

CHAPTER FOUR

Mixed Methods Research and Analysis

Nataliya V. Ivankova and Jennifer L. Greer

In support of evidence-based teaching, educators around the world are increasingly turning to mixed methods research (MMR) to seek answers to complex research questions. Indeed, one could argue that MMR has become a research approach of choice in the field of applied linguistics (Ivankova & Creswell 2009; Riazi & Candlin 2014), given the many factors – linguistic, social, cultural and political – involved in global language learning. In the United Kingdom, for example, MMR was used to explore the challenges of teaching English globally to learn how to best prepare primary school teachers worldwide for the local classroom setting (Copland, Garton & Burns 2013). In Belgium, researchers employed MMR to understand if corrective feedback via a 3-D avatar-based game would help improve language learning in students from middle school to college (Cornellie, Clarebout & Desmet 2012). In Taiwan, an investigator conducted an MMR study about the impact of new English exit testing requirements on the pedagogy of instructors in technical schools with teacher certification programs (Pan 2011). In the United States, MMR helped address the issue of Latino parental involvement in the learning of dual-language children in Head Start programs by providing insight into cultural, social and language questions as well as effective family engagement strategies (McWayne et al. 2013).

When conceptualizing those research studies educators and researchers all wondered: *What is the best approach to studying these multi-layered problems so that we understand what is really occurring in the language*

and learning setting? What methods should we use that will allow us to simultaneously explore the breadth and the depth of these issues and will give us the most comprehensive answers? Instead of conducting separate studies to examine trends and relationships using quantitative methods, or to explore individuals' experiences and perceptions about the problem using qualitative methods, researchers can combine or mix different methods within one study using an MMR approach (Creswell & Plano Clark 2011; Teddlie & Tashakkori 2009). Such mixing of methods within MMR creates a more complete picture of a problem in practice (Greene 2007; Johnson & Onwuegbuzie 2004; Tashakkori & Creswell 2007). In the field of applied linguistics, the application of MMR potentially provides a more multidimensional and accurate view of the processes of learning a language as well as social, cultural and political factors that influence the development of communicative competence as individuals cross boundaries, real and virtual.

In this chapter, you will learn what MMR is, what its primary philosophical assumptions and methodological characteristics are and why it is used in applied linguistics. We will introduce you to three basic MMR designs and their graphic representations. We will also discuss how to implement basic designs effectively and ethically. Finally, we will discuss a sample study in one of the most common MMR designs used in the field of applied linguistics and provide some points to remember when conducting MMR.

What is mixed methods research?

In the late 1970s and the 1980s, social science researchers began to study larger, multi-faceted questions by moving beyond a single-strategy approach – either quantitative or qualitative methods – and integrating the two methods within one study. Interestingly, scholars had been experimenting with combining quantitative and qualitative methods for a long time, with Aristotle, perhaps, being the first 'proto-mixed methodologist' (Teddlie & Tashakkori 2009, p. 47). Nevertheless, MMR was only recognized as a legitimate research approach around the end of the twentieth century (Creswell 2014; Ivankova & Kawamura 2010; Tashakkori & Teddlie 2003). At the same time, because MMR has united researchers from different social and behavioural disciplines, many definitions of MMR exist based on the different criteria researchers use to explain the nature of this approach (Johnson, Onwuegbuzie & Turner 2007). These criteria also include the situations when researchers mix different types of data or analytical strategies within the same approach, for example, surveys and numerical measures in quantitative research, and in-depth interviews and analysis of documents and artefacts in qualitative research. In 2007 Tashakkori and Creswell (2007), the founding editors of the *Journal of Mixed Methods Research*, advanced a broad definition of MMR that emphasizes the use

of both quantitative and qualitative data and a meaningful integration of quantitative and qualitative methods within a study to generate more credible and persuasive conclusions about the research issue:

As an effort to be as inclusive as possible, we have broadly defined mixed methods here as research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry (p. 4).

Why do we use mixed methods research?

