

Review

Resolving the qualitative-quantitative debate in healthcare research

Turyahikayo Everest

Uganda Management Institute, Kampala, Uganda.

Received 20 November, 2013; Accepted 11 February, 2014

This article was set out to examine the allegations labeled against qualitative research by quantitative researchers. The allegations were that: it is subjective, difficult to replicate in healthcare, and this amounts to little more than anecdote, personal impression or conjecture. In attempting to resolve the allegations, this article relied on extensive literature review and examined evidence that has been put forth in support of qualitative research approach in healthcare. The article also examined the benefits and pathologies of quantitative and qualitative approaches. It is revealed that although each of the two approaches has its own strengths and weaknesses, none can ably offer practical solutions to challenges of validity and reliability in healthcare research. To mitigate such challenges, the paper rests on the use of mixed methods/triangulation so as to neutralize pathologies inherent in each approach. It is recommended that the use of triangulation should be founded on the strong basis of pragmatism. Method integration should be done skillfully and cautiously, because validity and reliability of its findings may not be guaranteed due to its susceptibility to the ontological and epistemological positions of the researcher. The paper concludes that any attempt to resolve this debate creates even more discussions and finds this third paradigm inadequate in some research circumstances. This implies that the debate is far from over.

Key words: Qualitative research, quantitative research, healthcare research, pragmatism, paradigm.

INTRODUCTION

For decades, there has been a paradigm war between quantitative and qualitative researchers. Each category of researchers claims superiority over the other. Some quantitative researchers have even ridiculed qualitative researchers saying that real men do not collect soft data; and quantitative researchers have been branded number-crunchers (Miles and Huberman, 1994). Pope et al. (2000) also point out a serious criticism against qualitative researchers by the positivists who allege that qualitative data are subjective and that such research is difficult to replicate, and this amounts to little more than anecdote, personal impression or conjecture. However, throughout the paradigm debate, no side has attempted to provide proof in regard to how its research findings

have superseded the other in terms of utility. Perhaps, the failure to provide this proof may either signify a lack of conviction even within each paradigm, as to whether it enjoys monopoly in its contribution to human welfare or failure to embrace pragmatism.

This article examines such criticism in light of the philosophical underpinnings that have shaped the world view of researchers, and underscores pragmatism as a foundation upon which mixed methods approach can be built to strengthen research findings in healthcare.

METHODOLOGY

The paper relies heavily on literature review in examining the

qualitative-quantitative debate in healthcare research. Literature review is the use of secondary data (Amin, 2004) to justify the particular approach to the topic, the selection of methods, and demonstration that this research contributes something new (Hart, 2001; Levy and Ellis, 2006). The review has been discovered to be reliable in conducting scientific research. Authors such as Randolph (2009) and Onwuegbuzie et al. (2012) have recently emphasized the importance of literature review and view it as the foundation and inspiration for substantial, useful research.

Definition of key concepts and phrases

Applied research in healthcare

There are many definitions of research advanced in the early literature (Sarantakos, 1998; Babbie, 1998; Blaikie, 1991; Frankfort and Nachmias, 2003; Kerlinger, 2004). This paper relies on the recent definition given by Leedy and Ormrod (2005) who view research as an endeavor that scholars intentionally set out to enhance their understanding of a phenomenon and expect to communicate what they discover to the large scientific community. The definition links field research to practical solving of a problem. For example, a study on why patients prefer self medication as opposed to seeking medical advice should be driven by the desire to get practical solutions to the problem. Seeking pragmatic answers to a research problem is central to applied research.

Evolution of qualitative research in healthcare

Qualitative research involves the study of phenomena in their natural settings, attempting to make sense of, or to interpret phenomena in terms of the meanings people bring to them (Cresswell, 2003). For several millennia, historians and biographers have recorded the stories of human society using qualitative approaches (Caelli et al., 2003; Sherman and Strang, 2004). This is again supported by McDowell and MacLean (1998) who argue that qualitative data, in the form of words and observation, predated quantitative data in academic study. Such data were used in biology, history, law, and much later, in sociology and political science. However, in healthcare, qualitative research was introduced in the early 1970s (Rambaree, 2007; Cohen and Crabtree, 2008). This implies that although qualitative and quantitative researches were being mixed even in natural science research generally, and in healthcare in particular, natural scientists did not acknowledge it as important.

