<ul style="list-style-type: none"> <li>• Quantitative and qualitative methods are directly tied to the substantive or ideological framework employed in the study; methods are preferably of equal weight; implementation is variable; methods are integrated through joint analysis, comparison, or connection between quantitative and qualitative data during analysis.</li> </ul>



Refer to Chapter 1 and Table 1.1 for the discussion of Greene and colleagues' (1989) reasons for conducting mixed methods studies.

groups of designs: qualitatively driven and quantitatively driven. Additionally, the authors set aside complex mixed and multiple method designs consisting of multiple supplemental components added to the theoretical core project to form a series of linked mixed methods studies.

Finally, building on a typology of reasons or purposes for conducting mixed methods studies (Greene et al., 1989), Greene (2007) presented two groups or clusters of mixed methods designs characterized by differences in their “most salient and critical dimensions,” such as (1) implementation of quantitative and qualitative methods in the study—*independent or interactive*, and (2) *weight of quantitative and qualitative methods in the study—relatively equal or not* (pp. 120–121). Greene (2007) argued that an exhaustive listing of all designs within these clusters

is not possible because of a potential variation of mixed methods designs observed in research practice.

## TYPOLGY OF MMAR STUDY DESIGNS

Practitioner-researchers who wish to design and conduct an MMAR study can choose a suitable mixed methods design from the existing mixed methods design typologies. However, to stay consistent with a practical focus of action research and to make the application of mixed methods in action research conceptually easier for practitioner-researchers, a more generic typology of MMAR study designs is suggested. This typology of MMAR study designs builds on the mixed methods design typologies discussed earlier and incorporates their major common design elements. An important consideration is also the longitudinal and interactive nature of MMAR studies in which all phases are conceptually linked in the pursuit of an

effective solution to a practical problem/issue. Thus, each complete MMAR study, including all six phases of the action research cycle, may be viewed as a multilevel or fully integrated mixed design (Teddlie & Tashakkori, 2009), multiphase design (Creswell & Plano Clark, 2011), or complex mixed and multiple method design (Morse & Niehaus, 2009) study. Specifically, a complete MMAR study that includes all the six phases from at least one action research cycle may consist of multiple concurrent and/or sequential strands. These strands may be combined in different ways to address various goals of each phase by encompassing evidence from multiple quantitative and qualitative data sources within an overall action research project framework.

Additionally, Creswell and Plano Clark (2011) distinguished a transformative mixed methods design, in which a researcher's theoretical or ideological perspective, such as transformative orientation or advocacy lens, guides all methodological decisions in the study. Although important, this feature may not be essential for shaping an MMAR design because a transformative orientation reflected in the pursuit of social justice and empowerment is inherent to action research and its purposes. Following this criterion, all action research is transformative and an

Refer to Chapter 2 for the discussion of empowerment as an essential feature of action research. Also refer to Chapter 3 for the explanation of transformative/advocacy lens used in mixed methods and action research.



MMAR study is designed to adhere to transformation goals. Furthermore, an ideological perspective provides reasons for conducting the study, a perspective that “supersedes design choices” (Teddlie & Tashakkori, 2009, p. 140). Thus, a suggested typology of MMAR designs includes basic mixed methods designs that can be used in different combinations in the reconnaissance and evaluation phases in an MMAR study process to inform other phases in the action research cycle.

So, what are MMAR study designs and how can they be adapted and applied to address the purposes of action research?

## Key Methodological Dimensions of MMAR Study Designs

A proposed typology of MMAR study designs incorporates the key methodological characteristics or dimensions specific to mixed methods designs that have been well described and established in the mixed methods literature. Those dimensions include a number of study strands, sequence or timing of the strand implementation, priority or weighting of quantitative or qualitative methods, and integration or mixing of the quantitative and qualitative methods discussed in Chapter 1 (Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009). These methodological dimensions are important to consider when designing an MMAR study because they guide practitioner-researchers in selecting a study design that will best address the posted research questions within a specific MMAR study phase. Additionally, knowledge of these design dimensions will help practitioner-researchers understand how to implement the study so that it will produce meaningful meta-inferences to inform the next step in an MMAR study process. Importantly, having a practical grasp of MMAR study design elements will also provide practitioner-researchers with relative flexibility in making adjustments to the study design in response to the cyclical and dialectical nature of action research.

Revisit the explanation of the key methodological characteristics of mixed methods research in Chapter 1. Refer to Box 1.6, which summarizes the major aspects of these mixed methods characteristics.

To better understand the role of the key methodological dimensions in guiding the design of an MMAR study, consider how these characteristics were addressed and explained in two MMAR study proposals in the fields of K–12 education and health promotion. Davis’s (2011) MMAR study (Box 5.1) focused on identifying the technological needs of parents to increase their school involvement through an after-school technology use program at an elementary school in northern Alabama employing a concurrent MMAR design. Cunningham’s (2011) MMAR study (Box 5.2) focused on identifying factors related to intent for vaccination against HPV among college males in Alabama and thus to increase their vaccination rates at one southeastern Research I university. Cunningham proposed to use a sequential MMAR design.

Both studies consist of two strands, during which quantitative and qualitative data will be collected and analyzed. In Davis’s study, the strands will be implemented concurrently because quantitative survey and qualitative interview data from a sample of parents in a specific elementary school will be collected and analyzed independently during the same period to assess their technological needs. Cunningham proposes to use the strands sequentially because she plans first to survey male students at a southeastern Research I university to identify factors associated with their uptake of HPV vaccination. Once the analysis of the

## BOX 5.1

### Parent Involvement Technology Use Program: A Concurrent MMAR Study

*Study Purpose:* The purpose of this MMAR study is to identify the technological needs of parents to increase their school involvement through an after-school technology use program at an elementary school in north Alabama by using a concurrent MMAR design.

*Study Strands:* The study will consist of two strands: quantitative and qualitative. The goal of the quantitative strand of the study is to identify specific needs in a parenting technology use program by conducting and analyzing surveys administered to parents at an elementary school. The goal of the qualitative strand of the study is to explore specific technological support services that may enhance parental involvement in the school program through conducting interviews with participating parents at the end of each semester during one school year.

*Sequence or Timing:* Concurrent—quantitative survey and qualitative interview data will be collected and analyzed independently. The results from both study strands will be compared at the conclusion of quantitative and qualitative analysis.

*Priority or Weighting:* Priority will be given to qualitative data. The quantitative survey data will focus on identifying parents' specific technological needs. The qualitative data, however, will provide information on how best to get parents to participate in the program; the study emphasis on exploring ways for parent involvement leads to the premise of the study being qualitatively driven.

*Integration or Mixing:* The rationale for integrating quantitative and qualitative methods in the study is to gain a deeper understanding of parental technological needs to inform the development of an after-school technology use program. Integration of the data will occur at the stage of data analysis where meta-inferences are developed based on the results of the qualitative and quantitative analysis. Survey and individual interview results will be compared to produce well-validated conclusions about how to stimulate parents' involvement in the program.

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Adapted from Davis (2011) with the author's permission.

quantitative survey data is completed, the researcher will further explore these factors through individual interviews with select survey respondents to better understand the role of these factors in shaping vaccination uptake. Davis assigns priority to the qualitative data because she believes they will provide information on how to best get parents involved in participating in the school-based technology use program. On the other side, Cunningham proposes to weight quantitative data more because the study's focus tends to be more on the prediction of HPV vaccination intention among males rather than on the explanation of the role of promoting and impeding factors.

In Davis's study, the results from concurrently implemented quantitative and qualitative study strands will be combined and compared at the completion of both strands to develop meta-inferences and produce

**BOX 5.2****A Sequential MMAR Study to Examine Factors Related to Intent for HPV Vaccination among Collegiate Males in Alabama**

*Study Purpose:* The purpose of this MMAR study is to investigate factors associated with the HPV vaccination uptake among male college students to increase HPV vaccination rates for college males at a southeastern Research I university by using a sequential mixed methods design.

*Study Strands:* The study will consist of two strands: quantitative and qualitative. The goal of the quantitative strand is to identify prevalence of factors associated with intention of HPV vaccination among college males using survey data. The goal of the qualitative strand is to better understand and explain the factors influencing HPV vaccination intention, as revealed by the analysis of the survey data, using semistructured interviews with eight to ten purposefully selected survey respondents. The first, quantitative strand provides a scope of the research, while the second, qualitative strand will explain the scope of the research problem.

*Sequence or Timing:* The study will use a sequential timing—quantitative strand will be followed by the qualitative strand that builds on the results from the initial quantitative strand. In the first strand, quantitative data will be collected and analyzed to describe the sample and to identify prevalence of factors associated with the intention of HPV vaccination among college males. In the second strand, qualitative data will be collected and analyzed to explain the factors toward HPV vaccination intention identified in the first strand.

*Priority or Weighting:* Priority will be given to quantitative data due to the study focus on the prediction of outcomes with regard to HPV vaccination intention among males. The quantitative strand will be emphasized because it will guide the data collection in the qualitative strand.

*Integration or Mixing:* The rationale for integrating quantitative and qualitative methods in this study is to obtain validated meta-inferences to inform the development of HPV prevention education programs for males. The quantitative and qualitative study strands will be connected by selecting the participants for qualitative interviews from those who completed the survey and by developing interview questions addressing significant factors identified in the first strand. Additionally, the results from the quantitative and qualitative study strands will be combined when discussing the meta-inferences resulting from the findings from both strands related to promoting HPV vaccination among the students at a southeastern Research I university.