In their seminal paper on mixed methods evaluation designs, Greene, Caracelli and Graham (1989) identified five broad reasons for using MMR: (1) triangulation – to seek corroboration of results from different methods, (2) complementarity – to seek clarification of the results from one method with the results from the other method, (3) development – to use the results from one method to help develop or inform the other method, (4) initiation – to seek the discovery of new perspectives from one method with questions or results from the other method and (5) expansion – to extend the breadth and range of inquiry by using different methods for different inquiry components. Other mixed methods researchers (Creswell & Plano Clark 2011; Morse & Niehaus 2009; Teddlie & Tashakkori 2009) have further elaborated the rationales for applying MMR. For applied linguistics, MMR offers clear benefits in the following ways:

- Employing qualitative methods to determine the meaning and understanding of constructs and quantitative methods assessing the magnitude and frequency of constructs, as exemplified in the MMR study on family engagement among Latino Head Start parents by McWayne et al. (2013).
- Combining multiple methods compatible with the discipline (e.g. pre-post test, survey, questionnaire, case study, learning log, writing sample, focus group, in-depth interview, translation and observation) to gain comprehensive answers to research questions, as illustrated by Danzak's (2011) MMR study that used multiple methods to study the impact of adolescent English language learners' language and literacy experiences on their identities as bilingual writers.
- Combining quantitative and qualitative methods to draw on the strengths of each, as reflected in the MMR study by Cornillie, Clarebout and Desmet (2012) of corrective feedback in a digital game for the purposes of English language learning.

- Framing the investigation within synergistic philosophical and theoretical positions, such as Wesely (2010) did in her MMR study of motivation as a psycho-social learning construct in early adolescents who left language immersion programs in public schools.
- Offering ways to work more inclusively to study phenomena across disciplines and cultures, as did Copland, Garton and Burns (2013) in their MMR study of the challenges faced when teaching English by teachers in five different primary schools in five countries.

The utility and strength of MMR are emphasized by its recognition as the third research paradigm (Johnson & Onwuegbuzie 2004), the third methodological movement (Teddlie & Tashakkori 2003), the third research community (Teddlie & Tashakkori 2009) and the third research approach (Creswell 2014). As a result, signs of growth abound with MMR textbooks and reference books, published studies, methodological articles, reviews and special peer-reviewed journal issues devoted to this research approach. This media includes the *Journal of Mixed Methods Research*, the *International Journal of Multiple Research Approaches*, the *Sage Handbook of Mixed Methods in Social & Behavioral Research* (Tashakkori & Teddlie 2003, 2010) and Sage's Mixed Methods Research Series. Additionally, professional conferences offer mixed methods researchers a chance to exchange ideas in forums such as the American Educational Research Association Special Interest Group 'Mixed Methods Research', the American Evaluation Association Topical Interest Group 'Mixed Methods Evaluation' and the annual international MMR conference since 2006. The new Mixed Methods International Research Association (MMIRA) (<http://mmira.wildapricot.org/>, viewed 28 January 2015) has formed to unite mixed methods researchers around the world. Finally, US and internationally based funding agencies have begun to promote an MMR approach in their grant award guidelines.

What are philosophical assumptions and issues associated with MMR?

Implicit in the definition of MMR are certain philosophical assumptions that have preoccupied scholars for centuries as they debated how to best generate and assess new knowledge (Teddlie & Tashakkori 2009). For example, is knowledge constructed from many sources in a holistic fashion (a constructivist paradigm advocated by qualitative researchers), or is it a single, concrete truth based on a proven hypothesis or cause and effect (a positivist paradigm advocated by quantitative researchers)? These are important paradigm distinctions to consider when qualitative

and quantitative methods are integrated or mixed (Maxcy 2003). In particular, two paradigms – transformative and pragmatic – underlie MMR (Mertens et al. 2010; Teddlie & Tashakkori 2009). The transformative paradigm is guided by the principles of social justice, whereas pragmatism argues that what has practical and functional value is ultimately important and valid. Both philosophical paradigms justify the integration of epistemological practices associated with quantitative and qualitative research approaches when conducting MMR in applied linguistics.

Implementing MMR is not void of challenges. In recent years, leading MMR scholars (Creswell & Plano Clark 2011; Greene 2007; Tashakkori & Teddlie 2010) have identified a series of issues related to MMR, including differences in researchers' epistemological practices related to quantitative and qualitative research paradigms; the nature of true MMR research questions; unique aspects of MMR design and analysis; assessing quality of MMR studies; and collaborating on MMR projects with researchers from other disciplines, paradigms and cultures. More recently, Riazi and Candlin (2014) raised similar issues in their review of forty published MMR papers in language teaching and learning. They cited a general lack of exposure to or understanding of basic MMR concepts and principles and noted a tendency for the use of methodological procedures that do not always draw on the best of the MMR process. Riazi and Candlin also noted an absence of clear MMR purpose statements, although they identified triangulation, or cross-validation of findings, as the primary methodological aim in the papers studied, followed by complementarity. The authors cautioned that 'theorizing and conceptualizing a problem as an integrated but multi-layered whole ... is not an easy task, and is likely to present challenges for researchers' (p. 154).

