

Understanding the Nature of and Identifying and Formulating “Research Problems” in Mixed Methods Research

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Abstract

Mixed methods research (MMR) is suitable for studying research problems that cannot be adequately investigated through qualitative and quantitative methods alone. Nevertheless, the MMR literature offers a very limited discussion about “research problems.” To address this gap, this paper uses Elliott’s conceptual framework to offer guidance on how to identify and formulate research problems in MMR and understand their nature. This article contributes to the field of MMR by reframing the concept of research problems in this type of research and offering a conceptual and methodological approach to describing and characterizing research problems for investigation in social and cultural contexts.

Keywords

mixed methods research, research problem, research conceptualization, conceptual framework

Introduction

While the first explicit attempts to integrate quantitative and qualitative methods to address research problems in the social sciences were made in the late 19th century (Maxwell, 2016), it has only been in recent decades that mixed methods research (MMR) has become an established research methodology for examining complex phenomena in the social, behavioral, health, and interdisciplinary sciences. In these fields, mixing qualitative and quantitative paradigms, methodologies, and methods can help researchers gain a more comprehensive understanding of the studied phenomena, compared to monomethod designs (Creswell & Plano Clark, 2018; Fetters & Molina-Azorin, 2017; Schoonenboom & Johnson, 2017). Scholars have extensively discussed the purposes, questions, and rationales for using this methodological approach, providing valuable

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guidance on when and under what conditions to implement an MMR design. However, there is still limited guidance concerning the nature, identification, and formulation of research problems in this type of research. Additionally, little is known about how researchers use well-characterized problems to improve the design and conduct of their MMR studies. This omission contrasts with the claims in the MMR literature regarding the need for greater consideration of the type and nature of research problems investigated through MMR designs and how to identify and characterize research problems when designing and conducting MMR studies (Creswell & Plano Clark, 2018).

Several reviews (Fàbregues et al., 2020; Granikov et al., 2020; Harrison et al., 2020; Younas et al., 2019a) and quality appraisal tools (Fàbregues et al., 2019; Hong et al., 2019) have emphasized the importance of providing an explicit rationale for using an MMR design, formulating an MMR question and problem statement, and clearly articulating these two components of MMR quality. As argued in this literature, without an in-depth understanding of the nature of research problems and how they are identified and formulated, researchers may encounter the issue of designing and conducting less rigorous MMR studies, which may result in a lack of a clear justification for using qualitative and quantitative methods, a lack of an explicit integration of quantitative and qualitative data and findings.

Tashakkori and Creswell (2007) explored the nature of MMR questions and identified three essential features. First, MMR questions explicitly state the intention and nature of integration or mixing. Second, MMR questions provide clear linkages between the qualitative and quantitative strands and the underlying research questions. Third, MMR questions are contingent upon the nature of MMR designs, but they should be reframed according to the progression of each MMR study. Creswell and Plano Clark (2018) further elaborated on the nature and types of MMR questions. They explained that MMR questions aim to explicate the intent of integrating the qualitative and quantitative strands and identified three types of questions: (a) methods-focused questions, which focus on articulating the methods of the MMR design (e.g., to what extent do the qualitative results expand the quantitative results?); (b) content-focused questions, which focus on elaborating the study content and implicating the methods (e.g., how do the views of patients about discrimination in health care support or refute the results that many patients experience emotional distress when receiving care in discriminatory environments?); and (c) combination MMR questions, which elaborate both the content and methods of MMR designs (e.g., what results emerge after integration of qualitative data of domestic abuse survivors with their levels and factors affecting domestic abuse determined via the quantitative instruments?). Tashakkori and Creswell (2007) and Creswell and Plano Clark (2018) provided a comprehensive understanding of research questions in MMR, whereas they offered a very limited discussion of the nature of research problems in this approach. For instance, while Creswell and Plano Clark (2018) noted that problem statements offer an overall researcher's argument in an MMR study and should be described from more than one standpoint, they did not provide an explicit account of how research problems should be identified and formulated in an MMR study.

Purpose

The purpose of this paper is to explore the nature of research problems in MMR and illustrate the use of Steve Elliott's (2021) conceptual framework of problems for effectively identifying and formulating research problems in MMR. We draw from the discussion of research problems in the philosophy of science literature and discuss how Elliott's (2021) conceptual framework of problems can enable the explicit articulation of research problems suited for MMR. The outline of the paper is as follows. First, we differentiate between research questions, research problems, and purposes. Second, we argue that the adequate conceptualization and development of research

problems might help researchers carry out more rigorous and well-justified MMR research. Third, we discuss Elliott's characterization of research problems and outline his framework. Finally, we apply Elliott's framework to illustrate the formulation of a problem statement for an MMR study.

Background

Problem Statement, Research Purpose, Rationale, and Question

Researchers and methodologists in different disciplines define and use terms like purpose, objective, rationale, research question, and aim in unique ways. Generally, researchers use the concept of research problems to refer to the issue, conundrum, or challenge that leads to the initiation of a research study (McMillan & Schumacher, 2010). Research problems entail a comprehensive yet succinct description of a significant issue or concern, which allows for the generation of testable and observable assumptions about any phenomenon (Walliman, 2015). A research problem has three main components: context, significance, and purpose. Context places the problem in a broader subject area, whereas the significance of a problem statement implies the potential contribution to knowledge and practice after successfully studying the intended problem (McMillan & Schumacher, 2010). One or more research purposes can be derived from a research problem (Walliman, 2015). The research purpose is a statement that specifies and narrows the research problem (McMillan & Schumacher, 2010) and delineates the intentions of a research study (Walliman, 2015). Newman et al. (2003) proposed a typology of research purposes based on the nature of the problems addressed. These purposes included: predicting, adding to the knowledge base, having a personal, institutional, or sociocultural impact, measuring change, understating new phenomena, testing new ideas, generating novel ideas, examining the past, and informing new constituencies. Research purposes also help inform the conceptualization and operationalization of research methods (Polit & Beck, 2014).