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Adapted from Cunningham (2011) with the author's permission.

well-validated conclusions about how to stimulate parents' involvement. In Cunningham's study, due to the sequential nature of quantitative and qualitative data collection and analysis, integration of the quantitative and qualitative methods will occur while connecting the two study strands: first, by selecting the participants for qualitative interviews from those college students who completed the survey and, second, by developing the interview questions addressing the factors that were identified as statistically significant in the first,

quantitative study strand. Additionally, integration will occur when discussing the meta-inferences resulting from the findings from both study strands to enhance understanding of how to promote HPV vaccination among the students at that university.

## BASIC MMAR STUDY DESIGNS

Based on the variation of the key methodological dimensions discussed above, four basic types of MMAR study designs are suggested to address the purposes and needs of the action research process:

- Concurrent Quan + Qual MMAR design
- Sequential Quan → Qual MMAR design
- Sequential Qual → Quan MMAR design
- Multistrand MMAR design

While the first three designs consist of two concurrent (Quan + Qual) or sequential (Quan → Qual or Qual → Quan) quantitative and qualitative strands, a multistrand MMAR design may consist of multiple concurrent and sequential strands. These designs are distinguished based on how quantitative and qualitative methods are jointly used to create meta-inferences to enhance practitioner-researchers' understanding of practical issues and to develop and implement action/intervention plans aimed at providing effective solutions to practical problems/issues. Being generic, functional, and conceptually easier for practitioner-researchers to implement, these designs allow for a wider application when addressing different purposes of the reconnaissance and evaluation phases in an MMAR study process. Box 5.3 summarizes MMAR designs and the purposes of their application in action research projects. The rest of the chapter describes the methodological characteristics of each design, illustrates their applications in published MMAR studies, and discusses the pros and cons of using these designs in the action research process.

Specific sampling, data collection, and data analysis strategies used in these MMAR designs are discussed in more detail in Chapters 7 and 8.

### Concurrent Quan + Qual MMAR Study Design

#### *Methodological Characteristics*

A concurrent Quan + Qual MMAR design typically includes two strands, during which quantitative and qualitative data are collected and analyzed separately or independently of each other (see Figure 5.1 for a conceptual model of this design).

The primary purpose of this design is to compare quantitative and qualitative results to obtain complementary evidence in different types of data and produce well-validated conclusions. The major advantage of this design is that it allows exploring a range of confirmatory (verifying knowledge) and exploratory (generating knowledge) research questions concurrently or simultaneously within the same study phase (Teddle &

## BOX 5.3

## Typology of MMAR Study Designs

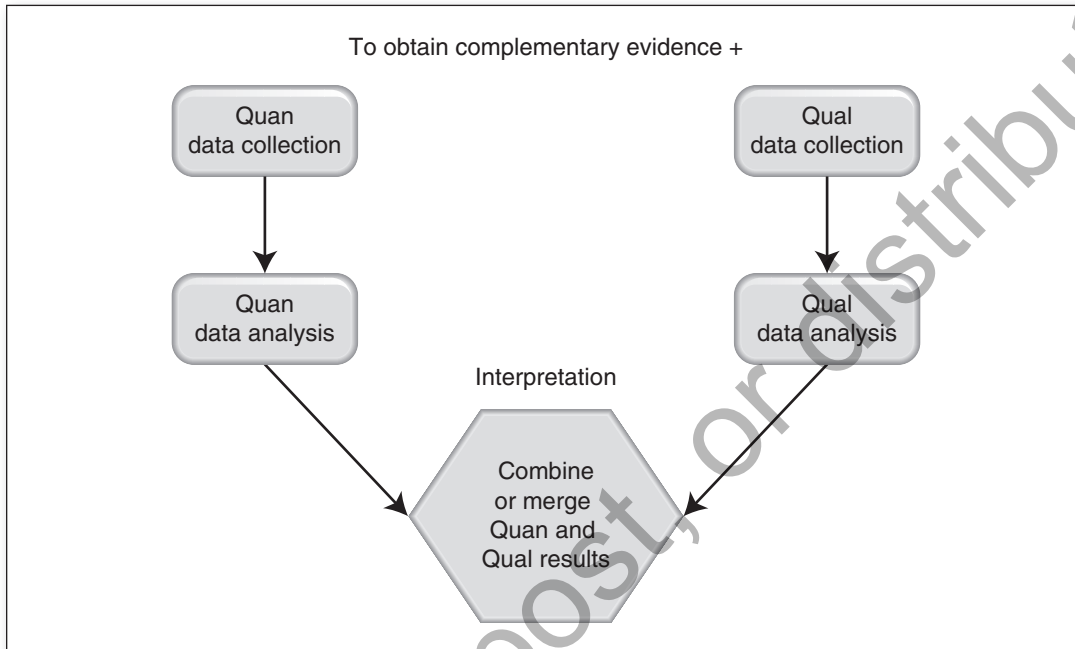
- *Concurrent Quan + Qual MMAR design*, consisting of two parallel or independent strands:
  - Purpose: To compare or merge quantitative and qualitative results to produce well-validated conclusions
- *Sequential Quan → Qual MMAR design*, consisting of two chronological strands with a quantitative strand first in sequence:
  - Purpose: To use follow-up qualitative data to elaborate, explain, or confirm initial quantitative results
- *Sequential Qual → Quan MMAR design*, consisting of two chronological strands with a qualitative strand first in sequence:
  - Purpose: To use initial qualitative data to develop new measures, and to identify unknown variables and relationships
- *Multistrand MMAR design*, consisting of multiple consecutive quantitative and qualitative concurrent and sequential strands:
  - Purpose: To combine and address the study goals consecutively in multiple strands by using the results from a previous sequential strand or two concurrent strands to inform the next consecutive combination of strands.

Tashakkori, 2009). For example, using a concurrent Quan + Qual MMAR design, an educational administrator who is seeking ways to effectively address the problem of high school students' truancy can concurrently explore the following research questions:

- Quantitative strand: What are the trends of students' absenteeism across the grades and school year in high school X? How do these trends correlate with reported students' absenteeism trends across the school district?
- Qualitative strand: What factors from the perspective of students, parents, and teachers can explain the reported students' absenteeism trends in high school X?

A concurrent design is well established in mixed methods literature, but it is referred to using different names: convergent parallel design (Creswell & Plano Clark, 2011), parallel mixed design (Teddle & Tashakkori, 2009), concurrent triangulation design (Creswell, 2009), simultaneous design (Morse & Niehaus, 2009), convergent design (Greene, 2007), triangulation design (Creswell & Plano Clark, 2007), and simultaneous triangulation design (Morse, 1991). As all these names suggest, in this design the two study strands, quantitative and

FIGURE 5.1

**Conceptual Model of a Concurrent Quan + Qual MMAR Study Design**

qualitative, are conducted independently from each other, either at the same time or with some time lapse within the same phase in the study process.

For example, in a high school student's truancy situation, numeric absenteeism data can be obtained from the school records and compared with absenteeism indicators across the school district to address quantitative research questions. At the same time, individual interviews can be conducted with select students who missed school at a higher rate than average and with those students' parents and teachers to answer a qualitative research question. Two other examples of concurrent timing include administration of a quantitative survey to a large group of people while simultaneously conducting individual or focus group interviews with a few individuals; or using a survey instrument that contains both close-ended and open-ended questions, thus allowing for collecting both types of data—quantitative and qualitative—within one survey administration.

Refer to Chapter 4 for the discussion of research questions in an MMAR study.

The priority or weight in a concurrent Quan + Qual MMAR design is typically given to both study strands because each study strand addresses related aspects of the same overarching mixed methods or integrated MMAR question in a complementary way. Integration of the quantitative and qualitative methods occurs after the analysis of the data in both study strands is completed; then the results are interpreted together. The most typical integration strategy is to compare or



synthesize quantitative and qualitative results to find corroborating evidence and to produce a more complete understanding of the research problem (Creswell & Plano Clark, 2011). For example, the numeric absenteeism trends from the school records and their correlations with overall school district trends can be compared with the themes about absenteeism influencing factors from the interviews to find explanations for variations in the trends across the grades and different time periods during the school year. Another strategy is to merge both set of results for further quantitative or qualitative analysis; this strategy involves transformation of one type of results, such as quantitative counts, into another type, such as qualitative categories and themes, or vice versa, and then conducting the joint analysis of the transformed data. Merged data analysis through data transformation is discussed in more detail in Chapter 8. Integration of quantitative and qualitative methods in this design is further discussed in Chapter 6.

### *Examples of Application in Action Research*

A concurrent Quan + Qual MMAR design is commonly used in action research. The review of the 108 MMAR studies discussed in Chapter 3 revealed that it was the design of choice in about 73% of all studies. In the process of conducting an MMAR study, a concurrent Quan + Qual MMAR design can be applied in both reconnaissance and evaluation phases, however it was more frequently used to evaluate the effects of the action/intervention than to conduct the needs assessment. In both instances, practitioner-researchers can use this design to compare or triangulate quantitative results from statistical tests with qualitative findings from thematic analysis of text data by comparing or merging them to obtain more complete evidence for the studied issue.

In the reconnaissance phase, using a concurrent Quan + Qual MMAR design can help conduct a more thorough initial analysis of a practical problem or lead to a more comprehensive needs assessment by collecting data from multiple data sources, for example, using quantitative surveys and tests, and qualitative interviews and observations of multiple stakeholders at the same time. In the evaluation phase, a concurrent Quan + Qual MMAR design can help provide more validated conclusions about the effectiveness of the employed action/intervention plan by triangulating multiple quantitative and qualitative data sources to seek corroborating evidence and input from those involved in the action research process.