What is clear, however, is that the persistent acknowledgement of quantitative methods in research ignored the innumerable benefits of qualitative research in healthcare (Lloyd, 2003; Rambaree, 2007).

Consequently, researchers realized that whereas questions of 'what', 'how much' or 'how many,' were answered through quantitative inquiries, other important questions of 'how', 'why' and 'in what way' (Hancock, 2002; Karri and Colyar, 2009), remained unanswered.

Today, as Snider (2010) observes, it has been acknowledged that numbers impress, but unfortunately, also conceal far more than they reveal. Qualitative research is now regarded as a gold standard for quantitative work, because of its inherently more comprehensive approach and greater validity (Murphy et al., 1998; Shank and Villella, 2004).

Qualitative research, its benefits and pathologies in healthcare

Qualitative research is a broad term applying to a range of research approaches based on theoretical origins in anthropology, sociology,

philosophy, psychology and linguistics (Parker and Carballo, 1990; Yin, 2009; Moriarty, 2011). Currently, there are four major types, namely, phenomenology, ethnography, grounded theory and case study (Miles and Huberman, 1994; Hancock, 2002; Marshall, 1996). This may explain why it is a family of approaches (Drisko, 1997). The main aim of this research was to enable researchers to understand and represent the experiences and actions of people as they encounter, engage, and live through situations (Elliott et al., 1999).

There are numerous benefits of qualitative research which include using the participants' own categories of meaning to collect and interpret data (Bryman, 1992); useful for studying a limited number of cases in depth (Frankfort and Nachmias, 2003); conducting cross-case comparisons and analysis (Johnson and Onwuegbuzie, 2004); providing understanding and description of people's personal experiences of phenomena (Cohen and Crabtree, 2008); and being responsive to local situations, conditions, and stakeholders' needs (Brod et al., 2009).

Today, qualitative research has penetrated natural sciences traditionally dominated by quantitative researchers (Murphy et al., 1998; Nicholls, 2011). Qualitative research relies on transforming information from observations, reports and recordings into the written words rather than into numeric data (Denscombe, 1998; Broom, 2005). That is why the approach has been misunderstood by natural scientists to constitute a mere anecdote, conjecture and personal impression of the researcher.

The current quantitative-qualitative debate has not led to recognition of one best approach in conducting healthcare research (Borrego et al., 2009; Murphy et al., 1998). However, the debate has resulted into an analysis of benefits and pathologies of each approach, and underscores the use of triangulation. As will be seen later, several researchers have cautioned that triangulation through the use of mixed methods or multi-methods should not be seen as panacea. Here, examines the benefits and negative criticisms (pathologies) researchers have labeled against qualitative research in healthcare.

There are three major alleged pathologies against qualitative research in healthcare. First, the bulky nature of data collected and consequent loss of time in data analysis (Miles and Huberman, 1994); second, the allegation that qualitative research is subjective and depends on the researchers whims, personal impression, anecdote and conjecture, which affects reliability and validity of research findings (Pope et al., 2000); and third, the allegation of ethical concerns arising from the inevitable physical contact between the researchers and human subjects, and the disclosure of the participant's identity (Myers and Barnes, 2005).

Analysis of the pathologies: The first pathology might be unique to the qualitative researchers in healthcare. However, the bulky nature of qualitative data should be seen as a strong point, because such data is more informative, richer and offers a deeper understanding of the problem than quantitative data (Shamai, 2003; Shank and Villella, 2004; Tewksbury, 2009). This is because it allows the voice of participants to be heard (Scammell, 2010) which is fundamental in solving practical problems using applied research. Moreover, this discussion agrees with Miles and Huberman (1994) who assert that words, especially organized into incidents or stories, have a concrete, vivid, meaningful flavour that often proves far more convincing than pages of summarized numbers. It is unfair to condemn qualitative research on the basis of its bulky data; qualitative findings can be more meaningful with some quantitative explanations.