What are the methodological characteristics of mixed methods research?

The key to successfully implementing MMR is understanding that it has distinct methodological characteristics that make it different from other research approaches. These characteristics or methodological dimensions refer to the number of quantitative and qualitative study strands and the timing, weighting and mixing of quantitative and qualitative methods, which vary strategically based on specific MMR designs (Creswell & Plano Clark 2011; Teddlie & Tashakkori 2009). Figure 4.1 summarizes and explains these methodological characteristics. The sum of these decisions – about study strands, timing, weighting and mixing – further defines the type of an MMR study and explains the variety of available MMR designs that can be employed in the field of applied linguistics.

- *Strand* – component of an MMR study that encompasses the basic process of conducting quantitative or qualitative research: posing a question, collecting and analysing data and interpreting results:
 - An MMR study includes at least one quantitative and one qualitative strand, and may consist of two or more varied strands.
- *Timing* – temporal relationship between the quantitative and qualitative strands within an MMR study:
 - *Concurrent*: collecting and analysing both quantitative and qualitative data at the same point in time or independently.
 - *Sequential*: collecting and analysing quantitative data first, followed by qualitative data or collecting and analysing qualitative data first, followed by quantitative data.
- *Weighting* – relative importance of quantitative and qualitative methods for answering the study's research questions:
 - *Equal weighting* - equal emphasis is placed on quantitative and qualitative methods.
 - *Quantitative weighting* – greater emphasis is placed on quantitative methods; qualitative methods perform a secondary role.
 - *Qualitative weighting* – greater emphasis is placed on qualitative methods; quantitative methods perform a secondary role.
- *Mixing* – explicit interrelating of the quantitative and qualitative methods in an MMR study:
 - *Combining*: mixing quantitative and qualitative methods during the interpretation of both quantitative and qualitative results.
 - *Connecting*: mixing quantitative and qualitative methods during data collection, that is, quantitative or qualitative data is collected based on the results of data analysis in the previous qualitative or quantitative strand.
 - *Merging*: mixing quantitative and qualitative methods during data analysis, that is, quantitative and qualitative data from different study strands are analysed together.

FIGURE 4.1 *Key methodological characteristics of MMR (adapted from Ivankova 2015)*

How do we design and conduct a mixed methods research study?

Ivankova and Creswell (2009) outlined a set of logical steps for researchers in applied linguistics to follow when designing and conducting an MMR study:

- 1 Determine if mixed methods research is the best approach to address the research problem that you want to study and identify the rationale for using MMR.
- 2 Select a specific mixed methods design to best address this problem.
- 3 Write a detailed mixed methods purpose statement that reflects the intent of the study and guides the selection of the methods.
- 4 Write specific research questions to address the quantitative and qualitative components of your study.
- 5 Choose the quantitative and qualitative data to collect. Draw a visual diagram of the methodological procedures to be employed in your study.
- 6 Collect and analyse the quantitative and qualitative data for your study.
- 7 Write the final report reflecting the mixed methods design you used in the study.

As in any research approach, the study design is guided by the study purpose and the research questions, whereas the selected MMR design informs the selection of the study participants, types of data to be collected and means of their analysis. Based on the variation of the methodological characteristics discussed above, three basic types of MMR designs can be used to address the purposes and needs of researchers in applied linguistics:

- Concurrent Quan + Qual MMR design
- Sequential Quan → Qual MMR design
- Sequential Qual → Quan MMR design

In the following sections, we discuss the methodological characteristics of these MMR designs, provide their conceptual diagrams, illustrate their use in applied linguistics and explain some advantages and limitations that novice mixed methods researchers should consider when selecting these designs. To better understand the design conceptual diagrams, we included a notation system for visual presentation of MMR study procedures (Creswell & Plano Clark 2011; Morse 1991) in Figure 4.2.