For example, in Glasson and colleagues' (2006) MMAR study (Example B) of nursing care for older acutely ill hospitalized patients, a concurrent Quan + Qual MMAR design was applied in both the reconnaissance and evaluation phases. During the reconnaissance phase, the aspects of nursing care that acutely ill older patients perceived as being important but found unsatisfactory were identified by triangulating the results from patient and nurse quantitative questionnaires and the researcher's observation notes of the nursing staff discussions about a new model of care grounded in patients' needs. The purpose of quantitative and qualitative data triangulation at this stage was "to establish an evidence-base for an evolving model of care" (p. 588). A concurrent Quan + Qual MMAR design was also employed to evaluate the effectiveness of the implemented new model. The quantitative and qualitative data from 60 acutely ill patients, of both genders, and from 13 nurses working in the ward were collected and analyzed concurrently using the same instruments and strategies. The integrated survey and focus group findings confirmed the efficacy of the new model of nursing care and provided directions for its further implementation and monitoring in the ward. In both applications of a concurrent Quan + Qual MMAR design in this study, the priority was given to both survey and narrative data, because



both were seen equally important in providing insight related to improving the quality of nursing care for older acutely ill hospitalized patients.

Similarly, in the field of management Maritz and colleagues (2011) used a concurrent Quan + Qual MMAR design in the reconnaissance phase of their MMAR study to explore the interface between strategy-making and responsible leadership within organizations in South Africa. The use of this design was emphasized through the combination of qualitative and quantitative data collection and analysis procedures. To capture multiple views on strategy-making modes, different types of data were collected from participants at different organizational levels, including top- and lower-level management and nonmanagerial employees. The researchers conducted in-depth interviews with 17 CEOs and managers involved in strategy-making, and surveyed 210 managerial and nonmanagerial employees across different organizations. The weight that the quantitative and qualitative methods carried in the study seemed equal as both types of data were perceived “instrumental in providing knowledgeable information through interviews as well as distribute questionnaires to respondents within their organizations” (p. 106). Comparison of the survey and interview findings allowed the researchers to identify two types of strategy-making in organizations—deliberate and emergent—and to provide recommendations for specific training in strategy making for organizational leaders.

Alternatively, in Kostos and Shin's (2010) MMAR study (Example A) of the effectiveness of journaling as a math teaching and learning strategy, a concurrent Quan + Qual MMAR design was applied in the evaluation phase to assess whether the use of math journals had improved the second graders' communication of mathematical thinking. The researchers chose a design that allowed for the concurrent analysis of multiple forms of quantitative and qualitative data—students' math assessments, math journals, and interviews, along with the teacher's reflective journal because they viewed triangulation of quantitative and qualitative methods and findings as beneficial and allowing to add “scope and breadth to a study” (p. 226). Qualitative data such as journals and interviews seemed to receive more priority in the study because the researchers' focus was on how the students communicated their mathematical thinking when using math journals before and prior to this instructional intervention. Comparison of students' pre- and posttest scores, with qualitative themes from students' math journals and interviews and the teacher's reflections, allowed the researchers to obtain corroborating evidence that the use of math journals positively influenced the students' communication of mathematical thinking and use of math vocabulary. Based on these findings, the teacher-researcher decided to more systematically incorporate math journaling in daily math lessons.

### *Procedural Pros and Cons*

Practitioner-researchers who decide to use a concurrent Quan + Qual MMAR design in the reconnaissance and/or evaluation phases in an MMAR study should consider the pros and cons of this design. On the one hand, this design is advantageous because it allows for collecting both quantitative and qualitative data within a short period of time, thus helping save time and the associated cost for conducting the study (Creswell & Plano Clark, 2011; Morse & Niehaus, 2009). Being cost- and time-efficient is an important consideration for action research projects that are often initiated to address immediate problems within a short time-frame. Another major strength of this design is that it allows for obtaining “different but complementary data on the same topic” (Morse, 1991). Implementing quantitative and qualitative strands of this design within the same time frame often calls for a team approach (Creswell & Plano Clark, 2011), which aligns well

with a collaborative and inclusive nature of action research. The necessity to simultaneously handle different data collection and analysis procedures may require different research skills, as well as active involvement of community members.

Alternatively, a concurrent Quan + Qual MMAR design is associated with a number of challenges that also should be considered when weighting the pros and cons of using this design. As a downside to the advantage discussed above, implementing this design may be challenging for a sole practitioner-researcher because of the need to concurrently implement quantitative and qualitative strands of equal priority that often require different sets of research skills (Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009). However, the collaborative nature of action research and partnerships with other practitioner-researchers, community members, and college faculty may help overcome this challenge. Additional challenges may be associated with the integration of quantitative and qualitative results that may not produce supporting or corroborating evidence, but rather show divergent and even conflicting outcomes. In this situation, practitioner-researchers may find it difficult to explain or resolve these inconsistencies and produce meaningful conclusions (Teddlie & Tashakkori, 2009). Carefully selecting the study participants and the most relevant data sources may help reduce this threat, although practitioner-researchers should always be ready to face this particular challenge because of different underlying epistemological approaches to quantitative and qualitative data collection and analysis. Finally, merging the two sets of results in order to produce one quantitative or qualitative data set and to use that data set in further analysis may be challenging, particularly if the collected data do not explore the same concepts (Creswell & Plano Clark, 2011).

Figure 5.2 presents a flow of ideas and methodological steps in a concurrent Quan + Qual MMAR design that may help practitioner-researchers make informed decisions in applying this design to their MMAR projects.

## Sequential Quan → Qual MMAR Study Design

### *Methodological Characteristics*

A sequential Quan → Qual MMAR design consists of two chronological strands, during which quantitative data are collected and analyzed first in the sequence, and qualitative data are collected and analyzed second and follows up on the meaning of specific quantitative results (see Figure 5.3 for a conceptual model of this design).

The primary purpose of this design is to use subsequent qualitative data to elaborate, explain, or confirm initial quantitative results to obtain a more complete understanding of the emergent trends and relationships in the data. The study strands are connected and address confirmatory and exploratory questions in chronological order (Teddlie & Tashakkori, 2009). For example, using a sequential Quan → Qual MMAR design, an educational administrator who is seeking ways to effectively address the problem of high school students' truancy can sequentially explore the following research questions:

- Quantitative strand: What is the relationship between students' absenteeism across grades and school climate in high school X?
- Qualitative strand: How does school climate promote or impede students' absenteeism across grades in high school X?

FIGURE 5.2

### Concurrent Quan + Qual MMAR Study Design Decision Flowchart

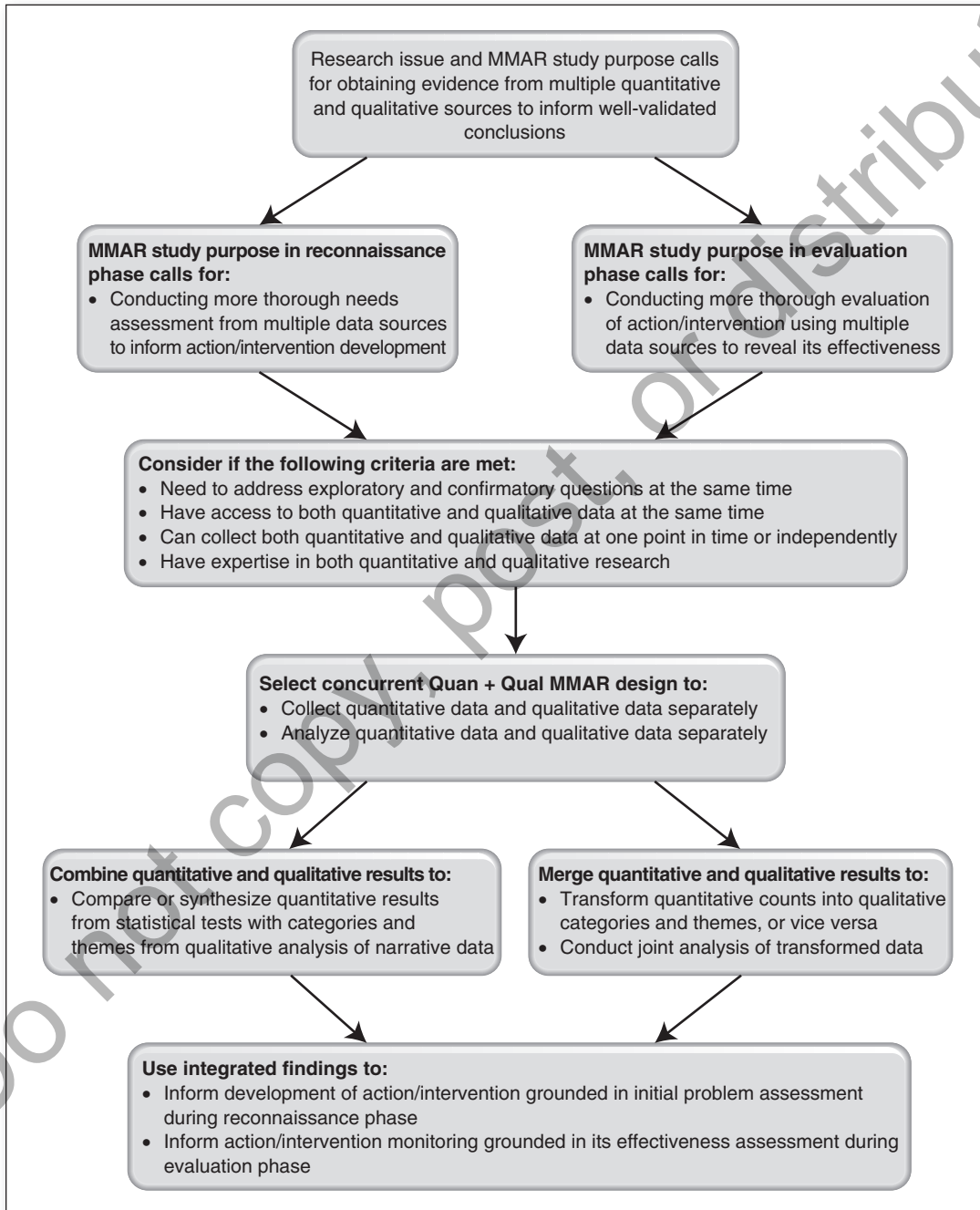
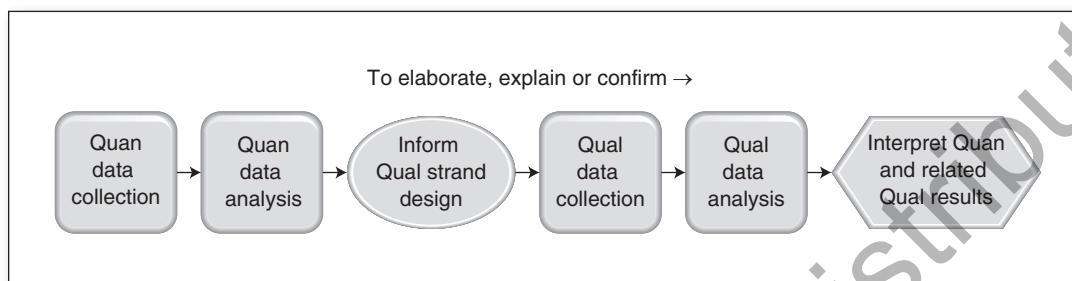