Research questions are interrogative forms of research purposes and can be classified as either descriptive or explanatory. Descriptive questions focus on the "what," "how," "where," "when," and "who" of a research problem. Conversely, explanatory questions aim to explore the why of a certain phenomenon (Rojon & Saunders, 2012). Finally, research rationales are the reasons and justifications for undertaking a project and demonstrating its potential contribution to practice, research, and policymaking (Wood & Ross-Kerr, 2010). Table 1 provides examples of how MMR researchers distinguish between research problem, research purpose, research question, and research rationales with examples.

Research Problems in Mixed Methods

Identifying researchable problem statements is instrumental for studying a particular phenomenon and discerning the appropriate methods for research. Consequently, it helps in the effective use of time, resources, and efforts and reduces the chances of research failure (Polit & Beck, 2020). MMR involves the complex task of mixing a diversity of quantitative and qualitative aspects and methods in different dimensions (e.g., philosophical, theoretical, and methodological) in a single study (Fetters & Molina-Azorin, 2017; Younas et al., 2019a). Therefore, generating researchable and manageable research problems for MMR can significantly enhance the rigorous implementation of methods to study a particular phenomenon. Identifying and formulating researchable problem statements directs researchers to choose appropriate methods to enhance the quality of MMR inquiries (Hesse-Biber, 2010). Well-formulated research problems can help researchers ensure that research purposes and questions are well aligned with the study's design and methods used and vice versa (Polit & Beck, 2014).

Table 1. Differentiation Among Research Problem, Purpose, Questions, and Rationales.

Research Problem	Research Purpose	Research Questions	Research Rationales
<p>A conundrum, issue, or a challenge prompting the initiation of research. It is a focused area or phenomenon to be studied and allows researchers to narrow the scope of research (McMillan & Schumacher, 2010)</p> <p>Research problems are derived from practice, experience, and literature reviews (McMillan & Schumacher, 2010; Walliman, 2015)</p> <p>Broadest in scope (Walliman, 2015)</p> <p>Varied types based on their origin such as practice-based problems, experience-based problems, and research-based problems (McMillan & Schumacher, 2010)</p>	<p>A statement/s relating to the research problem to delineate the intentions of the study (McMillan & Schumacher, 2010)</p> <p>Research purpose originates from the research problem (McMillan & Schumacher, 2010; Walliman, 2015)</p> <p>Narrower in scope than the research problem (Walliman, 2015)</p> <p>Exploratory</p> <p>Descriptive</p> <p>Explanatory</p> <p>Evaluatory</p> <p>Predictive (Newman et al., 2003)</p>	<p>Research questions are interrogative statements used to express the specific issues to be explored pertaining to a research problem (Rojon & Saunders, 2012)</p> <p>Origin/Derivation</p> <p>Research questions are derived from the research purpose (Rojon & Saunders, 2012; Polit & Beck, 2020)</p> <p>Scope</p> <p>Narrower in scope than the research problem and purpose (Rojon & Saunders, 2012; Polit & Beck, 2020)</p> <p>Types</p> <p>Same as research purposes</p>	<p>Research rationales are the justifications for conducting research in general or studying a research problem or purpose or question within a narrow area (Wood & Ross-Kerr, 2010)</p> <p>Research rationales are derived from experience or literature to justify a research problem or question (Wood & Ross-Kerr, 2010; Polit & Beck, 2020)</p> <p>The scope is defined in relation to the research problem, purpose, and question (Polit & Beck, 2020; Wood & Ross-Kerr, 2010)</p> <p>Not applicable</p>

(continued)

Table 1. (continued)

Research Problem	Research Purpose	Research Questions	Research Rationales
<p>Educators are finding it difficult to adjust to an online teaching and learning environment. It affects student engagement and learning. Better approaches are needed to help educators adjust to online teaching and learning</p>	<p>Several purposes can be derived from this problem</p>	<p>Research questions can be directly derived from the purposes</p>	<p>Addressing educators' barriers to adjusting to an online teaching and learning environment has the potential to improve student engagement and learning</p>
Example			
	<p>-To explore the barriers and facilitators of educators in adjusting to an online teaching and learning environment</p>	<p>-What are educators' barriers and facilitators to adjusting to an online teaching and learning environment?</p>	
	<p>-To design and test approaches to enhance educators' ability to adjust to online teaching and learning</p>	<p>-What approaches might be useful to enhance educators' ability to adjust to online teaching and learning?</p>	
	<p>-To describe the impact of educators' inability to adjust to an online teaching and learning environment on student engagement and learning</p>	<p>-What is the impact of educators' inability to adjust to an online teaching and learning environment on student engagement and learning?</p>	

Following a normative “textbook” approach, research purposes and questions should determine the decisions researchers make about methods and designs in a particular study. Based on this idea, MMR might not always provide better outcomes or be a better approach than monomethod research; it will only meet those goals when researchers demonstrate that it is an appropriate approach to the research questions and purposes of a study (Bryman, 2007). Since research problems are foundational to the formulation of research purposes and questions, research problems are essential for ensuring that MMR is worth the effort, particularly when considering the resources and challenges involved in carrying out an MMR study. It is noteworthy that the above-mentioned claims about the importance of good problem statements are theoretical, and empirical testing is needed to substantiate these claims. However, one obstacle to empirically testing such claims is the lack of theory on how to effectively structure and formulate problem statements. Nevertheless, research problems are scarcely discussed in the MMR literature. Limited guidance on identifying and writing problem statements in MMR can be particularly disadvantageous, resulting in poor conceptualization and operationalization of MMR and a waste of researchers’ time and resources.