- QUAN, QUAL: uppercase letters indicate increased weight for either quantitative and qualitative method.
- quan, qual: lowercase letters indicate decreased weight for either quantitative and qualitative method.
- Plus sign: + indicates that quantitative and qualitative data are collected and analysed concurrently.
- Arrow: → indicates that quantitative and qualitative data are collected and analysed in a sequence.
- Rectangle:  indicates a stage in quantitative and qualitative data collection and analysis.
- Oval:  indicates a stage in quantitative and qualitative methods integration and results interpretation.
- Hexagon:  indicates a stage where researchers create integrated conclusions from the quantitative and qualitative strands.

FIGURE 4.2 *A notation system for visual presentation of MMR study procedures (adapted from Ivankova 2015)*

Concurrent Quan + Qual MMR design

A concurrent Quan + Qual MMR design is used when it is necessary to compare or merge quantitative and qualitative results to produce well-validated conclusions. It typically includes two strands, during which quantitative and qualitative data are collected and analysed separately or independently of each other. Figure 4.3 presents a conceptual diagram of this design. The weight is typically given to both study strands, because each strand addresses related aspects of the same research question in a complementary way. The mixing of the quantitative and qualitative methods occurs when quantitative and qualitative results are compared or synthesized to find corroborating evidence and to produce a more complete understanding of the research problem (Creswell & Plano Clark 2011).

For example, Miyazoe and Anderson (2010) used a concurrent Quan + Qual design to examine the effectiveness of three different online writing activities – forums, blogs and wikis – in an English as foreign language (EFL) blended learning course in a university in Japan. They concurrently surveyed sixty-one second-year students from three course

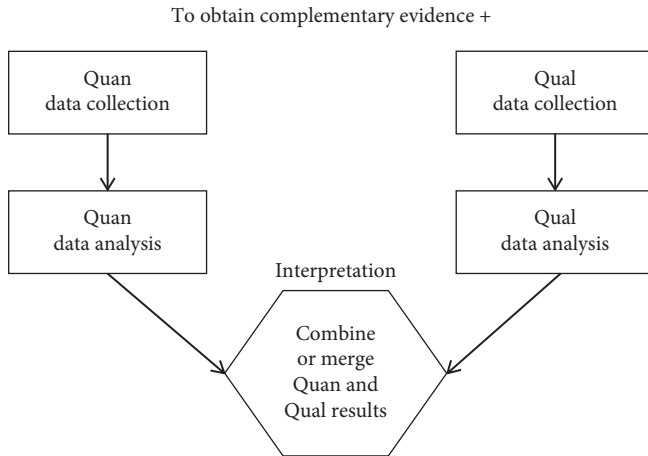


FIGURE 4.3 *Conceptual diagram of concurrent Quan + Qual MMR design (reprinted from Ivankova (2015), with permission of SAGE Publications, Inc.)*

sections and interviewed eighteen volunteer students. They also analysed writing assignments from all students. The researchers equally emphasized quantitative (survey) and qualitative (interview and written text) data because both data sets were used to explain different aspects of EFL learning. The results from quantitative and qualitative analysis were combined ‘to provide a triangulated interpretation’ (p. 190) of learning outcomes and students’ perceptions of learning EFL online.

An advantage of this concurrent design is that both quantitative and qualitative data can be collected and analysed within a short period of time. Thus, it helps save time and the associated cost for conducting the study (Creswell & Plano Clark 2011; Morse & Niehaus 2009). It can also result in well-validated and substantiated findings, because concurrent strand implementation allows for obtaining ‘different but complementary data on the same topic’ (Morse 1991, p. 122). However, this design may be challenging for a sole researcher because of the need to concurrently implement quantitative and qualitative study strands that often require different sets of research skills (Creswell & Plano Clark 2011; Teddlie & Tashakkori 2009).

Sequential Quan → Qual MMR design

A sequential Quan → Qual design is used when there is a need for follow-up qualitative data to elaborate, explain, or confirm initial quantitative results. It consists of two chronological strands with a quantitative strand occurring first in sequence. Figure 4.4 presents a conceptual diagram of

this design. The weight is typically given to the first, quantitative, study strand because this design is mostly used when the research problem and related purpose require examination by quantitative methods (Creswell & Plano Clark 2011). The mixing of the quantitative and qualitative methods typically occurs chronologically at the completion of the first, quantitative, strand and beginning of the second, qualitative, strand. For example, the results from quantitative survey in the first study strand can help identify the individuals to follow-up with qualitative interviews as well as inform the content of these interview questions. Additionally, the results from both study strands are interpreted together so that the qualitative findings can provide better understanding of the initial quantitative results.