FIGURE 5.3

**Conceptual Model of a Sequential Quan → Qual MMAR Study Design**

A sequential Quan → Qual design is popular among mixed methods researchers and is known under different names: sequential explanatory design (Creswell & Plano Clark, 2011), sequential mixed design (Teddlie & Tashakkori, 2009), two-phase design (Creswell, 1994), sequential quantitatively driven design (Morse & Niehaus, 2009), iteration design (Greene, 2007), and sequential triangulation (Morse, 1991). A sequential implementation of the quantitative and qualitative strands makes the design more straightforward and easier to organize and implement: first conducting a quantitative strand and obtaining the quantitative results, and then conducting a qualitative strand to explain or elaborate on these quantitative results.

For example, in a high school student's truancy situation, teachers, students, and parents can be surveyed to obtain their assessment of school climate and its potential relationship with students' absenteeism to address a quantitative research question. Once the quantitative analysis of the survey data and absenteeism indicators is complete, a subset of teachers, students, and parents who responded to the survey can be selected for individual or focus group interviews to better understand the revealed relationships in the quantitative data and thus to address a qualitative research question. In this design the study research questions and specific quantitative findings predetermine the particular individuals or groups of individuals who are selected for qualitative follow-up. These may include typical cases—that is, individuals who represent how the dominant majority responded to survey questions (Ivankova et al., 2006; Morgan, 1998), or extreme, outlier, or unique cases—that is, individuals who hold a different opinion or experience from the dominant majority (Caracelli & Greene, 1993; Ivankova, 2014; Morse, 1991).

The priority or weight in a sequential Quan → Qual MMAR design is typically given to the first, quantitative study strand because this design is typically used when the research problem and related study purpose require exploration using quantitative methods (Creswell & Plano Clark, 2011). Similarly, Morse and Niehaus (2009) considered quantitative to be a core, or a primary, component in this design and qualitative to perform a supplemental role. However, sometimes the study research focus may shift toward in-depth understanding of the issue versus assessment of trends and relationships, and the qualitative component takes more weight in the study (Ivankova et al., 2006). This often happens in action research; for example, during an initial assessment of a practical problem/issue, practitioner-researchers may decide to conduct more qualitative interviews and review more relevant documents than they had initially planned, because exploration of the views of additional stakeholders becomes important for the development of an effective action/intervention plan. In this design

integration of the quantitative and qualitative methods typically occurs chronologically at the completion of the first, quantitative strand and beginning of the second, qualitative strand—that is, “questions or procedures of one strand emerge from or depend on the previous strand” (Teddlie & Tashakkori, 2009, p. 151). Additionally, the results from both study strands are interpreted together so that the qualitative findings can provide a better understanding of the initial quantitative results.

For example, the results from quantitative survey data analysis about a potential relationship of school climate with students’ absenteeism will inform the selection of a sample of teachers, students, and parents for individual follow-up interviews and what quantitative results to further elaborate on qualitatively. The researcher may proportionally select participants who responded similarly to survey questions representing each grade or may decide to follow up on unique or outstanding responses. Once the second, qualitative study strand is completed, the results from both study strands will be interpreted together to provide an in-depth explanation of the studied problem. Integration of quantitative and qualitative methods in this design is further discussed in Chapter 6.

### *Examples of Application in Action Research*

Although a sequential Quan → Qual design is very popular in mixed methods studies in social and health sciences (Ivankova et al., 2006; Morse & Niehaus, 2009), the analysis of the 108 MMAR studies discussed in Chapter 3 revealed that this design was used in a small number of studies. The review of these studies and additional published MMAR research proposals in health care showed that a sequential Quan → Qual MMAR design can be equally applied in the reconnaissance and evaluation phases to elaborate, explain, or confirm initial quantitative results with follow-up qualitative data to obtain a better understanding of the situation or problem. Practitioner-researchers can employ a sequential Quan → Qual MMAR design to conduct an initial quantitative assessment of the problem using surveys and tests, and then to explore these results through in-depth individual interviews or focus group discussions with key stakeholders or select community members who can provide additional insight into the issue. In the evaluation phase, a sequential Quan → Qual MMAR design can help practitioner-researchers perform a more effective evaluation of the employed action/intervention plan, first by collecting numeric indicators and then by following up with select stakeholders to explain what these indicators mean to them and how the initial action/intervention plan can be revised based on this evaluation. In both phases, the use of a sequential Quan → Qual MMAR design can help first obtain a broad assessment of the problem and then secure understanding of its specific aspects that is more in-depth.

For example, Pickard (2006) applied a sequential Quan → Qual MMAR design in the reconnaissance phase to explore faculty and college students’ attitudes to plagiarism at University College Northampton (UCN) in the United Kingdom. The overall aim of this study was “to contextualize the problem at UCN [University College Northampton]; to produce evidence, raise awareness of the issues and encourage debate about the pedagogical issues associates with it” (p. 215). During the first strand, quantitative survey data were collected from 53 faculty and 509 students from a range of disciplines to assess the extent of the problem; during the second strand, individual unstructured and semistructured interviews were planned to be conducted with faculty and students to follow up on the major findings from the survey related to students’ behavior and staff’s experiences with plagiarism. To justify the use of a sequential Quan → Qual MMAR design, Pickard pointed out that

quantitative survey “was valuable in contextualizing the issue and allowed some scope for empirical generalizations but was not considered to be an appropriate methodology to explore the more complex human behaviors” (pp. 218–219). Qualitative follow-up individual interviews allowed “the voices of those involved to be heard and to develop explanations based on analysis of their narratives” (p. 219).

In a published research protocol for a proposed MMAR study (Montgomery et al., 2008; Example E), the researchers chose a sequential Quan → Qual MMAR design to evaluate “the processes and outcomes of supported housing programs for persons living with a serious mental illness in northeastern Ontario from the perspective of clients, their families and community workers” (p. 3). During the first study strand, the quantitative data collected from a series of surveys with housing residents will provide baseline data about their demographic characteristics, quality of life, housing stability, and housing preferences. These results will inform qualitative focus groups and photo-voice data collection strategies to further explore perceptions of the supported housing services from multiple stakeholders’ perspectives in the second, qualitative study strand. One of the research questions that this proposed study aims to answer using the integrated findings is, “What supported housing services need to be changed in order to make the most difference in the day-to-day lives of clients?” (p. 3)

Similarly, Seymour and colleagues (2011) applied a sequential Quan → Qual MMAR design to evaluate a three-day community-based peer education training program aimed at preparing volunteers for advance care planning and associated end-of-life care issues. The researchers first collected quantitative data via a mail questionnaire sent to 24 participants four months after the completion of the training. The questionnaire results were used to inform the development of the qualitative interview protocol created to guide a focus group discussion with 20 peer educators six months after the training, and individual and group interviews with 25 volunteers over a period of 12 to 18 months. These follow-up focus groups and interviews addressed peer educators’ perceptions of and experiences with peer education and related activities. The qualitative findings helped understand the initial quantitative results of why certain individuals in the community were more likely to take on the role of a peer educator and ultimately helped enhance this training program effectiveness.

### *Procedural Pros and Cons*

Practitioner-researchers who decide to use a sequential Quan → Qual MMAR design in the reconnaissance and/or evaluation phases in an MMAR study should consider the pros and cons of this design. On one hand, the sequential nature of the quantitative and qualitative data collection and analysis makes this design more straightforward and easier to implement by one researcher (Creswell & Plano Clark, 2011; Ivankova et al., 2006; Morse & Niehaus, 2009). Because a study using a sequential Quan → Qual MMAR design typically progresses in “a slower, more predictable manner,” it is less complicated methodologically (Teddlie & Tashakkori, 2009, p. 153). A strong quantitative orientation of this design makes it attractive in disciplines where quantitative is the dominant research approach. Other advantages of this design include the opportunities for the exploration of the initial quantitative results in more detail, especially when unexpected results arise from a quantitative strand (Morse, 1991). Besides, an emergent nature of a sequential Quan → Qual MMAR design (Morse & Niehaus, 2009) allows for a certain methodological flexibility because the design components of the follow-up qualitative strand are shaped by the outcomes of the first quantitative strand.