The last two pathologies cut across research approaches. It should be noted that even quantitative researchers make subjective decisions regarding which data analysis technique and interpretation model to use (Pansiri, 2005). Depending on the research question, quantitative researchers may interact with human subjects more often than qualitative researchers (Erican

and Roth, 2006). Moreover, meaning attached to phenomena is always in the mind of the perceiver. Interpretation of words or numbers is only possible through subjective thinking. This thinking may translate into objective conclusions no matter the research approach one employs.

Some examples of qualitative research conducted in healthcare: In the past, quality of healthcare was measured principally with reference to the norms set by the healthcare provider (Kramer et al., 1997) without patients' active participation. As such, diagnosis remained inadequate because decisions were made without the views of patients. There is empirical evidence to the effect that qualitative research has been conducted in healthcare with emphasis on patients' views on healthcare delivery and outcomes (Kramer et al., 1997). In addition, qualitative studies have also focussed on health services utilization (McVea et al., 1996; Michelene and Chi, 1997; Chi, 1998), and the experience of illness and people's perceptions of health, ill health, and evaluations of health services in relation to their appropriateness, effectiveness and costs (Bowling, 2002). Much of this qualitative research is conducted by medical practitioners such as Doctors, nurses, laboratory technologists and medical academicians. The following is the applied research that has been conducted.

Researchers, Bronstein and Morrisey (1990) conducted a qualitative research about the distances traveled for inpatient obstetrics care by women residing in rural Alabama in 1983 and 1988. Later in 2001, Janicke et al. (2001) conducted a qualitative study on the utilization of children's health care services. Around the same time, Fidler and Lambert (2001) conducted a study titled, 'A prescription for health: A primary care based intervention to maintain the non-smoking status of young people; and recently in 2009, Schwerdtfeger (2009), pursued a qualitative inquiry into the trauma-focused research procedures among pregnant participants. It is evident from the studies conducted so far, that qualitative studies conducted are applied in nature. However, in all these qualitative studies, it is apparent that qualitative enquiry has not stood alone; rather, its findings have been supported by quantitative research. It can be inferred that researchers are mixing the two approaches so as to produce more meaningful and acceptable findings.

The benefits of a qualitative approach in healthcare research are becoming increasingly recognized by both academics and clinicians (Marshall, 1996; Smith, 2003). Indeed many researchers including positivists and interpretivists (Howe and Eisenhart, 1990; Davis, 2007) agree that good qualitative research has equaled, if not exceeded, quantitative research in status, relevance, and methodological rigour due to the strict adherence to several principles. Yet, the use of integration of methodologies as advocated for by Cresswell (2003) cannot be ignored, and as discussed later in this paper. It is this multi-method integration that offsets likely weaknesses in both approaches.

Quantitative research, its benefits and pathologies in healthcare

Quantitative research is about collecting numerical data, making observations and measurements of the phenomena which can be subjected to statistical analysis, repeated and replicated by the same or other researchers under similar conditions (Hancock, 2002; Hamilton, 2003).

The ability of quantitative researchers to reduce data to numbers is seen as the major strong point of the quantitative approach in healthcare (Levin et al., 1997; Curry et al., 2006; Caldwell et al., 2005; Nicholls, 2011). Findings are more likely to be accepted if they are quantified (Greenhalgh and Taylor, 1997). This has been seen as the main source of objectivity and reliability of the quantitative research findings (Marshall, 1996; Castro et al., 2010).

If this is the case, one wonders why there is an increasing rate of barriers to the application of quantitative approach in biomedical research in clinical practice (Meyer, 2000).

Perhaps the reason is that while numbers can be used to summarize quantitative data, answering questions of 'why and how' of the data is not tenable using a quantitative approach (Britten, 1995; Hancock, 2002; Borrego et al., 2009). The inability of quantitative findings in healthcare research to answer these questions implies that numbers can mislead, because the full picture of the healthcare study is not revealed (Mahoney and Goertz, 2006). Take an example of studies in healthcare about patient's preference of medicinal local herbs as opposed to modern processed medicines. Findings from such a study summarized in numerical form may lack a pragmatic edification, because of the silence they exert on respondents feelings, explanations and recommendations.

This means that left on its own, quantitative research is insufficient in aiding the researcher to interpret quantitative data.