For example, Kissau (2012) used a sequential Quan → Qual design to examine the relationship between online second language (L2) methodology instruction and the sense of teaching efficacy of teacher-candidates in a licensure program in a US university. In the first study strand, quantitative, the researcher surveyed 62 L2 teacher-candidates twice – before the start of the course and upon its completion. In the second study strand, qualitative, at the end of the course, the researcher conducted follow-up individual interviews with eight teacher-candidates who completed the survey about their experiences in the course. The purpose was ‘to elaborate upon the survey data and to better understand the quantitative results’ (p. 302). The weight was given to initial quantitative survey data because they revealed teacher-candidates’ attitudes about the effectiveness of L2 methodology instruction. The two study strands were connected when the results of the survey data were used to inform the selection of the teacher-candidates for follow-up interviews and to inform the interview questions. The two sets of results were also mixed during the discussion of the overall integrated study conclusions.

An advantage of this sequential design is that the chronological nature of the quantitative and qualitative data collection and analysis makes it more straightforward and easy to implement by one researcher (Creswell & Plano Clark 2011; Ivankova, Creswell & Stick 2006; Morse & Niehaus 2009). This design also provides an opportunity for the exploration of the initial quantitative results in more detail, especially when unexpected results arise

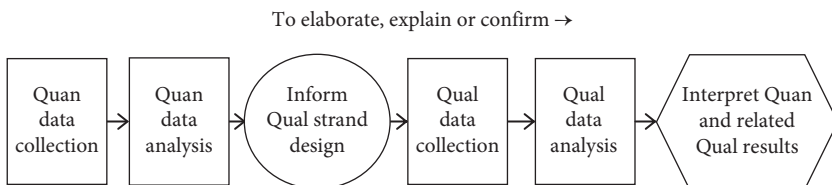


FIGURE 4.4 *Conceptual diagram of sequential Quan → Qual MMR design (reprinted from Ivankova (2015), with permission of SAGE Publications, Inc.)*

from a quantitative strand (Morse 1991). The limitations of this design are related to the length of time and feasibility of resources to collect and analyse both sets of data. Additionally, because many of the research aspects of the second qualitative strand are yet unknown at the study design stage, another approval for continuation of the study is required from the institution's ethical review board once the first quantitative strand is completed. This, ultimately, may extend the overall time of the study.

Sequential Qual → Quan MMR design

A sequential Qual → Quan design is used when it is necessary to use initial qualitative data to develop new measures and identify unknown variables and relationships. It consists of two chronological strands with a qualitative strand occurring first in sequence. Figure 4.5 presents a conceptual diagram of this design. The weight 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). The mixing of the qualitative and quantitative methods typically occurs chronologically at the completion of the first, qualitative, strand and the beginning of the second, quantitative, strand. For example, the results from the qualitative individual or focus group interviews can inform the development of a new survey instrument that will be further administered to a large group of people (Morse & Niehaus 2009). 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.

For example, Ghorbani and Alavi (2014) used a sequential Qual → Quan design to explore the possibilities of implementing English as the medium of instruction (EMI) at Iranian universities. In the first study strand, qualitative, the researchers conducted email interviews with six undergraduate students and six lecturers at the University of Bojnord to explore their perceptions of adopting EMI and to inform the development of a quantitative survey to explore these perceptions

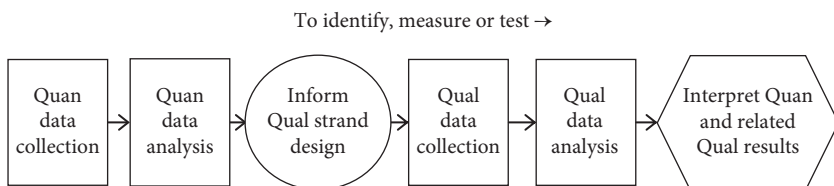


FIGURE 4.5 *Conceptual diagram of sequential Qual → Quan MMR design (reprinted from Ivankova (2015), with permission of SAGE Publications, Inc.)*

with more students and faculty. In the second study strand, quantitative, the researcher administered the new survey to 344 undergraduate and graduate students and thirty-six lecturers. The weight was given to initial qualitative interview data because their analysis ‘leads to detailed generalizable results through the second quantitative phase’ (Creswell 2005, as cited in Ghorbani & Alavi 2014, p. 4). The two study strands were connected when the themes from qualitative interviews were used to inform the development of the survey items and scales. The two sets of results were also mixed during the discussion of the overall integrated study conclusions.