Despite obvious advantages inherent to a sequential Quan → Qual MMAR design, its implementation is associated with a number of challenges that should also be considered in weighting the pros and cons for using this design. The limitations of this design are related to the length of time and feasibility of resources to collect and analyze both sets of data. Using this design may be especially challenging in small-scale action research projects that need to address immediate practical problems, but that have limited resources at hand. Another challenge for practitioner-researchers is related to a wait time that is associated with having first to complete quantitative data collection and analysis before making a decision about what stakeholders to approach to further explore the emerged quantitative results and what additional permissions may be needed. This is particularly important when obtaining an approval for a sequential Quan → Qual MMAR study by the IRB (Creswell & Plano Clark, 2011). Because many of the research aspects of the second qualitative strand are yet unknown at the study design stage—for example, what participants will be selected for follow-up interviews, or what questions will be discussed during the follow-up focus groups—practitioner-researchers have to submit an IRB amendment once the first quantitative strand is completed, which ultimately extends the time of the study. This can potentially make this design less attractive in addressing immediate practical problems or in responding to urgent situations.

Additional challenges may be associated with deciding what quantitative results to follow up and what stakeholders' views and opinions to further explore. Choosing less important quantitative results and selecting wrong individuals for follow-up may produce inconsistencies in the quantitative and qualitative conclusions (Creswell & Plano Clark, 2011) and result in an erroneous and incomplete assessment of a practical problem leading to the development of a less effective action/intervention plan, or making flawed conclusions about the effectiveness of the action/intervention during its evaluation and monitoring.

Figure 5.4 presents a flow of ideas and methodological steps in a sequential Quan → Qual MMAR design that may help practitioner-researchers make informed decisions when applying this design to their MMAR projects.

## Sequential Qual → Quan MMAR Study Design

### *Methodological Characteristics*

A sequential Qual → Quan MMAR design also consists of two chronological strands. However, this design starts with qualitative data collection and analysis to first explore the problem using qualitative methods. Quantitative data collection builds on the findings from the first, qualitative strand, and occurs during the second study strand (see Figure 5.5 for a conceptual model of this design).

The primary purpose of this design is to initially explore the phenomenon of interest using qualitative methods and then to test the revealed variables and relationships quantitatively. This design is often used to inform the development of quantitative measurement instruments, to identify variables to study quantitatively, to reveal patterns in behavior, to test the emergent theory, and to determine the distribution of a phenomenon within a chosen population (Creswell & Plano Clark, 2011; Greene, 2007; Morgan, 1998; Morse, 1991; Morse & Niehaus, 2009). Similar to a sequential Quan → Qual MMAR design, in Qual → Quan MMAR design the study strands are connected and address both exploratory and confirmatory questions in chronological order (Teddlie & Tashakkori, 2009). For example, using a sequential Qual → Quan MMAR design, an educational



FIGURE 5.4

**Sequential Quan → Qual MMAR Design Decision Flowchart**

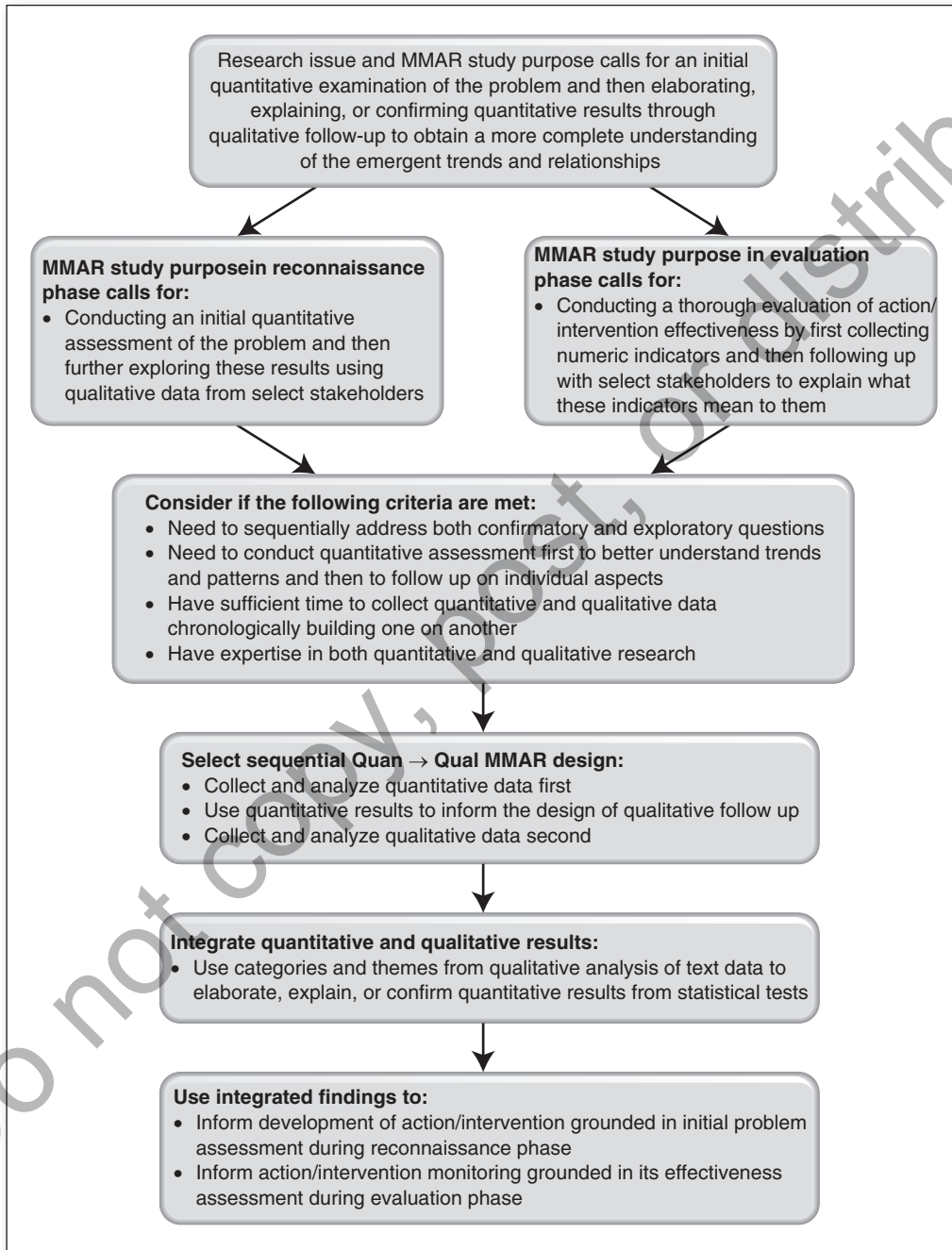
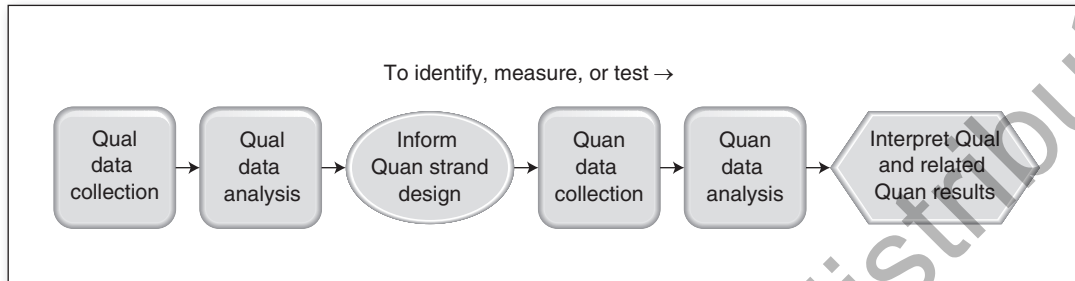


FIGURE 5.5

**Conceptual Model of a Sequential Qual → Quan MMAR Study Design**

administrator who is seeking ways to effectively address the problem of high school students' truancy can sequentially explore the following research questions:

- Quantitative strand: What school-, home-, and community-related factors, as perceived by students, parents, and educators, influence students' absenteeism across grades in high school X?
- Qualitative strand: How do these factors correlate with the number of days missed for different reasons by students in high school X?

A sequential Qual → Quan design is frequently used in mixed methods research. It is most often used to inform the development of a new measurement instrument when a needed tool is not available. Therefore, this design is often referred to as instrument-development design (Creswell, Fetters, & Ivankova, 2004), but in the mixed methods literature it is also known as sequential exploratory design (Creswell & Plano Clark, 2011), sequential mixed design (Teddle & Tashakkori, 2009), iteration design (Greene, 2007), sequential qualitatively driven design (Morse & Niehaus, 2009), and quantitative follow-up design (Morgan, 1998). Similar to a sequential Quan → Qual MMAR design, a consecutive implementation of the qualitative and quantitative strands makes Qual → Quan MMAR design easier to implement in separate strands: first, conducting a qualitative strand to obtain an in-depth understanding of the studied phenomenon or issue and, then, developing a quantitative strand to measure and test the revealed variables, patterns, and relationships.

For example, individual or focus group interviews can be conducted with selected individuals first to explore the phenomenon of interest (e.g., student absenteeism) and to identify important factors or variables to further study quantitatively (Creswell & Plano Clark, 2011). In many cases, themes, categories, and quotes from the qualitative analysis of interview and focus group data inform the development of the quantitative instrument to measure the identified variables or to test an emergent theory (Palcanis et al., 2012). Once the instrument is created and tested, a larger group of individuals who have not participated in the first, qualitative study strand is selected to complete a quantitative survey in the second, quantitative strand. Thus, the use of a sequential Qual → Quan MMAR design allows researchers to systematically explore the phenomenon of interest and to test and generalize the qualitative exploratory findings to a larger population.