MMR methodologists have discussed the purposes, questions, and rationales for MMR, but comparatively they have little elaborated on the nature and formulation of research problems. For example, Maxwell & Loomis (2003) developed an interactive model outlining five components of research designs: purposes, conceptual framework, research questions, methods, and validity. They placed research questions at the center of the model, arguing that they inform and are directly related to the other four components. They discussed two types of research questions. First, variance questions are designed for quantitative research due to their emphasis on measuring variables, determining frequencies or values of categories or variables, and assessing the relationship among variables. Second, in qualitative research, process questions are commonly used to explore a variety of phenomena, their characteristics, and the participants’ interpretations of events, situations, and phenomena.

Plano Clark & Ivankova (2015) discussed the contextual elements affecting the formulation of research purposes, objectives, and questions, but they did not address the nature and characteristics of research problems in MMR and how they may be developed and operationalized within an MMR design. DeCuir-Gunby & Schutz (2016) described the logic for developing appropriate research questions for MMR. While they mentioned that the introduction section of an MMR proposal must provide the context of the research problem being addressed, they did not further elaborate on the types of research problems that might be addressed in MMR. Creswell & Plano Clark (2018) used the term “research problems” to describe what other authors have described as “research questions” or “research rationales.” Creamer (2018) provided an excellent discussion about the typologies of MMR research purposes, including elaboration, triangulation, initiation, and enhancement, but she did not address how to develop research problems for MMR. Recently, Tashakkori et al. (2021) described a model for generating research questions in MMR that included the following four steps: (a) determining the reason or reasons for conducting research; (b) identifying a researchable idea in a certain area of interest; (c) developing research objectives; and (d) generating research questions. These authors noted that researchers should establish a clear rationale for conducting an MMR study based on the nature of the research question, which is sometimes drawn from personal characteristics, life experiences, and education. The authors then provided a list of general reasons for using MMR, including description, prediction, testing, investigation, exploration, and empowerment of disadvantaged groups. The authors did not, however, provide a comprehensive account of how these reasons could be embedded within broader research problems in MMR.

As Guba (1978) noted, research problems do not just simply exist in the human world, waiting to be picked up by researchers. Rather, research problems are identified, created, and refined

through the extensive work of researchers after due consideration of their personal interests, local and global significance, and gaps in practice and theory (Jacobs, 2013; Newman & Covrig, 2013). In a similar vein, research problems that are amenable to MMR are not just available in the literature but are influenced by a number of personal, interpersonal, and social contexts that shape researchers' MMR practices and thinking (Plano Clark & Ivankova, 2015). Poth (2020) argued that MMR has the potential to study both low-complexity and high-complexity research problems, where the former type of research problems have definable, identifiable, and distinct intentions, contexts, integration, capacity, and outcomes, whereas the latter type of research problems do not.

The problems studied through MMR are intricate and complex because they are contingent upon the nuanced differences among social and cultural contexts and are affected by contextual factors and complexity (Poth, 2018, 2020). Creswell & Plano Clark (2018) identified seven types of research problems requiring MMR approaches. These include research focused on: (a) generating more complete and corroborated results; (b) explaining initial results; (c) exploring before administering instruments; (d) enhancing the results of an experiment with qualitative results; (e) comparing and describing distinct cases; (f) achieving greater involvement of research participants; and (g) developing, implementing, and evaluating a program or an intervention. The research problem discussed in the paper is of the third type, as we were required to explore educators' experiences and develop an instrument for the subsequent quantitative phase. We chose Elliott's framework to identify and formulate research problems in MMR because it highlights the nuances of social and cultural contexts and their convoluted interconnections with the personal, intellectual, and historical beliefs of researchers. Therefore, this framework may serve as an excellent tool for understanding the complexity of research problems in MMR.

Elliott's Conceptual Framework of "Research Problems"

Elliott (2021) argues that, historically, philosophers of science treated research problems as open questions, lack of knowledge, or inconsistencies in empirical claims related to theories. However, historical definitions of problem statements are limited to accounting for the range of problems addressed by scientists in actual research and practice. Hence, in his framework, Elliott characterizes research problems as states of affairs or situations. Elliott's framework has two aims. First, to rescind spurious differences between intellectual and practical research problems and place these types of problems across different dimensions. Second, Elliott argues that research problems are relative to values, and that problems and the values to which they are relative are all objects of empirical research. This framework consists of three components, Slogan, General Propositional Model, and Agential Model, which are discussed in detail below.

Slogan

Elliott (2021) describes the slogan as a superficial definition of a research problem, defining it as "a state of affairs or situation in which something valued is harmed or is obstructed from reaching an end both valued and assigned to it" (p. 8). He clarified that the slogan enables individuals to consider a problem worthy of research based on its anticipated value and potential harm to individuals or society. For example, if a passive lecture-based teaching method is negatively affecting students' learning and the educator does not consider such a method detrimental to student learning, then for the educator it is not a problem requiring any solution.

Elliott (2021) further explicates that situations are considered problems because individuals may assign values and ends to those situations and their anticipated harms, benefits, and consequences. Therefore, in scientific disciplines or research, individuals may overemphasize or undermine the degree of some situations as research problems based on their values, practice, and

experience (Elliott, 2021). Consider a situation where decreased scores of undergraduate students on the Graduate Record Examination (GRE) affect their induction into the respective university graduate programs. If educators or other educational researchers do not value the importance of students' GRE scores and their potential effect on their admissions, then this problem may not be considered a significant research problem.