The sequential nature of the qualitative and quantitative data collection and analysis in this design makes it more straightforward and easy to implement by one researcher. This design is specifically advantageous for situations when a researcher wants to explore the phenomenon in depth with a few individuals and wants to expand these findings to a larger population. The sequential nature of this design also may require lengthy time and more resources to collect and analyse both sets of data. Additionally, developing a measurement instrument is a complex process that requires adherence to special psychometric procedures. The sequential nature of this design also necessitates the need to submit an amendment to the existing research protocol, seeking another approval from the institution’s ethical review board, once the first qualitative strand is completed to test the new instrument.

What research issues should we consider when implementing an MMR study?

As with any research study, researchers conducting MMR in applied linguistics should ensure that their studies produce accurate or valid conclusions and meet accepted ethical standards for research. Assessing quality of an MMR study can be especially challenging because of the intended mixing of the results from quantitative and qualitative study strands (Teddle & Tashakkori 2009). It is also important to consider MMR design characteristics, such as concurrent and sequential timing of quantitative and qualitative data collection and analysis, the order of quantitative and qualitative study strands in sequential designs (quantitative or qualitative first) and the type of mixing procedures (Creswell & Plano Clark 2011; Ivankova 2014). These design-related decisions may either compromise or increase the overall validity of an MMR study. Therefore, it is recommended that MMR researchers first evaluate the methodological rigour of each quantitative and qualitative study strand using the procedures adopted in each research approach; after that, they should assess the quality of the integrated study conclusions using approaches described in MMR literature (Creswell & Plano Clark 2011; O’Cathain 2010; Onwuegbuzie

& Johnson 2006; Teddlie & Tashakkori 2009). Assessing the quality of an MMR study should be included in the study design plan and should be an ongoing process.

Likewise, consideration of ethical issues should be a critical component of the whole research process from the study design to reporting of results. Researchers conducting MMR studies in applied linguistics should observe general ethical principles for research, such as obtaining an approval for the research protocol from the institution's ethical review board, securing informed consent from study participants, ensuring their voluntary participation and preserving their anonymity and confidentiality. There are also several ethical considerations that relate to the process of conducting MMR. Because collecting quantitative and qualitative data entails different levels of data sensitivity, an institution's ethical review board may require explanations of different details related to these processes. Additionally, as discussed earlier, in sequential designs that build one study strand on another, it is necessary to file an amendment to the initial research protocol to seek further institutional approval for the study.

A sample study

In this section, we will look closely at an MMR study conducted by Yu, Sun and Chang (2010) in Taiwan. The study employed the most commonly used MMR design in applied linguistics – concurrent Quan + Qual design – and illustrates many of the characteristics essential to a good model MMR study. In this study, the researchers addressed the timely topic of how online course management systems (CMSs), once assumed to be content-neutral, might influence learning outcomes in unexpected ways in the language classroom.

Yu and colleagues structured their study report in a traditional manner, including a thorough introduction to the benefits and possible downsides of modern CMSs, a study purpose statement, research questions, description of the study methods, results merged with discussion of findings and a conclusion with implications. Of note is the researchers acknowledged use of MMR in the paper's abstract, a move that is highly useful to readers and considered a best practice if the study is true to its design. Further, they justified the use of MMR, citing MMR literature in support of their methodological choice when they discussed the study methodology: 'With a mixed method approach – "a natural complement to traditional qualitative and quantitative research" (Johnson & Onwuegbuzie 2004, p. 14) – the study utilizes a collection of data from both questionnaires and face-to-face interviews with CMS users (teachers and students)' (p. 335). In creating a rationale for the use of MMR, Yu and colleagues identified gaps in the research with most CMS studies being strictly quantitative and too little CMS research in the language learning classroom to indicate how instructors and students perceive value

in online systems. Noting that the study of human perception is deepened and made more comprehensive by qualitative research, the authors set the stage for their study purpose and research questions, which are both framed in an MMR context. In particular, the study purpose statement is clear and direct: 'to address the gaps and enrich our understanding of college teachers' and students' use of CMSs for the purpose of language teaching and learning' (p. 335). The research questions included:

- 1 How are CMs and other computer programs adopted in language courses?
- 2 What motivates the use of CMSs in language courses?
- 3 What are the perceived limitations of and desired technical and professional support for using CMs in language courses? (p. 335)

The target population was native Mandarin speakers from a variety of disciplines at two Taiwanese universities. In keeping with MMR philosophy, Yu and colleagues included multiple perspectives by studying both teachers and students. The study consisted of two concurrent strands and quantitative and qualitative methods received equal weighting. The researchers did not include a visual representation of their MMR design, so we developed a visual diagram of the study procedures based on their report (see Figure 4.6).

The quantitative strand included the administration of a questionnaire (through email and in person) to university English teachers ($n = 53$) and university students ($n = 241$) who had already been using their existing CMSs (Blackboard, Moodle and a local Taiwanese system, E-Campus 3) for several months. The questionnaire covered questions about (a) demographics, (b) usage experience with CMSs and computer assisted language learning and teaching and (c) perceptions of CMSs in language learning and teaching with items structured around five variables: self-efficacy, enjoyment, usefulness, intention and quality. These data were analysed using descriptive statistics, including means, percentages, frequencies and rankings.

For the qualitative strand, the researchers conducted 45 minute face-to-face, post-hoc interviews with seven teachers and seven students. They also used text data from the open-ended questions in the questionnaire. The interview questions addressed four main topics: definitions of and attitudes about CMSs; learning/teaching approaches and beliefs; strengths and limitations of CMSs in English language courses; and new ideas and suggestions for using CMSs. Both the responses to open-ended questions and interview transcripts were coded and analysed around the three research questions to produce categories and themes.

The results from both quantitative and qualitative strands were then combined and discussed in an integrated fashion around the posted research questions. In particular, the researchers integrated presentation of

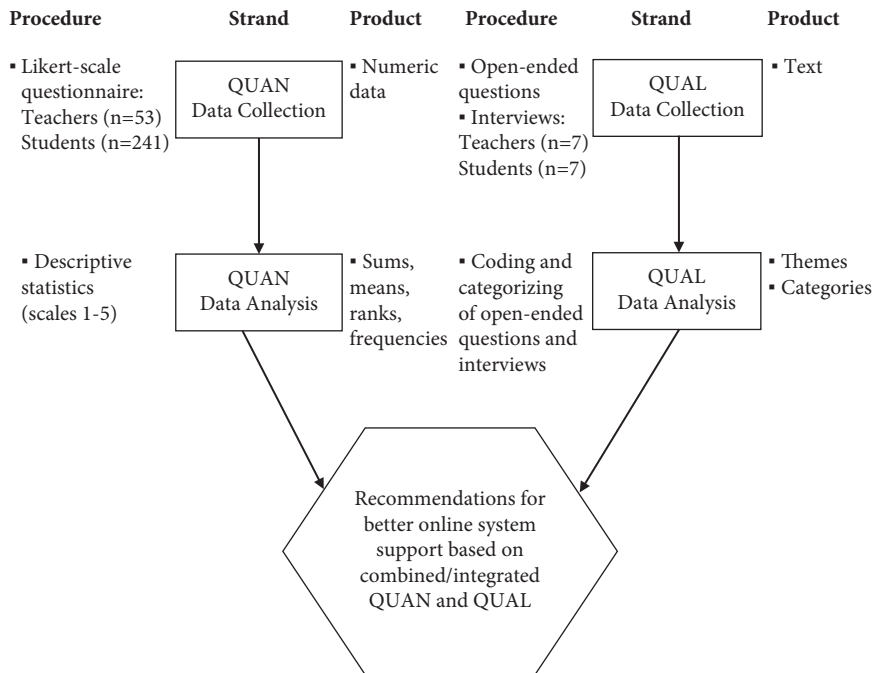


FIGURE 4.6 Visual diagram of concurrent *Quan + Qual* MMR design (original diagram by Ivankova and Greer, based on a study by Yu, Sun & Chang 2010)

quantitative results in numeric data tables with the description of major qualitative themes. For example, a numeric table on commonly used functions is followed by a paragraph of text that includes a quote to show why teachers only use those features that support the language learning objectives and do not feel compelled to be high-end users of all CMS tools. Such consistent merging of the findings from both quantitative and qualitative strands allows the readers to appreciate the synthesis of research evidence in this report. Based on the integrated study conclusions, Yu and colleagues provided recommendations for better online system support for CMS users in language learning.

