

CE

Nursing Research

Understanding the Basics

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Qualitative, quantitative, and mixed framework methods provide a foundation for research premises, ideas, and theories. This article provides a basic overview of the underlying principles and describes the benefits and limitations of qualitative, quantitative, and mixed framework research. Additional information is discussed to analyze the advantages and disadvantages of each approach for conducting research on critical thinking in nursing education.

Qualitative, quantitative, and mixed framework methods of research are used by educational researchers seeking to describe, predict, improve, and explain phenomena related to both teaching and learning (Gall, Gall, & Borg, 2003). Many nursing educational researchers are intrigued with both the science and the art associated with teaching, learning, and the nursing phenomena associated with critical thinking during the educational process and in practice. As nursing research continues to contribute toward the validity of nursing theories, educational program outcomes, and nursing knowledge, so will questions involving research application to practice continue to encourage the search for different or additional methods to conduct research studies within the nursing profession and nursing education (Fontana, 2004).

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Qualitative, quantitative, and mixed framework methods that are explored in nursing research provide an opportunity to expand on the variety of situations presented within the complex profession of nursing and the nursing education process that involve critical thinking. To understand the various research contributions and distinctive characteristics of qualitative, quantitative, and mixed framework research methods, an overview of the underlying principles is discussed, along with a description of the benefits and limitations, followed by an analysis of the advantages and disadvantages of each approach in relation to research on critical thinking in nursing education.

UNDERLYING PRINCIPLES OF QUALITATIVE, QUANTITATIVE, AND MIXED FRAMEWORK

Gall et al. (2003) explain the unique differences between qualitative and quantitative framework in relation to how, why, and what data are collected to reach the outcome of the research assumption. The principles on which qualitative research is based contain the aspects of phenomenology, while quantitative research is based on the principles from logical positivism. Phenomenological research seeks to appreciate the distinctive experiences and qualities of each individual, while exploring human responses and societal influences on personal perception. Logical positivism aims to conduct research from an objective and measurable base, establish a cause-effect relationship between variables, and develop a direction for a hypothesis. Mixed framework research uses principles for a multidimensional perception, such as qualitative

and quantitative, to examine a phenomenon, question, or subject on several different levels (Blenner, 1995).

Benefits of Qualitative Research

Some of the benefits of qualitative research result from exploring the unique experiences of individuals as they interact within their personal or larger social systems as well as providing very detailed and holistic accounts of the particular phenomena in question (Ghesquiere, Maes, & Vandenberghe, 2004). Qualitative research is subjective and unique to the individual's part of the research agenda, while encouraging an environment that is nonjudgmental and holistic. This provides an opportunity for participants to openly express feelings and perceptions. Qualitative research provides a valuable connection between phenomena and participants' perceptions of phenomena being studied (Burns & Grove, 1997).

Hopwood (2004) describes some of the advantages of qualitative research in relation to the ability to remain open-minded and prepared to adjust or adapt to obstacles or unforeseen changes that occur during the study. Gall et al. (2003) support Hopwood's claim by describing one of the advantages of using a qualitative approach as enabling the researcher to change the course of the study by developing new questions and establishing other methods for data collection. Gall et al. assert another advantage to include reflection of the researcher's perspective in order to provide the reader with comparisons or contrasts in the findings that may reveal similarities or differences in thoughts about particular phenomena. For example, Gall et al. include ethnography or cultural studies in qualitative designs to provide the reader with detailed descriptions, insight, and documented experiences about a particular cultural group from the researcher's perspective.

According to Keen and Packwood (1995), qualitative studies can provide real-life descriptions of how an individual or individuals relate to their environment and study interventions. For example, a qualitative approach to research exploration may be beneficial in the healthcare environment when attempting to find out how a patient is responding to a treatment emotionally or holistically. Questions involving why a patient may not be responding well to treatment might be found in the missing elements in qualitative questioning. Benefits using qualitative questions may also be applicable to various educational environments. For example, questions involving how students are responding to a particular teaching technique or strategy can be explored through interviews or surveys using qualitative methodology.