PHILOSOPHICAL UNDERPINNINGS AS FOUNDATIONS FOR QUALITATIVE AND QUANTITATIVE RESEARCH IN HEALTHCARE

In this section, three philosophical underpinnings, that is, ontology, epistemology and methodology as foundations of positivism and interpretivism/constructionism, the two paradigms (Figure 1) that categorize researchers are discussed. A discussion of terminologies and partial defence of interpretivism/constructionism is given in the proceeding discussion. The following questions have been resolved hereunder: What are the three philosophical underpinnings and how do they relate to positivism and interpretivism as research paradigms (Figure 1)? Which research paradigm prevails in healthcare research?

Ontology is the study of being/reality. It answers questions of meaning of reality and its nature (Taylor, 1959; Hamm, 1970; Fine, 1991). Ontology, relates to the nature of reality, that is, what things, if any, have existence or whether reality is the product of one's mind (Burrell and Morgan 1979). The researcher's view of reality is the corner stone to all other assumptions, that is, what is assumed here predicates the researcher's other assumptions. As applied to healthcare research, ontology is about the nature of reality that is worth investigation (Guba and Lincoln, 1994).

Epistemology is the study of knowledge and its basis (Hall, 1990; Hartmann and Lange, 2000). It is concerned with the nature, validity and limits of enquiry and also how possible, if it is, to gain knowledge of the world (Hughes and Sharrock, 1997). It is the foundation of true knowledge and is important in the creation of new knowledge, because it provides a means of understanding how researchers generate and acquire scientific knowledge (Ashatu, 2009). Epistemology enables qualitative researchers in healthcare to answer questions of what, how and why (Ashatu, 2009). These questions cannot be answered using positivism alone, yet, their importance is highly manifested in the impact of the generated answers on the beneficiary community. In the context of healthcare research, knowledge of epistemology enables the researcher to