What should we remember when conducting MMR?

Researchers conducting MMR in the field of applied linguistics should remember that a true MMR study requires mixing of quantitative and qualitative methods at different stages in the study process (Teddlie & Tashakkori 2009). Given this need for seamless integration, researchers

should systematically apply the steps necessary for designing and conducting an MMR study. They should also learn how to assess MMR study quality and any ethical issues that may be new to them.

Additionally, considering the relatively recent interest in MMR from the field of applied linguistics, researchers need to educate their audiences about MMR when preparing such studies for publication. In structuring reports, they could follow O’Cathain, Murphy and Nicholl’s (2008) guidelines for Good Reporting of a Mixed Methods Study, known as GRAMMS, and clearly articulate an MMR approach, explain a rationale for it and provide a purpose statement and research questions that reflect the MMR orientation of the study. They could also visualize the study design and procedures in a diagram; explain how they attend to critical issues of timing, weighting and mixing; and describe any insights gained from mixing methods.

Finally, researchers could consider networking with other MMR researchers in their field at conferences, through publications, in online forums and via other professional outlets that emphasize development of MMR research. Although times of innovation and shifting paradigms can be difficult and challenging, they also offer opportunities for making what Kuhn (1962, p. 84) called ‘a decisive difference’ in finding new solutions to problems in a field. With the current dynamism in the field of applied linguistics, no time is more apt than now for decisive differences in research solutions.

Resources for further reading

Books

Creswell, JW & Plano Clark, VL 2011, *Designing and Conducting Mixed Methods Research*, 2nd edn, Sage, Thousand Oaks, CA.

This text provides a practical, step-by-step guidance in designing and implementing an MMR study, covering different topics from the nature of mixed methods; the type of research problems that fit this new approach; the advantages and challenges of using MMR; the foundations of MMR (historical, philosophical and theoretical); specific details and examples of different designs; and guidelines for a proposal, dissertation and journal article.

Greene, JC 2007, *Mixed Methods in Social Inquiry*, Jossey-Bass, San Francisco, CA.

This text examines multiple ways of looking at MMR and provides a clear and coherent perspective to guide new researchers as well as inform experienced scholars. The text includes numerous examples that facilitate understanding of some of the more difficult aspects of MMR.

Morse, JM & Niehaus, L 2009, *Mixed Method Design: Principles and Procedures*, Left Coast Press, Walnut Creek, CA.

This text provides a discussion about what constitutes a true MMR design and offers step-by-step instructions for conducting MMR. Easy to use, this text introduces and discusses key concepts that new scholars will need to implement in a study and write up their findings, drawing on the authors' bank of published studies.

Tashakkori, A & Teddlie, C (eds), 2010, *Sage Handbook of Mixed Methods in Social & Behavioral Research*, Sage, Thousand Oaks, CA.

This handbook addresses all MMR topics, such as use of integrated design, monitoring and evaluation, methods teaching and pedagogy, intervention studies, grant proposals and publishing and draws on an international team of scholars to offer diverse perspectives on this dynamic field.

Teddlie, C & Tashakkori, A 2009, *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*, Sage, Thousand Oaks, CA.

This book provides a discussion of the evolution of MMR, setting it in the context of both historical and contemporary methodological thought. Well-sourced and filled with numerous interdisciplinary examples, visuals and charts, this text offers a comprehensive approach to executing an MMR study, from strategy and research design to implementation techniques and reporting.

Journal

Journal of Mixed Methods Research (JMMR).

This is a peer-reviewed flagship journal in the field with an interdisciplinary and an international scope. It publishes both empirical MMR research and methodological and review articles within the social, behavioural, health and human sciences. (<http://mmr.sagepub.com/>, viewed 28 January 2015)

Association

Mixed Methods International Research Association (MMIRA).

This is a global professional community for promoting methodological quality and innovation. Members receive an online subscription to the Journal of Mixed Methods Research, networking and training opportunities and access to scholarly MMR resources. (<http://mmira.wildapricot.org/>, viewed 22 March 2015)

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