Limitations of Qualitative Research

According to Hatcher and Brooks (2000), qualitative techniques in research studies have been scrutinized because of the uncertainty of collecting subjective data. Emotions, perceptions, opinions, or expressions of lived experiences are difficult to harness into facts or numerical values. Hatcher and Brooks also examine the credibility of a research study that is based purely on subjective data, while questioning the validity of the results. For example, limitations to qualitative research may be found in the potential lack of logical reasoning or statistical rigor that is needed in a scientifically based field, such as healthcare. Some medical researchers, due to the perceived deficiency of solid scientific evidence, might dismiss conducting a purely qualitative research approach (Shank & Vilella, 2004).

Although qualitative research studies involve the researcher as the research instrument and part of the experience, the subjective nature of this approach presents potential limitations in response to the accuracy of the researcher's judgment. The role of qualitative researchers includes collecting and analyzing the data gathered from the research findings and then evaluating the overall results (Gall et al., 2003). Questions involving quality of the research report depend greatly on the reliability, reputation, and quality of the researcher and relationship that the researcher established with the participants in the study. The researcher maintains control of the project and can change components of the study during the research process. However, qualitative findings may change during the course of the study, presenting a shift in circumstances (Verschuren, 2001).

Some of the benefits of establishing closer relationships with participants during a qualitative research study may also pose a threat and present limitations associated with ethical considerations. Emotional involvement may accompany qualitative interactions and participants may feel too exposed during or after the questioning phase. Therefore, it would be important for the researcher to be consistently aware of emotional vulnerabilities and seek protection for all involved before a study is conducted using proper institutional review board forms and thorough documentation (Gall et al., 2003).

Benefits of Quantitative Research

Research gains legitimacy and validity depending on the foundation, framework, and measurements of the study variables. Quantitative research efforts have set the standard for traditional methods of testing and validating research findings through establishment of correlational and causal relationships between variables (Watts, Jones, Wainwright,

& Williams, 2001). Deductive reasoning, empiricism, and logic are some of the terms used to describe the standard for quantitative rigor. By analyzing statistics and by testing a theoretically derived hypothesis, one can present logical and scientifically validated outcomes found in non-experimental and experimental research designs (Burns & Grove, 1997).

For example, a quantitative approach to testing a theoretical hypothesis is beneficial in the healthcare environment when attempting to predict and determine the number of patients responding to a given treatment and the cause-effect relationship between patients and treatment. A similar approach is applicable for testing teaching strategies and/or programs in relation to student outcomes. For example, questions involving a correlational or cause-effect relationship between students of a certain number, gender, age, or educational level in relation to a particular teaching strategy in question can provide the foundation for a quantitative inquiry.

Other benefits of quantitative research include gathering data using an objective, uninvolved approach to observing and reporting behavior and/or phenomena. Researchers can then maintain a scientific approach in selecting the appropriate instruments and gathering data without an emotional attachment with the participants and project. Therefore, the statistical significance of a predetermined hypothesis becomes the main focus (Sandelowski, 2000). In relation to ethical consideration, there are benefits to establishing the methodology before the study and during the proposal stage of a quantitative research approach. This allows the researcher to identify potential risks to participants and provide time to minimize complications (Gall et al., 2003).

Limitations of Quantitative Research

One of the limitations in solely conducting quantitative research is the potential lack of subjective data about human response or interactions necessary to answer questions pertaining to social, internal, and holistic phenomena. Purely quantitative research methods do not include the establishment of human emotion, habits, perceptions, or experiences that might expose other personal variables related to the participants that could influence the final outcome of the study. Therefore, the rich interpretation of human and social phenomena may be lost during the quest for purely numerical and statistically driven outcomes (Dahlberg & Drew, 1997). In relation to healthcare, human interaction and perceptions of treatments pose more complexity than other natural sciences, creating the need for understanding a deeper meaning about human response than quantitative analysis is able to produce (Mays & Pope, 1995).

Another limitation to quantitative methods in relation to ethical considerations may be demonstrated through the lack of personal interaction. The relationship between the researcher and the participant might be perceived as detached and very clinical. This might leave the participant with feelings of uneasiness, while possibly creating a negative environment and/or relationship between the researcher and participant (Gall et al., 2003).

Benefits of Mixed Framework Research

Mixed framework stems from the quantitative traditions of maintaining evidence of research findings and validation, while contributing to the reliability of quantitative research by presenting supportive data. Integration of qualitative methods can complement quantitative objectives by combining strengths of two or more methods, providing a broader perspective into the complex diversities that accompany human experiences and perceptions (Barbour, 1998).