The General Propositional Model

The general propositional model provides the structure of a research problem and the particulars for describing situations as problems. Elliott (2021) argues that the general propositional model enables researchers to differentiate between their wants and things valued and requires them to conduct comprehensive empirical work to demonstrate the existence of the research problem. This model helps specify the details of a problem statement by using the following five kinds of propositions (Elliott, 2021):

1. Propositions about the harms or obstructed ends of a situation.
2. Propositions listing the individuals who may have assigned values or ends to the situation.
3. An evaluative proposition about the disvalue of the situation.
4. An imperative proposition to ameliorate the situation.
5. Propositions describing potential constraints on amelioration (Elliott, 2021, p. 11).

Researchers can use this construct to characterize a situation as a problem when they show that conditions 1, 2, and 5 are true, for instance, by providing empirical support for the descriptive accuracy of those conditions.

The Agential Model

The agential model explicitly links individuals, their values, consciousness, and research problems and enables individuals to influence their own behaviors and operationalize empirical studies of behaviors (Elliott, 2021). The agential model is used to empirically demonstrate who accepts the problem as characterized by using the general propositional model. Application of the agential model requires empirical work (Elliott, 2021). The agential model includes several propositions about individuals' acceptance of a problem statement about the issue under consideration, its pertinent harms or obstacles, and the necessity of actions and strategies for ameliorating the issue. Elliott's (2021) framework assumes that people have bounded rationality and look for satisfactory rather than perfect solutions to problems. As a result, the agential model characterizes individuals or agents by the degree to which their aims and actions ameliorate rather than solve a problem.

Applying the Framework of “Research Problems” to a Mixed Methods Study

Overview of the Study

We apply Elliott's framework of research problems to an exploratory sequential MMR study aimed at understanding nurse educators' challenges when teaching undergraduate nursing students. A three-phase design was used. In Phase 1, a descriptive qualitative study was conducted to gain a deeper understanding of the experiences of nurse educators. We conducted semi-structured interviews with 12 nurse educators in five cities in Pakistan. We utilized inductive reflexive

thematic analysis (Braun & Clarke, 2006; Clarke et al., 2019) and generated 27 sub-themes and seven themes. The themes included: personal, institutional, ministerial, student-related challenges, classroom environmental challenges, educational research challenges, and challenges in clinical teaching. The seven themes were used as the domains of a questionnaire designed to measure the challenges facing educators. The questionnaire included 58 items in seven domains. In Phase 2, the questionnaire was pilot tested and validated. The pilot testing involved a brief survey of 15 nurse educators and consultations with five expert nurse educators and nurse researchers to determine face and content validity. The item content validity indexes ranged from .80 to 1, and the overall context validity index for the questionnaire was 1, demonstrating excellent content validity (Polit & Beck, 2006). In Phase 3, a survey was carried out with 112 nurse educators across five cities in 12 nursing institutions.

In this study, the integration of the quantitative and qualitative components occurred in the philosophical, theoretical, researcher, literature review, data collection, data analyses, interpretation, and reporting dimensions using strategies such as the integration of a framework about nurse educators’ competencies, the review of qualitative and quantitative studies in the literature review, the involvement of researchers with experience in qualitative, quantitative, and MMR, the use of the building integration technique to develop a questionnaire for the quantitative phase, the use of the merging integration technique to integrate the findings from Phases 1 and 3, and the use of visual joint displays for interpreting and reporting the MMR findings. The procedural diagram of the study is presented (Figure 1), and detailed findings of this MMR study and the building procedure are reported in Younas et al., 2019b, 2020.

Application of Elliott’s Framework

In this section, we apply Elliott’s framework of research problems to illustrate the fundamental intellectual and practical dimensions of the above-mentioned MMR study. We also illustrate how the personal experiences of researchers who worked as educators in a similar setting, and their personal and educational values influenced the problem.

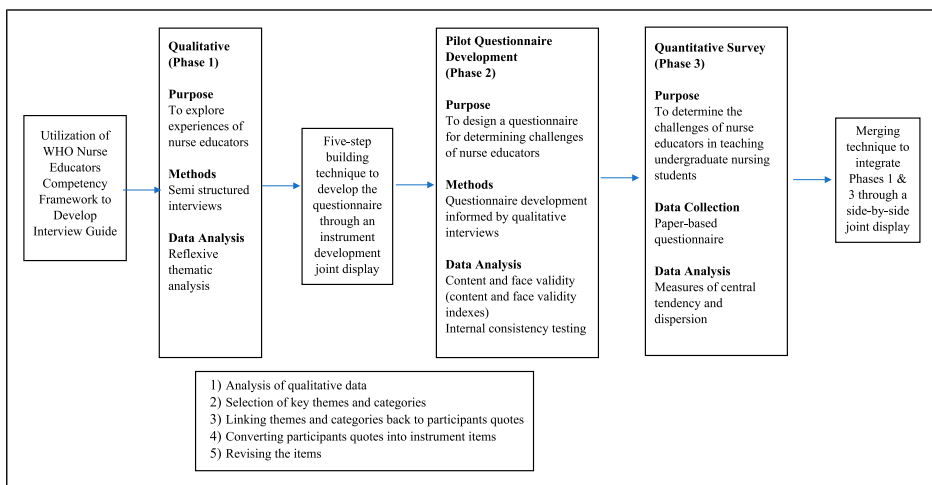


Figure 1. Procedural Diagram of Mixed Methods Study of Nurse Educators.