To refer to a high school students' truancy situation, focus groups can be conducted with select students, parents, and educators to reveal the role that school-, home-, and community-related factors may play in influencing

students' absenteeism in this school, thus addressing a qualitative research question. Based on the analysis of the focus group data, a new questionnaire that will include qualitatively identified factors/variables can be developed to survey all school personnel, students, and parents in order to identify the relationships between these factors and students' absenteeism, thus addressing a quantitative research question.

The priority or weight in a sequential Qual → Quan MMAR design is typically given to the first, qualitative study strand because in this design “the researcher starts by qualitatively exploring a topic before building to a second, quantitative phase” (Creswell & Plano Clark, 2011, p. 86). Similarly, Morse and Niehaus (2009) considered qualitative to be a core, or a primary, component in this design, while the qualitative component is performing a supplemental role.

For example, practitioner-researchers may extensively use qualitative methods to conduct an in-depth exploration of the practical problem; then they may use these findings to inform a focused assessment of the views of multiple stakeholders to verify the issue and identify its effective solution. In this design, integration of the qualitative and quantitative methods typically occurs chronologically at the completion of the first, qualitative strand and beginning of the second, quantitative strand. As in a sequential Qual → Quan MMAR design, “questions or procedures of one strand emerge from or depend on the previous strand” (Teddlie & Tashakkori, 2009, p. 151). Additionally, the results from both study strands are interpreted together so that the quantitative results can verify, confirm, or generalize the initial exploratory qualitative findings.

To illustrate, in a high school student's truancy situation, qualitative themes and categories from the analysis of the focus groups with students, parents, and educators will inform the development of a new survey instrument that will be administered to all school personnel, students, and parents in this school. Once the second, quantitative study strand is completed and the survey data are analyzed, the results from both study strands will be interpreted together to confirm and generalize the focus group qualitative findings, thus providing a more complete understanding of the studied problem. Integration of qualitative and quantitative methods in this design is further discussed in Chapter 6.

### *Examples of Application in Action Research*

A sequential Qual → Quan MMAR design is a more frequently used sequential design. The analysis of the 108 MMAR studies discussed in Chapter 3 showed that this design is more often applied in the reconnaissance phase of an MMAR study because the intent is to obtain a more complete exploration of a practical problem and thus to better inform the development of the action/intervention plan. Practitioner-researchers can employ a sequential Qual → Quan MMAR design to conduct an initial qualitative exploration of the problem/issue using naturalistic observations of the settings and employing individual and focus group interviews with key informants to identify and subsequently test important variables and relationships with a larger group of stakeholders. A sequential Qual → Quan MMAR design can also help practitioner-researchers perform a more effective evaluation of the implemented action/intervention by first exploring select stakeholders' perceptions about the action/intervention effects so that to inform further quantitative examination of its effectiveness among multiple stakeholders. In both of these phases in the action research process, the use of a sequential Qual → Quan MMAR design can help initially explore the phenomenon or issue of interest, and then assess it by using quantitative methods.

For example, in Craig's (2011) MMAR study (Example C), a sequential Qual → Quan MMAR design was applied during the reconnaissance phase to conduct “a mixed-methods community needs assessment with the intent of

creating a system of care for gay, lesbian, bisexual, transgender, and questioning (GLBTQ) youths in an urban area” (p. 274). During the first, qualitative strand, documented evidence about existing national and local GLBTQ programs was collected to identify the key informants. Then, the researcher interviewed 45 key informants from the community consisting of local service providers, community leaders, and other stakeholders. In addition, 10 focus groups with GLBTQ youths were conducted “to deepen relationships with the population of interest and to provide a richer understanding of the true needs of the population by building upon the perspective of the providers” (p. 281). During the second, quantitative strand, “based on the domains articulated in the qualitative research,” the researcher identified and modified a survey instrument that was completed by 273 GLBTQ youths (p. 282). Such a deliberate approach to needs assessment and exploration of the issue from multiple perspectives ensured that all stakeholders’ views were represented in the recommendations for developing a system of care for GLBTQ youths. It has also supported the effectiveness of the approach as a means “of community empowerment and decision-making in the development of a plan for a system of care” (p. 283).

In Reese, Ahern, Nair, O’Faire, and Warren’s (1999) MMAR study exploring cultural and institutional barriers to access and use of hospices by African Americans, a sequential Qual → Quan MMAR design was also applied in the reconnaissance phase “to explore unexpected reasons for the lack of participation of African Americans in hospice” (p. 552). During the first study strand, qualitative interviews were conducted with six African American pastors to identify major themes “to develop a quantitative measure, which was used in the subsequent quantitative strand of the study” (p. 553). Additionally, several hypotheses were generated based on the emergent qualitative findings that were further tested in the quantitative strand. During the second strand, 127 hospice patients, churchgoers, and nonchurchgoers completed the developed questionnaire. Besides testing those research hypotheses, the quantitative findings were also used to explore the credibility of the qualitative findings.

Similarly, in a study of transitions in care from hospital to homeless shelter, Greysen and colleagues (2012) used a sequential Qual → Quan MMAR design in the reconnaissance phase to accomplish two objectives: “to understand patients’ experiences of transitions from hospital to a homeless shelter, and to determine aspects of these experiences associated with perceived quality of these transitions” (p. 1485). During the first strand, consistent with the community-based participatory research approach, the researchers explored the key stakeholders’ perspectives by conducting several focus groups with case managers, social workers, and executive staff, and by conducting 10 individual interviews and one focus group with homeless individuals at one shelter. The purpose of the qualitative data collection was to identify improvement priority areas and to design a survey instrument to explore the views and experiences of all shelter residents. Based on the analysis of those qualitative data, Greysen and colleagues determined that their “first research priority would be to generate patient-centered data about transitions in hospital care from individuals actively seeking shelter in our community” (p. 1486). To collect the data from a large sample of homeless individuals, they designed a 20-item multiple choice survey with two open-ended questions grounded in the results from the qualitative analysis. During the second study strand, a new instrument was pilot tested and administered to 98 eligible shelter residents.

### *Procedural Pros and Cons*

Practitioner-researchers who decide to use a sequential Qual → Quan MMAR design in the reconnaissance and/or evaluation phases in an MMAR study should consider the pros and cons of this design. Similar to a sequential Quan → Qual MMAR design, the sequential nature of the qualitative and quantitative data collection and analysis makes Qual → Quan MMAR design more straightforward methodologically and thus easier to implement by

a single researcher (Creswell & Plano Clark, 2011; Morse & Niehaus, 2009; Teddlie & Tashakkori, 2009). The strong qualitative orientation of this design makes it particularly appropriate for action research because qualitative methods allow for in-depth input from the study participants as key informants. In their justification of the use of qualitative methods to inform the subsequent quantitative data collection, Reese and colleagues (1999) stated, “Thus, we see qualitative methodology as an important component of participatory action research” (p. 552). A sequential Qual → Quan MMAR design is specifically advantageous for those researcher-practitioners who want first to explore the phenomenon of interest in depth with a few stakeholders, and then to expand these findings to multiple stakeholders. Similar to a sequential Quan → Qual MMAR design, the emergent nature of Qual → Quan MMAR design (Morse & Niehaus, 2009) allows for methodological flexibility because the design components of the subsequent quantitative strand are shaped by the initial qualitative findings about the studied problem.

As with any MMAR design, a sequential Qual → Quan MMAR design is not void of challenges that should be considered when weighting the pros and cons of this design. Similar to a sequential Quan → Qual MMAR design, this design requires lengthy time and resources to collect and analyze both sets of data (Creswell & Plano Clark, 2011). This may have negative implications for small-scale action research projects that need to promptly address immediate practical issues with sometimes limited resources. Additionally, developing a measurement instrument is a lengthy and complex process that requires adherence to special psychometric procedures (DeVellis, 2011). Partnerships with local university or professional agency consultants may help practitioner-researchers acquire the expertise needed to ensure the new instrument is reliable and valid and correctly reflects the views of large groups of stakeholders.

Another challenge is related to the need for practitioner-researchers to wait until the completion of the initial qualitative exploration of the studied phenomenon to be able to identify the variables, patterns, and relationships that will be examined further with large groups of stakeholders. Similar to a sequential Quan → Qual MMAR design, adhering to Qual → Quan MMAR design requires practitioner-researchers to submit an amendment to an original IRB approval after the instrument is developed and thus to secure additional permissions to use it to survey large groups of stakeholders. Additional challenges may be associated with deciding what qualitative results to choose to inform the development of the instrument (Creswell & Plano Clark, 2011), what hypotheses generated from the qualitative strand might be used to further test quantitatively, what groups of stakeholders to survey, how many individuals to include, and how to gain access to these individuals. Creswell and Plano Clark (2011) warned that choosing weak qualitative findings, focusing on testing hypotheses that are less important, and selecting wrong individuals to survey may produce inconsistencies in the qualitative and quantitative conclusions. Such inconsistent and unreliable results may lead to an erroneous and incomplete assessment of the practical problem, development of a less effective action/intervention plan, or flawed conclusions about the effectiveness of the plan during its implementation and evaluation.

Figure 5.6 presents a flow of ideas and methodological steps in a sequential Qual → Quan MMAR design that may help practitioner-researchers make informed decisions in applying this design to their MMAR projects.