Halcomb and Andrew (2005) explain the reasons for combining qualitative and quantitative methods, as providing an analysis at the different stages of data collection and interview processes. Solely using qualitative or quantitative methods of research may represent only a partial account of a potentially in-depth study. Halcomb and Andrew also assert that mixed framework can provide elements of rigor within a qualitative study that uses quantitative variables, such as larger target populations, to help build research stability within the scientific community. For example, when addressing patient groups according to diagnosis, cultures, age, and many other categorical variables, quantitative and qualitative methods could be used to enrich the project and outcomes with more detail and pertinence to patient care. When subjective, emotional, and holistic data become acquainted with statistical data collection, interpretation, and systematic research designs, a more thorough strategy to justify rigor in qualitative research may be accomplished (Mays & Pope, 1995).

Limitations of Mixed Framework Research

One of the major limitations of mixed framework research may be grounded within the basic conflict between the two paradigms of qualitative and quantitative research. Both assert and depend on two different assumptions regarding the generation of knowledge through research efforts. A researcher who chooses to combine methods should have a thorough understanding of how to use each method separately as well as for the same study. The inability to completely understand the intricate characteristics

of qualitative and quantitative research strategies may lead to inadequate findings (Morgan, 1998).

Halcomb and Andrew (2005) emphasize other possible limitations with combining qualitative and quantitative methods, as time, cost, and resources become a concern. Investigator skills and funding issues may present barriers to the feasibility of collecting large amounts of data and accomplishing extensive timelines. In turn, research quality is compromised if research objectives are not clear or organized. Halcomb and Andrew also point out the potential risks for multiple errors when combining two opposing methods in the attempt to maintain congruency throughout the study and in the final outcome report.

RESEARCH ON CRITICAL THINKING IN NURSING EDUCATION

Critical thinking that involves nursing interventions stretch beyond the immediate response to find an answer or a solution to resolve a problem. Through questioning and reviewing various aspects of possible outcomes, critical thinking then becomes the process of providing a range of solutions depending on the situation, individuals, and variables that encompass the problem (Simpson & Courtney, 2002). Feuerstein (1999) defines *critical thinking* as applying subjective influences to include culture, social, gender, religion, and ethics to decision making, without dismissing important logical, analytical, and empirical foundations. One definition will not completely satisfy the basic need to understand critical thinking. There are many variations of critical thinking used in the educational process including nursing education and research agendas (Talbot, 1995).

Various critical thinking strategies and outcomes can be examined and explored in nursing education using qualitative, quantitative, and mixed framework research methods. Questions involving a particular methodology and direction depend on prudent research questions and approaches used to describe, predict, improve, or explain critical thinking when linked to nursing education (Gall et al., 2003). Through analysis of the advantages and disadvantages of each research method, critical thinking research outcomes can reflect the complex process of making judgments and decisions regarding nursing knowledge, educational purpose, patient care, and professional agenda.

Advantages and Disadvantages of Qualitative Research

According to Crawford (2003), qualitative research is based on a postpositivism perspective and strives to describe, explain, and explore, leading to a gen-

erated theory. In relation to nursing research, a qualitative approach to exploring and gathering information about a nursing student's experience related to critical thinking during both class interactions and clinical interventions may be discovered by conducting a case study. An advantage to this approach is the ability to closely identify and document a series of critical thinking scenarios, responses, and strategies that reflect the nursing student's personal experience and deeper connection to critical thinking (Greenwood, 2000). Because case studies are unique to the participants, they present a variety of individualized outcomes rather than representing nursing students as a group. This may pose a disadvantage when questioning the reliability and validity of critical thinking skill development among other nursing students within a nursing program structure from a positivist or quantitative perspective (Gall et al., 2003).

Other qualitative inquiry to critical thinking in nursing education may involve phenomenology and ethnography to generate theoretical ideas for further research exploration. Dahlberg and Drew (1997) support phenomenological assumptions that thread critical thinking throughout personal discovery as one pursues insight into life situations, human experiences, and the capacity to receive information. For example, how students apply their life experiences to nursing knowledge, responsibility, and educational delivery to the patients may depend on how they process information taught in the classroom in relation to their own personal interpretation of how information should be disseminated. Unfortunately, finding ways to gather information from all students about their experience during course exercises or clinical rotations can be time consuming for nursing instructors and may require additional curricular adjustments to accommodate any new type of teaching or learning technique (Simpson & Courtney, 2002).