Context and Complexity of the Research Problem. In Pakistan, the nursing education system is gradually progressing to meet the global standards of nursing education (Huda & Alisbinati, 2015; Sodho et al., 2021). One hundred sixty-six accredited nursing institutions offer a three-year diploma program in nursing, a four-year bachelor's degree, and a two-year master's degree. To our knowledge, only three nursing institutions offer a doctoral degree in nursing. Two of those institutions began their program in 2020–21. The Pakistan Nursing Council ceased the three-year diploma program in 2020 to ensure that nurses are qualified to meet the international standards of nursing education (Khuwaja, 2020). However, there are insufficient resources and inadequate guidance to address the shortage of nurse educators and practicing nurses. Institutions and regulatory bodies expect educators to possess specific competencies but offer limited support to develop and harness their competencies (Huda & Alisbinati, 2015).

In addition, little attention is placed on translating research-based knowledge about nursing education into developing protocols and policies for enhancing clinical and academic nursing education (Sodho et al., 2021; Zeb et al., 2019). Seemingly, the whole nursing education system appears to be still based on dated research evidence. Concerning the qualifications of nurse educators, most of the educators in nursing institutions hold a three-year diploma, a post-registered diploma in education, and a bachelor's degree in nursing. While master's-prepared educators have started to replace bachelor's-prepared educators, there is still a significant shortage of master's and PhD-prepared educators (Huda & Alisbinati, 2015; Younas et al., 2019c).

In addition to the lack of qualified educators, many personal and system-related issues affect the progress of nursing education. These issues include: underdeveloped and inconsistent curricula, poorly defined educators' roles, lack of implementation of educational policies, administrative issues, limited cross-institutional collaboration, authoritarian and non-supportive academic administration, condescending attitudes towards novice educators, insufficient workplace resources and teaching aids, limited educational research funds, and access to scholarly resources (Huda & Alisbinati, 2015; Sodho et al., 2021; Younas et al., 2019c). Given these known issues and the research team's personal experiences of working in educational institutions deprived of clinical and educational resources and research-based activities, the MMR study about educators was a worthwhile problem to study. This problem could be considered complex because nurse educators' ability to teach students effectively is influenced by personal, interpersonal, social, organizational, and contextual factors as well as the characteristics, competencies, and teaching and learning styles of nurse educators and students. Moreover, nursing is both a practical and scientific discipline, and teaching the art and science of nursing practice entails focusing on concrete, ethical, moral, interpersonal, and cognitive skillset. The need to equip nursing students with a multidimensional skillset could require intensive work from nurse educators.

Initial Description of the Problem. Based on the above-discussed complexity of the problem and the study context, the superficial or preliminary problem was formulated as follows: *nurse educators encountering challenges while teaching undergraduate nursing students in Pakistan is a situation that may have several negative consequences. First, it may impair the teaching and learning process and ultimately diminish the quality of education received by nursing students in Pakistan. The limited existing literature already supports the notion that nursing education in Pakistan is still developing (Younas, Rasheed & Sommer, Younas et al., 2019c). Second, experiencing challenges on an ongoing basis may affect the general physical and emotional well-being of educators, thereby affecting their ability to teach in an effective manner. Finally, if educators are unable to teach effectively and prepare a competent nursing workforce, it affects the quality of patient care in Pakistan (Figure 2).* Consequently, it could negatively impact the image of nursing as a caregiving discipline. Given these consequences, the research team assigned practical,

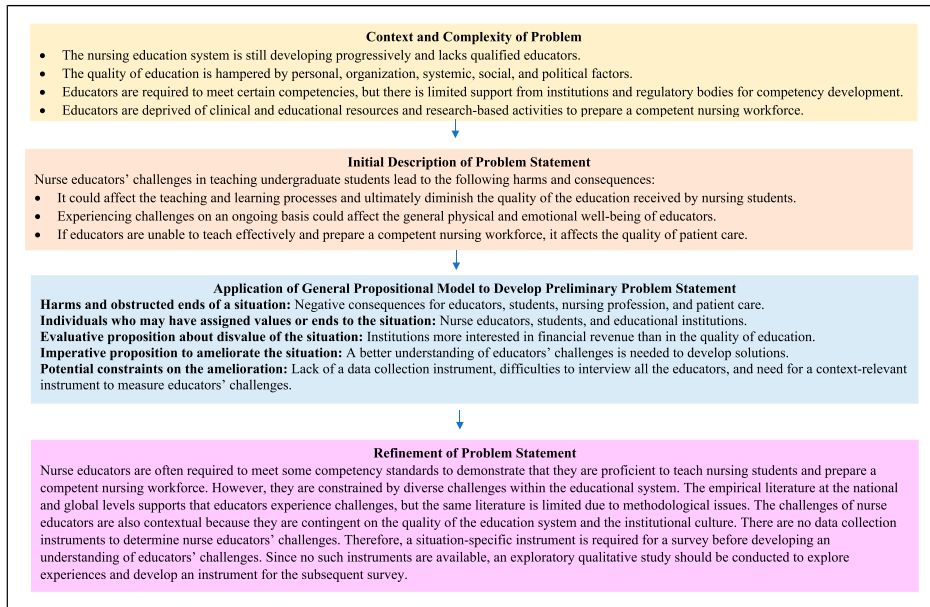


Figure 2. Application of Elliot's Framework for the Development of Mixed Methods Research Problem.

clinical, and social values to explore in detail the issues and challenges of nurse educators in the Pakistani education system.