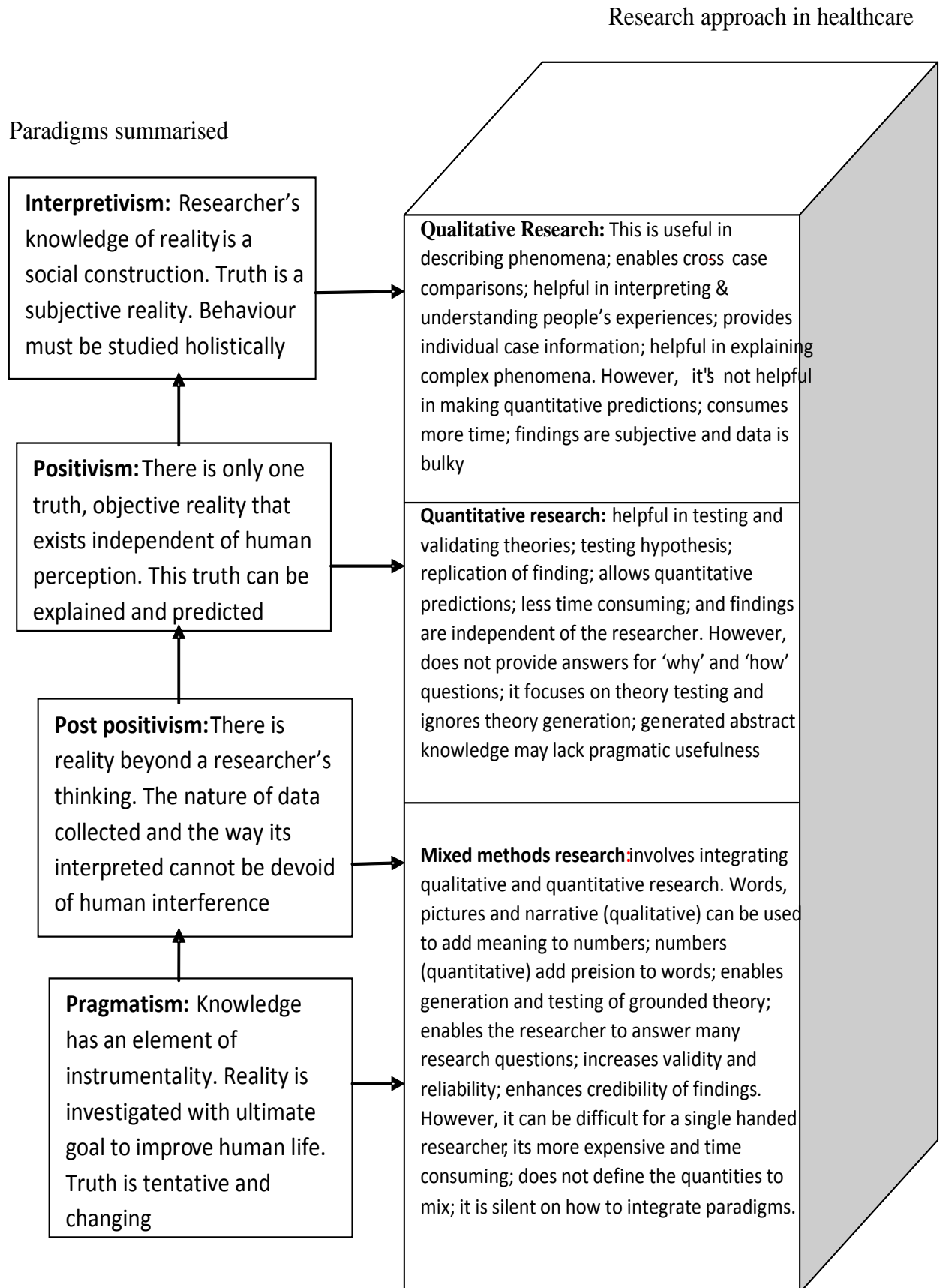


Figure 1. Summary of the relationship between paradigms and research approaches in healthcare.

epitomize various aspects of the phenomenon under investigation and then proceed to ascertain the kind of knowledge he/she intends to acquire about it.

Lastly, methodology is the application of various methods used in understanding reality and its nature (ontology) and various aspects of knowledge the researcher intends to gain about the reality (epistemology). The ontological and epistemological positions will dictate methodological perspectives the research will pursue.

Research paradigms in healthcare

The term 'paradigm' has not only been over-used but also misused. It is common to hear young researchers use the term to refer to a simple idea or an object. To some people, it sounds nice and sophisticated to simply pronounce the term 'paradigm'. The following is the exploration of several definitions of the term advanced by scholars in research. The term paradigm has been defined as a set of basic beliefs that deal with principles (Guba and Lincoln, 1994). This definition is in tandem with one by Rubin and Rubin (2005) who define paradigm as a set of basic beliefs that deals with principles about the nature of the social world. Other scholars such as Gilgun (2005) and Ambert et al. (1995) refer to paradigms as epistemologies or methodological perspectives. The discussion makes use of the definition by Rubin and Rubin (2005) as it brings out, in concrete terms, the alignment between paradigms and the social world which is at the heart of healthcare research.

The philosophical underpinnings discussed earlier are the main tools of healthcare researchers. These researchers fall within two paradigms-positivism and interpretivism/constructionism (Pansiri, 2005).

Pragmatism as a third paradigm has been discussed in the context of mixed methods approach. This has been done deliberately, because pragmatism lays a strong basis for multi-methodology in healthcare research (Pansiri, 2005).

Rationale for interpretivism in healthcare research

Scholars Walsham (1993) and Reed (2008) define interpretivism as description, which posits that interpretive methods of research start from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors and that this applies equally to researchers (Thorne et al., 1997; Wing, 2003). Phenomena are not based on objective truth, but are socially constructed (Lee, 1992; Silverman, 2000, 2001; Moriarty, 2011). Its purpose is not to attempt to generalize data to the population, but to explore individuals' experiences (Vishnevsky and Beanlands, 2004). Which is why, the burden of proof as to whether qualitative data is transferable, lies on the reader of the

research findings and not the researcher (Deetz, 1996; Tobin and begley, 2004). Interpretive researchers attempt to understand the way others construct, conceptualize, and understand events, concepts, and categories, in part because these are assumed to influence individual behaviour (Kaplan and Duchon, 1988; Sale et al., 2002). However, beyond understanding of these events, concepts and categories, and how they impact on individual behaviour, there is nothing useful this paradigm brings. This paper fills the gap by rendering credence to pragmatism which advocates for the wellbeing of society as the ultimate goal of research.