Role-playing, as a qualitative exercise, may provide an opportunity to explore how nursing students demonstrate, express, and verbalize the critical thinking process in relation to course topics and discussions (Comer, 2005). Comer suggests the use of role-playing to represent and explore a particular course topic in order to develop specific questions or scenarios that relate to corresponding clinical requirements. This would provide nursing students with an opportunity to demonstrate their ability to share critical thinking perspectives and projections pertaining to the various examples. One of the disadvantages of this approach to critical thinking inquiry may be linked to inadequate use or a lack of measurement tools used to determine the actual legitimacy of application during real patient situations. How a student responds in the class environment may change when stress or anxiety becomes

part of the experience. Therefore, Comer encourages the use of stricter measurement tools and control groups to help determine the advantages and outcomes of role-playing, which would then require quantitative integration.

According to Hickey (1996), nursing instructors are in an exciting position to discover differences among students' abilities to absorb and process information. Some differences may be a result of how each individual responds to his or her environment depending on cultural influences. Ethnography or cultural studies may help reveal critical thinking perspectives of a particular cultural group or an individual within a diverse population of nursing students. For example, Xu, Crane, and Ryan (2002) examined the Asian population in relation to their role as nursing students within a community setting. Xu et al. found that Asian nursing students exhibited less assertiveness within their interaction with other students, less verbalization of knowledge, and less demonstration of various clinical skills. These findings may present an interesting foundation to explore critical thinking perceptions and applications among Asian students within a nursing program. In turn, this may encourage nursing instructors to be more aware of less assertive behaviors of Asian nursing students and focus on helping them develop, assert, and apply more confidence in critical thinking skills within the clinical environment.

Unfortunately, according to Gall et al. (2003), ethnography or cultural studies may only reveal what is perceived by the qualitative researcher, leaving the reader with a subjective, vague, or even distorted view of the culture being observed. Gall et al. identify other disadvantages including the lengthy process of collecting data, scrutiny among scientific scholars regarding potential ambiguity issues associated with cultural findings, and time that is required to fully learn and understand how to appropriately conduct these types of studies.

Advantages and Disadvantages of Quantitative Research

According to Crawford (2003), quantitative research is based on a positivism perspective and strives to describe, explain, and predict, leading to theory testing. The role of critical thinking in guiding nursing research is essential for identifying viable options, attentiveness to logical concerns, thorough assessment, and clinical judgment. Quantitative research on critical thinking in nursing education may provide the necessary questions, evaluation process, plan of action, and implementation strategies to help students make the transition from nursing student to nursing professional (Simpson & Courtney, 2002). For example, research outcomes

on critical thinking may encourage nursing instructors to create exercises and teaching techniques to help nursing students identify, demonstrate, and suggest various options to clinical situations, while examining the validity of assumption (Facione & Facione, 1996).

Some of the advantages and disadvantages of quantitative research on critical thinking in nursing education may be discovered through using non-experimental or experimental designs. Non-experimental quantitative research may include a descriptive, causal-comparative, or correlational design, whereas experimental research seeks to determine a cause-effect relationship between variables using tightly controlled and rigorous protocols (Gall et al., 2003). As with most quantitative methods, more clinical and rigid techniques for conducting research are maintained. Nursing students may feel scrutinized or watched during their efforts to perform naturally within the examination environment (Dahlberg & Drew, 1997).

Gall et al. (2003) explain the purpose for descriptive research as a method to observe and study phenomena as they exist at a particular length or point in time. Although descriptive research provides valuable reports of information, this type of design foundation simply initiates the discovery for further research after some of the basic assumptions related to natural phenomena are revealed. There may be opportunities for descriptive research in nursing education to question quantitative data such as the number of nursing students enrolled and separate student groups, according to various categorical variables such as age, gender, and culture. Inquiry into how many females and males are enrolled in a nursing program along with the numerical results of critical thinking testing scores may lead to testing gender differences in relation to critical thinking scores. Further questioning would be required to develop a research hypothesis using a selected variable or variables in relation to critical thinking in nursing education (Clinton, Murrells, & Robinson, 2005).

Other non-experimental designs, such as correlational research or causal-comparative, provide the educational researcher with an opportunity to analyze relationships among many variables within one study and to analyze the degree to which educational strategies may have an impact or effect on student learning. Although these two designs may only reveal a relationship with student learning, they may need further research to determine the particular cause and effect on student learning (Russell, 2005). Correlational studies primarily help gather data and present findings that can lead to causal-relationship studies and experiments to test the more positive correlational results (Gall et al., 2003).