## Multistrand MMAR Study Design

### *Methodological Characteristics*

A multistrand MMAR design typically consists of more than two concurrent or sequential strands and is considered to be a more complex design (Teddlie & Tashakkori, 2009). For example, this design can begin as a

concurrent Quan + Qual MMAR design and have quantitative and qualitative data collected and analyzed independently. Then it can be followed by a strand of a different method (Quan + Qual  $\rightarrow$  Quan, or Quan + Qual  $\rightarrow$  Qual). Similarly, it can start as a sequential Quan  $\rightarrow$  Qual or Qual  $\rightarrow$  Quan MMAR design and can be followed by a concurrent Quan + Qual (Quan  $\rightarrow$  Qual  $\rightarrow$  Quan + Qual, or Qual  $\rightarrow$  Quan  $\rightarrow$  Quan + Qual) or another sequential strand (Quan  $\rightarrow$  Qual  $\rightarrow$  Quan, or Qual  $\rightarrow$  Quan  $\rightarrow$  Qual) of data collection and analysis. Variations are numerous and are evident from the review of published MMAR studies. The sequence and number of the quantitative and qualitative concurrent and sequential strands depend on the project purpose and specific goals of each study strand (see Figure 5.7 for a conceptual model of this design). As stated earlier in this chapter, the longitudinal and interactive nature of action research makes it easy to align it with a multistrand MMAR design, generating evidence from multiple differently sequenced quantitative and qualitative study strands within an overall action research project framework.

Consistent with a sequential implementation of different forms of data collection and analysis, the results from one method, quantitative or qualitative, are used to inform the development of another method, quantitative or qualitative. This design is particularly useful when the project has multiple exploratory and confirmatory questions that need to be addressed chronologically. The priority or weight of quantitative and qualitative methods may be equal because one method meaningfully informs the development of the other and builds on the previous method (Greene, 2007). The integration of the quantitative and qualitative methods in a multistrand MMAR design is done in accordance with the integration procedures specific to the concurrent or sequential designs. However, because in this design each strand often leads to another, integration may occur chronologically at the completion of one strand and beginning of the next strand when research questions and procedures of one strand emerge from or depend on the results from the previous strand (Teddle & Tashakkori, 2009).

### *Examples of Application in Action Research*

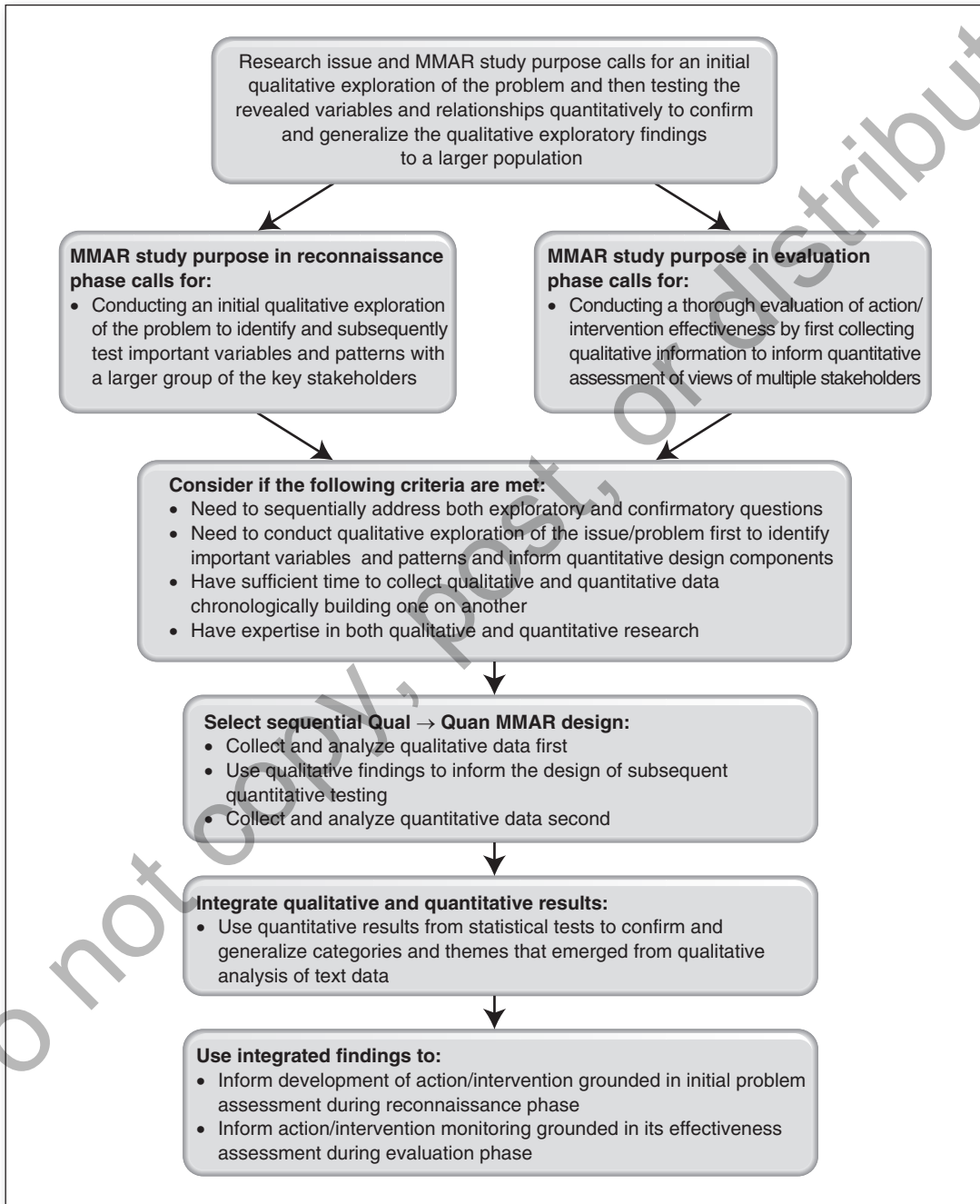
Applying a multistrand MMAR design during the reconnaissance phase of an MMAR study can be advantageous because an additional chronological or concurrent exploration of a practical problem or issue may be important to capture all aspects of the issue from multiple stakeholders' viewpoint. In the evaluation phase, inclusion of multiple chronological or concurrent quantitative and qualitative strands may be necessary to ensure that the conclusions made about the effectiveness of the action/intervention are thorough and consistent with the views of everybody involved in the action research process.

To illustrate, in Sampson's (2010) MMAR study (Example D), a multistrand MMAR design was applied to inform the development and implementation of the English language instruction in the EFL Japanese Interpersonal Communication college class that was based on the assessment of students' preferences. The study consisted of the following multiple strands: Quan + Qual  $\rightarrow$  Qual  $\rightarrow$  Quan. First, a concurrent Quan + Qual data collection and analysis was applied to identify students' preferred lesson style by triangulating the results from a quantitative survey, the Lesson Style Questionnaire, and students' stories from a narrative exercise, the Language Learning Autobiography. The author explicitly discussed the purpose of data triangulation at this stage "to most effectively inform the change-action without interfering with student learning" (p. 286). The priority was given to qualitative data, because they were seen as being more important in providing insight into the students' lesson style preferences. Based on the analysis of the quantitative and qualitative

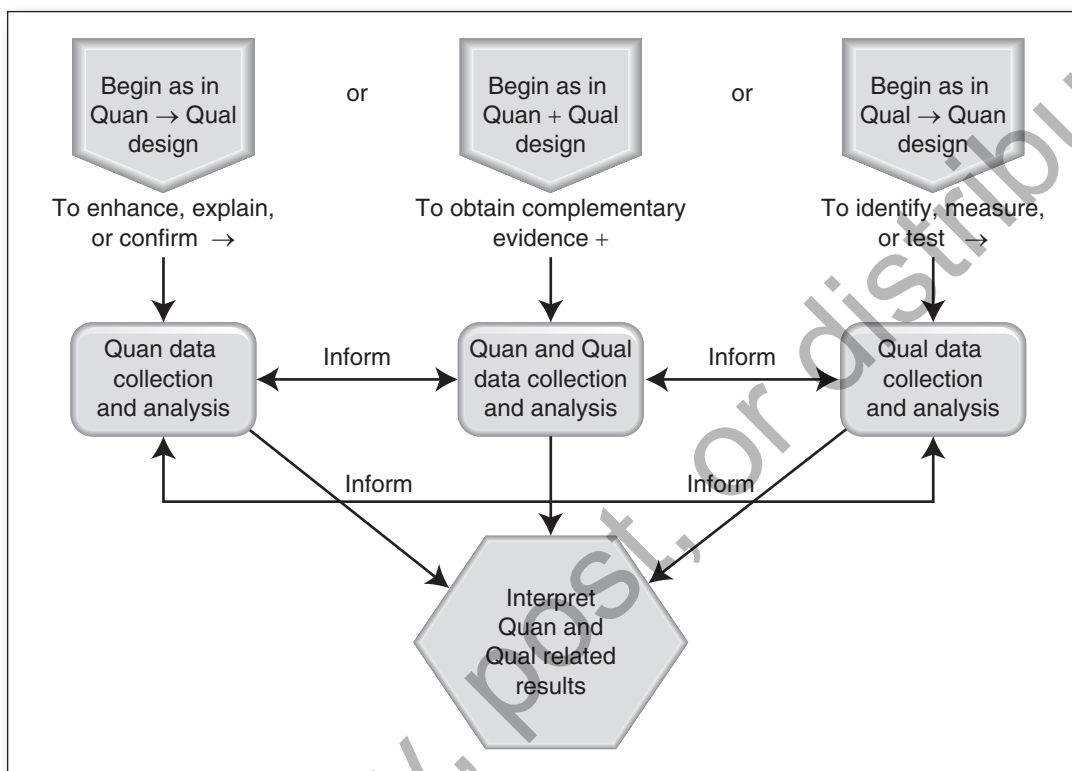


FIGURE 5.6

Sequential Qual → Quan MMAR Design Decision Flowchart





**FIGURE 5.7** Conceptual Model of a Multistrand MMAR Study Design

data, task-based-oriented lessons were developed to refocus the instruction and introduce more opportunities for practical use of English by the students during the class time.