Interpretivism is the father of qualitative research (Rambaree, 2007). According to Sandelowski and Barroso (2002), Ryan et al. (2007), and Roth and Mehta (2008) qualitative research does not regard truth as objective, but as a subjective reality that is experienced differently by each individual. This explains why qualitative researchers assume that human behavior is always bound to the context in which it occurs (Merriam, 2009; Scammell, 2010) and therefore, behaviour must be studied holistically rather than being manipulated (Perone and Tucker, 2003). Subjective meanings have to be attached to the scientific enquiry (Krefting, 1991), because reality is ultimately subjective (Broom and Wills, 2007). This being the case, one wonders as to whose interests these studies are being conducted. The question of what happens after behaviour has been studied holistically is not answered. This paper provides the answer in the discussion about pragmatism and its useful nature in healthcare research.

In spite of the praises poured onto interpretivism and its followers, quantitative researchers have undermined it arguing that it is biased, based on personal impression of the researcher and not sufficient in conducting healthcare research. The following section discusses the positivist position.

Application of positivism in healthcare research

The positivist approach is modeled on the methods of the natural sciences with the goal of discovering social laws analogous to the natural laws uncovered by the methods of natural science (Roth and Mehta, 2008). Positivism assumes that truths can be explained and predicted; and its epistemological belief in objectivity is guided by the quantitative methodology (Wing, 2003; Rambaree, 2007; Moriarty, 2011).

The ontological position of positivists is that there is only one truth, an objective reality that exists independent of human perception. Hence, the researcher and phenomena are independent entities (Hischheim, 1985), and that all phenomena can be reduced to empirical indicators which represent the truth (Sale et al., 2002). This paper discusses two major healthcare issues in respect to the position held by positivists. First, positivists

create an impression that all diseases that affect human life exist and can be reduced to empirical analysis. This is the case because the paradigm contends that reality exists and is awaiting discovery by the researcher. Second, the positivist ontological position implies that the researcher and the nature of diseases being investigated are independent entities which are separable.

To start with, it may be recalled that there are diseases of the past recent disease. Research shows that there was no HIV/AIDS in the world not until early 1980s. This disputes positivist's stance that reality is there and awaits to be discovered. Whereas malaria can be found in many parts of Africa, you may not find Malaria in New Zealand or Britain. However, it cannot be absolutely certain that Malaria will not invade these countries some day, because truth is ever changing (Rorty, 1999; Kadlec, 2006). The claim by positivists about the absolute nature of truth leaves many unanswered questions.

Second, there are many examples to show that the researcher and phenomenon under investigation may interact before, during and after the study (Kuhn, 1962; Pansiri, 2005). A patient of an oncological illness may not avoid including his experiences in the study he/she conducts about people's perceptions of causes of this illnesses. This also applies to a cancer patient medical doctor investigating patient's response to a newly introduced cancer drug. A positivist refugee researcher of healthcare initiatives in a refugee camp may not bypass the environment he/she lives. This justifies the use of multi-methods so as to fill these gaps.

Which of the two paradigms ensures validity and reliability of findings in healthcare research?

Although positivists have dismissed qualitative research as mere conjecture, anecdote, based on personal impression of the researcher and lacks replicability (Pope et al., 2000), there is evidence that neither interpretivism nor positivism offers panacea to challenges of validity and reliability of findings in healthcare research (Golafshani, 2003). Traditional challenges of ensuring validity and reliability have remained a puzzle amidst the use of any of the two paradigms. In order to ensure validity and reliability of research findings, researchers have developed the use of triangulation (Denzin, 1978) or mixed methods (Miles and Huberman, 1994; Krantz, 1995; Johnson et al., 2007; Borrego et al., 2009; Ihtantola and Kihn, 2011). Triangulation/Mixed methods are now recognized as the third research approach. It is claimed that triangulation ensures validity and reliability of research findings. This claim will be discussed subsequently.

Resolving the paradigm war

After decades of qualitative-quantitative debate, scholars recognized that there is no single accepted method of

scientific inquiry (Krantz, 1995), and that lack of recognition of multi-interpretability of reality led to several problems in healthcare research (Lafaille, 1995). This has been the basis of triangulation of research paradigms and methods. Researchers who subscribe to this approach are known as post-positivists.