To support the existence of this problem, the research team gathered the available empirical evidence from the literature in Pakistan and other similar contexts (Awalkhan & Ghani, 2018; Huda & Alisbinati, 2015; Zeb et al., 2019). The existing evidence noted the critical nature of the problem, the dearth of robust national and international studies on educators' challenges, and the lack of data collection instruments to determine educators' challenges. Qualitative studies from Iran, Cameroon, South Africa, and Europe discussed nurse educators' challenges with several facets of the educational process in nursing, including curriculum designing, clinical teaching, and educators' roles (Jamshidi, 2012; Ndawo, 2015; Raholm et al., 2016). However, these studies had numerous methodological limitations, including extremely small samples and a lack of rigor in data collection and analysis. One quantitative study (Eta et al., 2011) identified educators' challenges by utilizing an unvalidated and unreliable tool with extremely limited applicability to the Pakistani context. These evidence gaps warranted the need for an MMR study to first explore educators' experiences, identify various types of challenges, and then develop a survey questionnaire.

Application of the General Propositional Model to Develop a Preliminary Problem Statement. Drawing on the initial description of the problem, the general propositional model was used to develop a preliminary problem statement: *nurse educators in Pakistan experience challenges when teaching nursing students in undergraduate nursing programs. The ongoing challenges hamper their ability to provide effective teaching and enhance student learning. However, the types, nature, and degree of the challenges are not fully known.* This preliminary problem statement was illustrated using the five propositions of the general propositions model, which addressed the harms and obstructed ends, the values attributed to the importance of the problem, the problem's disvalues,

tentative solutions to the problem, and constraints to ameliorating the problem. Each of these propositions is illustrated as follows.

Propositions about the harms and obstructed ends of a situation. Nurse educators find it challenging to teach undergraduate nursing students in the Pakistani education system, which is constrained by organizational and personal barriers to effective teaching and learning (Zeb et al., 2019; Younas et al., 2019c). The limited data from Pakistan demonstrate the dearth of qualified educators, material and human resources, financial and institutional support, and research and teaching resources (Huda & Alisbinati, 2015; Zeb et al., 2019). If nurse educators are unable to provide effective education and prepare the nursing workforce, it poses negative consequences for the nurse educators, students, clinical and health care, and the national image of the nursing discipline (Shahzadi et al., 2017; Zeb et al., 2022). Nursing students experience harm such as adaptation to academic and clinical learning environments, poor learning outcomes, academic performance (Victor, G., Ishtiaq, M., & Iqbal, 2016), increased dropout, workload, and fear of failure (Sikander & Aziz, 2012; Watson et al., 2017). Additionally, the education system also impacts nursing students' personal lives, resulting in burnout, emotional and physical distress, threatening professional identity, and decreased interest in pursuing and continuing nursing careers (Tharani et al., 2017; Watson et al., 2017). The practicing nurses experience harm, such as increased workload and time constraints to mentor nursing students (Strøm et al., 2023) and care and ethical conflicts when working with nursing students (Albert et al., 2020). Patients experience harm, such as medication errors, safety concerns, falls, and iatrogenic infections (Ta'an et al., 2021; Tabassum et al., 2015). Nursing educators experience harm, such as burnout, stress, workload, ineffective student facilitation, and conflicts with students, clinical nurses, and management (Zeb et al., 2022; Younas et al., 2019c). The challenges of continuously progressing and developing the nursing education system also affect the standards of quality education in the nursing discipline (Awalkhan & Ghani, 2018; Younas et al., 2019c).

Propositions listing the individuals who may have assigned values or ends to the situation. Nurse educators, students, and educational institutions assign values and an end to the situation. When nursing students are satisfied with the teaching and learning process and the education system, it can positively affect their performance appraisal of educators and the reputation of educational institutions (Victor, G., Ishtiaq, M., & Iqbal, 2016; Zeb et al., 2022). On the other hand, if nurse educators are satisfied with the available resources and support provided by the institutions, it may reduce their burnout and turnover, leading to the retention of nurse educators and an improved teaching and learning environment within educational institutions (Zeb et al., 2019, 2022, 2022). The regulatory nursing bodies and the educational institutions seem to be downplaying the poor quality of nursing education and less interested in the challenges of nurse educators (Younas et al., 2019b; Zeb et al., 2019). Many educational institutions are more focused on generating revenues than improving the quality of nursing education across the country (Aziz, 2011; Yaqoob, 2020; Zeb et al., 2022). On the other hand, nurse educators value the significance of excellent teaching and learning resources for student learning (Zeb et al., 2022).

Evaluative proposition about the disvalue of the situation. Nursing students disvalue the poor education and career prospects they get. Therefore, research suggests that they would like to see improvements in educational resources and facilities, clinical teaching facilities, and support from leaders, clinical instructors, and nurse educators to foster mitigating stressful and unethical practices during clinical learning (Farooq et al., 2018; Khan and Begum, 2020; Victor, G., Ishtiaq, M., & Iqbal, 2016; Zeb et al., 2020). Nursing educators disvalue the current state of international prestige for their education system (Younas et al., 2019b) and emphasize the need for improving

the quality of teaching and learning environments, the global relevance of the curricula, the availability of advanced clinical skills labs and academic resources, emotional and material support from the administration, and opportunities for educational research and scholarly activities (Victor, Ishtiaq, & Parveen, 2016; Zeb et al., 2019, 2022, 2022).

Imperative proposition to ameliorate the situation. A better understanding of nurse educators' challenges should be developed so that necessary measures are taken to address those challenges, enhance the quality of nursing education, and promote effective student learning in clinical and educational settings (Huda & Alisbinati, 2015; Zeb et al., 2019).