Experimental research is used in educational research to focus on the effect that a particular

practice strategy or teaching technique has on student outcomes and is valued as a stringent and direct method to determine a cause and effect relationship between variables in question. Careful consideration needs to be in place to include questions about how the experiments are conducted in relation to the variables involved (Gall et al., 2003).

To properly conduct an experiment that measures student outcomes, a control group and an experimental group should be included to determine the effect of the experimental treatment (Hungler & Polit, 1999). This seems to present benign implications for experimenting on students, but there are other important factors that should be explored before developing educational research questions to test students using randomization and tight control. Gall et al. (2003) point out that there are many factors that present a threat to the experimental validity including pre-test sensitivity and the extent to which personological variables interact with treatment effects. For example, pre-test sensitivity may pose a threat to validity through pre-conceived ideas about what is being tested, such as critical thinking, and may present a challenge to obtaining accurate results. Therefore, nursing students may answer questions pertaining to critical thinking to reflect answers according to how they want the outcome of the experiment to read.

The extent to which personological variables interact with treatment effects is another consideration when determining the validity of an experiment conducted in an educational environment. For example, Gall et al. (2003) mentioned anxiety levels as an example of a personological variable. Anxiety can lead to temporary memory loss or inability to concentrate. Anxiety could lead to an additional barrier to the learning process and critical thinking abilities. Nursing programs have a variety of ages among adult learners who may present more anxiety due to some sensory loss. According to Cavanaugh (1998), sensory memory is the first stage in processing incoming information whereas the second stage involves the attention span for remembering educational materials that are freshly presented. By considering all the different types of variables that may threaten the validity of an experiment on critical thinking, educational researchers within nursing may be able to develop studies that control some of these variables through awareness and random selections within their studies.

Advantages and Disadvantages of Mixed Framework Research

According to Crawford (2003), mixed framework combines both qualitative and quantitative methods to test and generate theory. The combination of phenomenological and logical positivism views may

create more resourceful and versatile research studies on critical thinking in nursing education. Storch (1999) emphasizes the value of channeling feelings and emotions during patient interactions and care to bring more meaning to the practice environment. Storch also suggests that nursing education agendas should include and apply more holistic methods in research, along with scientific knowledge to stimulate more research alternatives for nursing programs and practice. Although the combination of qualitative and quantitative methods may appeal to nursing research efforts, it is a complex approach. Student time, thorough evaluation techniques, and use of instruments are required, which may be difficult to implement within tightly structured nursing programs (Halcomb & Andrew, 2005).

Mixed framework research may be used to explore and measure critical thinking in relation to how students respond and perform during tests designed to evaluate critical thinking skills. For example, Comer (2005) describes how role-playing scenarios and patient simulators can be combined to explore student experiences and responses to patient situation while measuring the effect on critical thinking through skill competency. Jeffries (2005) supports the use of mixed framework methods by establishing quantitative data associated with gender, age, or class size, while incorporating qualitative methods during interviews, surveys, or observations among the selected samples groups in relation to their response to the manipulated variable, such as role-playing versus the traditional classroom lecture.

One of the disadvantages that both Comer (2005) and Jeffries (2005) highlight pertains to the high cost of patient simulators and to the extensive time required in the development of role-playing scenarios. Furthermore, some traditionally trained nursing instructors may not be comfortable with implementing a new type of teaching strategy. Despite some of the disadvantages, mixed framework research can effectively provide nurse educators and researchers an opportunity to expand the knowledge of health beyond scientific constraints, while providing a perspective of human phenomena as a credible, valid, and useful source of knowledge.

CONCLUSION

Qualitative, quantitative, and mixed framework research methods continue to be used in educational research. Being aware of the underlying principles, along with the benefits and limitations of each approach, helps the researcher prepare for the important elements and steps involved in considering a research direction. Nurses as educators and researchers are in an exciting position to explore the

many possibilities to use each method, depending on the research goals, assumptions, and social phenomena in question. By understanding and appreciating the advantages and disadvantages of qualitative, quantitative, and mixed framework research methods, a higher developed process of research can help guide educational nursing research toward improving critical thinking in nursing education, especially as critical thinking continues to be a crucial element of the nursing phenomenon and paradigm.

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