The case of pragmatism in healthcare research

The preceding discussion has shed light on the interaction between qualitative and quantitative researchers. This interaction is lubricated by the philosophical backgrounds of each category of researchers. However, there are two unanswered questions. First, what should be the ultimate goal of researchers? And second, to what extent is the claim that truth/reality is out there and is independent of the researcher? The first question cuts across qualitative and quantitative research. The second question is specific to quantitative researchers. Pragmatism attempts to provide answers to these questions.

One of the popular proponents of pragmatism is John Dewey who was a positivist (Kadlec, 2006). He contended that the critical potential of experience can and must be tapped if scientists are to mount an effective challenge to the entrenched interests in the study of reality. He further maintained that even the slightest manifestation of any intellectual activity whatever, in language, contained a specific conception of the world (Goldkuhl, 2012). Dewey, being a natural scientist, realized that laboratory experiments cannot be devoid of human construction of the world. Studying reality would therefore dictate that the researcher interacts with the environment in which the study is conducted (Reason and Bradbury, 2001). For example, studying traditional preventive and curative measures of malaria in tropical Africa may not achieve much if it excludes studying and understanding experiences of people who have been affected or infected by malaria. As such, the researcher must interact with people who are affected or will be affected by the phenomenon being studied (Johnson and Onwuegbuzie, 2004). This is the starting point of building a bridge between positivists and interpretivists.

Most importantly, pragmatism transcends other paradigms and puts emphasis on the end result of research. Whereas positivism and interpretivism prescribe for the study of reality for its own sake, pragmatists see no value of any scientific enquiry into phenomenon if the ultimate purpose is not to increase human welfare (Pansiri, 2005). In the healthcare research, a study of myths held by the oncologically challenged patients in the remote parts of Africa would focus on the end result of demystifying these patients and help them to appreciate the cause of abnormal malignant growth on their body. Likewise, the study of people's understanding of pathogen-friendly environment should have, as its ultimate goal, to create awareness among populations on how to make a good human environment.

Such studies however, are not aimed at uncovering and discovering ultimate truth, but rather a temporary and tentative truth which is expected to change in future. Pragmatism therefore unveils a changing reality and creates a basis for pragmatic researchers to explore and investigate the discovered reality, so as to ascertain certain elements of the phenomenon that have changed over time.

However, pragmatism in healthcare research is not a bed of roses. Not all research is about improving human condition (Bryman, 2007). Some scientific studies are conducted for various reasons such as satisfying curiosity, gaining an academic award or promotion on the job. These reasons have little to do with the ultimate goal of pragmatism, yet, they are important. Moreover, there may be useful yet non-untrue beliefs, and non-useful but true beliefs (Rylander, 2012). It appears pragmatism does not recognize and appreciate any enquiry into non-useful beliefs.

One question not yet answered by pragmatists is, whose pragmatic findings are they? In other words, pragmatic researchers need to categorically define beneficiaries of the research findings if this paradigm is to make sense (Greenwood and Levin, 1998).

Notwithstanding the criticisms labeled against pragmatism, it remains an important paradigm in applied scientific research. Moreover, research in healthcare focuses on improving human welfare which is the foundation for pragmatism. This paper concurs with Rorty (1999) who contends that pragmatism is important in building a basis upon which mixed methods research is conducted. This explains why this discussion advocates the use of pragmatism, while designing multi-methods for triangulation so as to focus on human welfare as the end result of the scientific enquiry in healthcare.

Putting triangulation/mixed methods in context

The increasing sophistication of healthcare research has rendered qualitative and quantitative research inadequate. The qualitative-quantitative debate has given birth to a third research paradigm universally recognized as triangulation/mixed methods (Tobin and Begley, 2004; Johnson, et al., 2007). Triangulation is a combination of methodologies in the study of the same phenomenon (Denzin, 1978). It involves combining complementary methods in qualitative and quantitative approaches so as to neutralize weaknesses in each. In healthcare, triangulation has been used, for instance, to study barriers to treatment or patient records (Lukas et al., 1996) clinical trials, survey of attitudes and beliefs and epidemiological measures to better understand health problems (Mitchell et al., 2007; Almarsdóttir and Traulsen, 2009).

Scholars have supported the combination of the two research paradigms on the basis that they share the goal of understanding the world in which we live (Haase and Myers, 1988); sharing a unified logic, and use the same

rules of inference; and lastly, they share a common goal of improving human condition. But no approach can claim superiority over another.