Propositions describing potential constraints on the amelioration. It is difficult to develop a comprehensive understanding of educators' challenges due to the absence of instruments for conducting a survey of nurse educators across different cities in Pakistan. It is not possible to interview all the educators around Pakistan; therefore, a qualitative study of educators can inform the development of a contextualized and relevant questionnaire to undertake a survey. Based on the personal experiences of members of the research team in the educational system, it was identified that there are limited financial and research resources, research training, an emphasis on research to understand issues and identify potential solutions to pressing educational issues, and a lack of overall direction on how to improve the clinical and academic teaching-learning environments through generating evidence-based knowledge to inform the development of contextualized curricula, teaching and learning processes and strategies, and the most needed resources for educators and students. The team also identified a clear possibility that the Pakistan Nursing Council and many nursing institutions have not conducted any research since their inception to explore educators' issues, their needs, and their perspectives on how to shape the nursing education system to meet global standards.

Refinement of Problem Statement

After gathering empirical and experiential support for the state of affairs regarding nurse educators' problems, the lead researchers approached other like-minded researchers and educators who considered this issue worthy of exploration and amelioration. The educators collaborated from five different cities and sought representation from 12 nursing institutions. These educators met in weekly discussions to generate and clarify ideas for an MMR project. An advisory committee was developed, consisting of nurse educators, deans of nursing, and associate deans of research and teaching. Based on the feedback of the advisory committee, the research protocol for the MMR study was finalized and then shared with the research team. During the meetings and protocol developed, a lack of educational research was identified as a common issue across nursing institutions in Pakistan; all the nurse educators who collaborated on this research valued the need for greater research into educational affairs pertaining to the nursing discipline. Therefore, the educators' personal and professional values and experiences are linked to the problem statement. These educators represented different institutions, which speaks to the significance placed on understanding educators' issues by those institutions.

After reviewing the general problem, the advisory group of nurse educators decided to initially focus on the more granular issue of nurse educators' challenges in clinical and classroom teaching. Therefore, the problem statement was formulated as follows: *nurse educators are often required to meet some competency standards to demonstrate that they are proficient in teaching nursing students and preparing a competent nursing workforce. While nurse educators recognize that they need to improve the quality of teaching and learning in educational institutions, they are constrained by diverse student-focused, educator-focused, and institutional-based challenges*

within the educational system. While empirical research at the national and global levels demonstrates that educators experience challenges, the same research is constrained due to methodological issues. The challenges of nurse educators are also contextual because they are contingent on the quality of the education system and the institutional culture. There are no data collection instruments available to ascertain the obstacles faced by nurse educators while teaching nursing students in the classroom and clinical settings. Therefore, before developing an understanding of educators' challenges, a situation-specific instrument is required for a survey. Since no such instruments are available, an exploratory qualitative study should be conducted to explore experiences and then develop an instrument for use in the subsequent survey.

In response to this problem statement, [Younas et al., 2019b](#) formulated three research questions: (a) what are the experiences of nurse educators in Pakistan? (qualitative question); (b) what are the challenges faced by nurse educators while teaching undergraduate nursing students? (quantitative question); and (c) to what extent are the qualitative themes relating to the challenges and experiences of nurse educators consistent with the quantitative data? (MMR question).

[Elliot \(2021\)](#) noted that there are two ways to link and relate research questions to the problem statement. First, a semantic relationship might be established, which entails directly transforming the problem statement's arguments into interrogative questions. For example, the statement that nurse educators experience challenges when teaching undergraduate nursing students can be rephrased as follows: nobody knows or has documented the individual, institutional, and clinical challenges that nurse educators face when teaching undergraduate nursing students. Second, intellectual relationships in which a single research problem might generate multiple research questions and interrogative statements based on several directly and indirectly linked arguments. We developed research questions based on both of these relationships.

The qualitative research question (a) is directly drawn from the idea presented in the problem statement: the challenges of nurse educators are contextual and varied across institutions and cultures. Therefore, it was important to explore the experiences of nurse educators in the Pakistani context to understand what contextual issues are prominent in their teaching and learning environments. The requirement to construct a context-specific data collection instrument necessitated a deeper exploration of educators' experiences in order to establish relevant categories and items for the subsequent quantitative survey. The quantitative question (b) is derived from the premise that if a more comprehensive understanding of the challenges is needed, a quantitative survey with a reasonable sample of nurse educators can provide stronger evidence to inform practice and policymaking aimed at assisting nurse educators in meeting the required competencies. Finally, the MMR question (c) is justified by the necessity of comparing qualitative data from a small group of educators to quantitative data from a larger sample in order to determine whether contextual challenges are likewise systemic across multiple institutions in Pakistan. This comparison would allow the generation of more plausible meta-inferences about the most prominent challenges of nurse educators, as well as the provision of information to alleviate the problem.

Discussion

The application of Elliott's framework of research problems enabled a greater in-depth understanding of the nature of the state of affairs regarding nurse educators' challenges, thereby demonstrating how research problems can be developed and synthesized for MMR. By outlining the evidence supporting the research problem under various propositions, the framework enabled differentiation between the actual researchable problem and the propositions supporting the research problem ([Elliott, 2021](#)). The utilization of the framework enabled linking the personal and professional values of the research team (i.e., nurse educators); the perceived harms of the

research problem for educators, students, and nursing image and quality of care; the educational culture; the quality of the education system; and the limited initiatives taken by the regulatory bodies and the institutions to understand and address nurse educators' issues.