By obtaining and comparing evidence from students' surveys and narratives, the instructor-researcher was able to better understand the needs of the students in his class and a preferred mode for classroom instruction. Subsequently, a sequential Qual → Quan data collection and analysis was applied to inform the development of the quantitative Learning Experience Questionnaire that was completed by the students at the end of the course with the purpose of evaluating the new task-based oriented language instruction. Qualitative narrative data from the journals that the students kept to reflect on the learning activities during each class were analyzed for themes that made the basis of the quantitative questionnaire. The survey yielded quantitative indicators of students' experiences with learning in the course that were compared with respective narrative journal entries and served to confirm the students' positive perceptions of their learning experiences.

In another example, Vecchiarelli and colleagues (2005) used a multistrand MMAR design in the reconnaissance phase to inform the development of a school-based environmental intervention to support

healthy eating and physical activity among students. The study consisted of the following multiple strands: Qual → Quan → Quan. During the first, qualitative strand, participating community stakeholders used a Delphi process to identify the top 15 benchmark criteria for each of eight components to include in a Nutrition Friendly School program. During the next, quantitative strand, all participating stakeholders rank ordered these 15 criteria for each of the eight components. In a subsequent quantitative strand, based on the selected criteria, the researchers developed a user-friendly self-evaluation tool so that the schools could assess their nutrition environment and determine specific actions that they should take to reach all 15 benchmarks.

In their MMAR study, Akintobi and colleagues (2012) employed a multistrand MMAR design to evaluate a community-based training program aimed at helping 20 community-based organizations conducting HIV prevention in the southern United States. The project was funded by The Pfizer Foundation Southern HIV/AIDS Prevention Initiative. The study consisted of the following multiple strands: Quan → Qual → Quan + Qual. During the program implementation, a cross-site quantitative program assessment survey was conducted to determine changes in participants' knowledge, skills, abilities, and technical needs based on the participation in the program. It was followed by one-on-one semistructured qualitative teleconferences with participating community-based organizations to gain better insight into their training needs based on the quantitative assessment. At the completion of all evaluation-capacity-building activities, another quantitative assessment survey was conducted concurrently with qualitative semistructured interviews with the representatives from each community-based organization to gather additional feedback on the evaluation-capacity-building partnerships. According to Akintobi and colleagues (2012), each step in the evaluability assessment was systematically staged to build upon each other in preparation for evaluation capacity-building through understanding of each community-based organization's program and evaluation context" (p. 36).

### *Procedural Pros and Cons*

Practitioner-researchers who decide to use a multistrand MMAR design in the reconnaissance and/or evaluation phases in an MMAR study should consider the same pros and cons discussed earlier for a concurrent Quan + Qual and sequential Quan → Qual and Qual → Quan MMAR designs. Additional challenges may be associated with the need to submit more than one IRB amendment and request additional permissions for each study strand as the study progresses. Additional time and resources may be needed as the project grows, and a team approach may be advantageous for implementing each study strand due to the complexity of the design. Specific considerations should be given to ensure the quality of quantitative and qualitative data collection and analysis, as faulty decisions made at one strand may threaten the chosen methodological procedures and related outcomes of the next study strand (Ivankova, 2014). Practitioner-researchers may refer to Figures 5.2, 5.4, and 5.6 for the flow of ideas and methodological steps in concurrent Quan + Qual and sequential Quan → Qual and Qual → Quan MMAR designs to guide their decisions in sequencing concurrent and chronological strands when applying a multistrand MMAR design to their MMAR projects.

Box 5.4 summarizes the essential features of MMAR designs to assist practitioner-researchers in their design considerations when conceptualizing and designing an MMAR study.

**BOX 5.4****Essential Features of MMAR Study Designs**

- MMAR designs consist of two or more concurrent or sequential quantitative and qualitative strands, and can include one or several chronological strands.
- MMAR designs can be applied in both reconnaissance and evaluation phases in an MMAR study.
- Different or similar MMAR designs can be applied in different phases in an MMAR study process.
- A concurrent Quan + Qual MMAR design is the most commonly used MMAR design; its purpose is to help seek corroborating evidence and produce more-validated conclusions to inform the development, implementation, and evaluation of the action/intervention plan.
- A concurrent Quan + Qual MMAR design is more frequently used in the evaluation phase of an MMAR study with the purpose of data triangulation.
- A sequential Quan → Qual MMAR design can be used both in the reconnaissance and evaluation phases of an MMAR study with the purpose of elaborating, explaining, or confirming initial quantitative results with follow-up qualitative data so as to obtain a better understanding of the problem or evaluate the effectiveness of the action/intervention.
- A sequential Qual → Quan MMAR design is more frequently used in the reconnaissance phase of an MMAR study with the purpose of obtaining a more complete assessment of a practical problem and informing the development of the action/intervention plan.
- A multistrand MMAR design can begin as a concurrent Quan + Qual, sequential Quan → Qual or Qual → Quan MMAR design, but can include additional sequential or concurrent quantitative and qualitative strands to inform data collection and analysis during a subsequent study strand.
- A multistrand MMAR design is reflective of a longitudinal and interactive nature of action research allowing for generating evidence from multiple differently sequenced quantitative and qualitative study strands within an overall action research project framework.
- Priority or weighting is often placed on qualitative methods, such as interviews, focus groups, and naturalistic observations in the reconnaissance phase of an MMAR study to understand the issue and inform action/intervention plan, while the evaluation phase may include more quantitative methods, such as surveys and hypothesis testing to assess effectiveness of the action/intervention plan.

**SUMMARY**

The chapter begins with the discussion of four recent mixed methods design typologies. To stay consistent with a practical focus of action research and to make the application of mixed methods in action research conceptually easier for practitioner-researchers, a more generic typology of MMAR study designs is suggested. The typology of MMAR study designs builds on major mixed methods design typologies and incorporates their common design elements. This typology includes basic MMAR designs that can be used in

different combinations during the reconnaissance and evaluation phases in an MMAR study process to inform other phases in the action research cycles. Importantly, due to the longitudinal and interactive nature of MMAR projects in which all phases are conceptually linked in the pursuit of an effective solution to a practical problem/issue, each completed study including all six phases of the action research cycle may be viewed as a multilevel or multiphase integrated design.

Based on the variation of the key methodological dimensions specific to mixed methods designs (number of study strands, priority or weighting of quantitative or qualitative method, sequence or timing of the study strands, and mixing or integration of the quantitative and qualitative methods) four basic types of MMAR designs can be distinguished: a concurrent Quan + Qual design, a sequential Quan → Qual design, a sequential Qual → Quan design, and a multistrand design. Methodological characteristics, application in the action research process, and procedural pros and cons of each design are discussed and illustrated using examples from published MMAR studies. A conceptual visual model and a design decision flowchart for each design are presented to help practitioner-researchers make informed decisions in applying these designs to their MMAR projects.

### REFLECTIVE QUESTIONS AND EXERCISES

1. Reflect on the purposes and key methodological dimensions of MMAR study designs (number of study strands, priority or weighting of quantitative or qualitative method, sequence or timing of the study strands, and mixing or integration of the quantitative and qualitative methods). Discuss how each methodological characteristic shapes a specific MMAR design.
2. Select a published MMAR study in your discipline or area of interest. Identify the type of MMAR design and in what phase—reconnaissance or evaluation, or both—it was used in the action research process. Discuss the methodological dimensions of the design. Reflect on how well the chosen MMAR design helped address the study purpose and research questions.
3. Carefully examine Figures 5.2, 5.4, and 5.6 for the flow of ideas and methodological steps in concurrent Quan + Qual, sequential Quan → Qual, and sequential Qual → Quan MMAR designs. Identify the flow of the procedures and discuss the guiding decisions made by the researchers when selecting the MMAR design used in the article.
4. Discuss pros and cons of the MMAR design used. Could the researchers have applied a different MMAR design to address the same research problem? How would a choice of a different design change the study procedures?
5. Draw a conceptual model of the MMAR design used in the article you selected. Compare your model with the suggested conceptual model for this MMAR design.
6. Identify a practical problem or issue in your work or community setting that requires improvement. Reflect on how you will design an MMAR study and what MMAR design you will use to address this problem/issue. Describe the methodological characteristics of the proposed design and how they will guide your decisions. Draw a conceptual model of the proposed MMAR design.

## FURTHER READINGS

To learn more about recent mixed methods design typologies, examine the following sources:

- Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage, Ch. 3–4, pp. 68–142.
- Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass, Ch. 7, pp. 112–141.
- Morse, J. M., & Niehaus, L. (2009). *Mixed method design: Principles and procedures*. Walnut Creek, CA: Left Coast Press, Ch. 8–10, pp. 85–155.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage, Ch. 7, pp. 137–167.

To learn more about key methodological dimensions of mixed methods designs examine the following sources:

- Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage, Ch. 3, pp. 63–68.
- Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass, Ch. 7, pp. 118–120.
- Morse, J. M., & Niehaus, L. (2009). *Mixed method design: Principles and procedures*. Walnut Creek, CA: Left Coast Press, Ch. 1, pp. 16–22.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage, Ch. 7, pp. 142–147.