Identifying and writing succinct research problems in MMR is often daunting because it requires narrowing down a broad topic into a manageable issue for study (Polit & Beck, 2014). In line with the components of research problems—context, significance, and purpose (McMillan & Schumacher, 2010)—Elliott's framework of research problems provides an excellent approach to outlining propositions pertaining to these elements of research problems through MMR. Better characterization of research problems in MMR is critical to generating more pertinent research questions for distinct qualitative and quantitative phases as well as the research questions for the integration or mixing phase, thereby enabling the researcher to identify methods appropriate to address those problems and then select a relevant MMR design (DeCuir-Gunby & Schutz, 2016; Younas et al., 2019a). A more clear articulation of the problem statement is also crucial in highlighting the intentions of the researchers, the context of the study, and the importance of the problem for research participants, practitioners, and policymakers (DeCuir-Gunby & Schutz, 2016). In the above-mentioned example, the general propositional model enabled refinement and finalization of a preliminary MMR problem statement by allowing an understanding of the context and harms and obstructed ends of nursing education and educators' challenges. The above-described research problem was exploratory in nature, but it is reasonable to claim that the framework of research problems can be useful for outlining the components of research problems across a wide range of descriptive, predictive, and experimental MMR designs.

While Elliott's (2021) framework of research problems has been used in this paper to identify and write problem statements for an exploratory sequential MMR study, it has the potential to guide the development of problem statements in other core and advanced MMR designs. In advanced MMR designs, such as experimental, evaluation, participatory, and case study designs, there is a greater interplay of personal, social, and contextual factors (Creswell & Plano Clark, 2018). Therefore, these types of designs show a greater need to tease out the different components of research problems and the probable effects of various researcher- and participant-based factors on the conceptualization and operationalization of research. For example, since in participatory and social justice designs, there is greater involvement of research participants during the design and conduct of research, the differences in viewpoints and preferences of researchers and participants can affect the development of relevant research problems. In these types of advanced MMR designs, the use of Elliott's framework of research problems may enable breaking down a considered problem. Once a problem is broken down, the general propositional and agential models can enable unpacking the issues, preferences, and values of researchers and participants and synthesizing the available evidence under different propositions.

Contribution to the Field of Mixed Methods Research

This paper offers a conceptual contribution to the field of MMR by highlighting how MMR problems can be synthesized by combining evidence under different propositions (e.g., propositions about the harms, benefits, context, and significance) that support the broad research problem. The complexity of the research problem illustrated in the paper demonstrates that designing robust MMR studies requires untangling the nuances of an intended phenomenon before conceptualizing and operationalizing MMR.

The complexity of this framework also intersects with the complexity of MMR. MMR entails complex questions, methods, approaches, and techniques and addresses intricate and wicked research problems (Creswell & Plano Clark, 2018; Mertens, 2015). Therefore, untangling the complexity of research problems before choosing an MMR design and the appropriate methods

may help reduce the intensive work required at the operationalization stage. MMR questions are intricate because they should explicate the methods, context, relevance, and individual components of an overall MMR study (Creswell & Plano Clark, 2018). By using a framework to synthesize various components of a problem, researchers may be able to develop research questions for a variety of different propositions of the research problem. For example, after delineating the various components and propositions of a research problem to be studied with MMR, researchers can determine which propositions require in-depth investigation through MMR. The chosen propositions could be further unraveled through the same process and then transformed into meaningful and relevant problem statements. Elliott's framework serves as a roadmap for researchers to refine their initial thinking by teasing out any supporting propositions that may designate a certain issue as a research problem.

Drawing from our practical example of identifying and constructing an MMR problem statement, we outline the following characteristics of a useful MMR problem statement.

- An MMR problem statement should be drawn from an integrated review of qualitative, quantitative, and MMR literature.
- A useful MMR problem statement makes explicit the linkages between qualitative and quantitative research, knowledge, and practice gaps drawn from the literature review as they pertain to the research project.
- A useful MMR problem statement allows researchers to generate qualitative, quantitative, and MMR questions.
- A useful MMR problem statement is descriptive and informative to allow readers, stakeholders, and researchers to realize its necessity to be addressed through an MMR approach.
- A useful MMR problem statement covers distinct aspects of one or more central phenomena to be studied through an MMR approach. However, it is important to ensure that if more than one central phenomenon is studied, the problem statement remains researchable.
- A useful MMR problem statement is specific, non-ambiguous, and framed in such a way that readers or researchers can recognize that the issue is researchable.

Limitations

Elliott's framework is abstract. This paper offers one example of its application for identifying and formulating research problems. Further application of this framework is required to demonstrate its usefulness for generating research problems. Collecting evidence for a range of propositions for the general propositional and agential models can pose difficulties in the literature review dimension, particularly if the literature is scarce. Further application of this framework can be useful for revisiting these propositions to meet the contextual needs of a specific MMR design. Because of the differences in MMR designs and typologies, it is even more important to evaluate and amend the framework to develop well-defined research problems.

Conclusions

Generating and writing researchable problem statements is often daunting because it entails identifying personal, social, practical, and intellectual issues, reviewing and compiling supporting and conflicting evidence, and refining the components. Researchers' values and beliefs about the importance of labeling any problem as researchable are intertwined with the sociocultural and contextual factors supporting the critical need to address a problem. Given these complex steps, it is reasonable to say that writing appropriate and relevant research problems requires intensive

work. In MMR, developing research problems could be even more daunting due to the need to justify why qualitative and quantitative methods alone are not sufficient to study a particular issue and how the synthesis of two methodologies can produce workable methodologies and robust designs. Therefore, it is critical for novice researchers to be given clear and sound guidance on the nature of MMR research problems and how to approach them. We hope to have contributed to this effort by demonstrating how research problems for an MMR study can be identified and formulated using Elliott's framework of research problems.

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