According to Denzin (1978), triangulation takes four types mainly, data triangulation, researcher triangulation, theory triangulation and methodological triangulation. This implies that in order to apply the use of mixed methods in healthcare research effectively, various sources of data must be explored; multiple researchers used, multiple uses of perspectives and theories; and the use of more than one method (Borrego et al., 2009; Clark, 2010).

Justification for the use of mixed methods in healthcare research

Some scholars have discussed the advantages of using mixed methods in healthcare research (Baum, 1995; Bowling, 2002). According to Fry et al. (1981), the use of mixed methods serves the following purpose: (1) enabling testing of quantitative models, (2) enhances the discovery of more explanatory concepts and categories, (3) helps to explain the margin of error, (4) facilitates collection of better quality data, (5) researcher is able to counter anomalies faced in analyzing quantitative data using the strengths of qualitative contexts, (6) use of qualitative methods to supplement quantitative analysis may contribute to the generation of new ideas, insights, hypotheses, and understandings.

One may argue that the totality of all uses of mixed methods is validation of research results (Ashatu, 2009). This validation is enhanced by the synergy of the two approaches. This is made possible by the fact that the use of mixed methods improves the quality and scientific power of data in healthcare research, e.g. poor adherence to treatment thought to be effective, behavioural factors contributing to disability and translational needs of health (Almarsdóttir and Traulsen, 2009; Creswell and Zhang, 2009; Klassen et al., 2009).

Some scholars have appreciated the use of mixed methods from the point of view of validity and reliability in nursing especially when the quantitative measures are used alongside qualitative measures (Morse, 1991; Chi, 1998; Morgan, 2007). According to McDowell and MacLean (1998) and Pansiri (2005), triangulation/mixed methods take advantage of the particular strengths of one approach in compensating for known limitations in the other under particular circumstances. At the end, the validity of theoretical propositions is improved and a more complete picture of the phenomenon under study is obtained (Ihantola and Kihn, 2011).

Triangulation/Mixed methods not a panacea: A critique

Notwithstanding the justification for triangulation/use of mixed methods (Clark, 2010), it has been acknowledged

that it is not a panacea for all researches and research problems in some circumstances (Collins et al., 2006; Greene, 2007). There is an increasing debate as to whether validity and reliability of findings in healthcare research can be guaranteed on the basis of mixed methods (Blaikie, 1991; Ihanola and Kihn, 2011).

The main fear is that triangulation of methodologies in differing ontological and epistemological assumptions can be challenging to combine (Blaikie, 1991). Scholars such as Curry et al. (2009) have observed that the increased methodological sophistication of mixed methods research in the social and behavioural sciences demands for the use of high quality research skills. It is important to note that most quantitative researchers have a strong academic background in quantitative methods and may lack qualitative research skills (Blaikie, 1991). On the other hand, most qualitative researchers have a strong background in qualitative methods and may lack knowledge of quantitative skills. Yet, in order to produce high quality research findings in healthcare, a mixture of qualitative and quantitative skills are needed.

Triangulation can be difficult for a single handed researcher and is more expensive and time consuming (Cresswell, 2003); does not define the quantities to mix. It is also silent on how to integrate paradigms (Almarsdóttir and Traulsen, 2009). Yet, paradigms provide a starting point for any scientific enquiry.

The degree of validity and reliability is largely dependent on the researcher's methodological skills (Bryman, 1992). In fact Tobin and Begley (2004) advise that there is need to recognize the epistemological cannons of approaches used if research is to demonstrate a true mixture of perspectives. Triangulation must be carefully thought out and articulated. Figure 1 summarizes the main discussion of this paper and depicts a lack of an absolute answer to the qualitative-quantitative debate.

Figure 1 also summarizes the relationship between the four paradigms, that is, interpretivism, positivism, post positivism, pragmatism on one hand, and approaches to research, that is, qualitative, quantitative and mixed methods research on the other.

A thread of arrows runs through paradigms from pragmatism to interpretivism. This has been done deliberately to emphasize Pansiri's (2005) view that pragmatism is the foundation of the mixed methods research. Now, if the researcher employs mixed methods, it obviously implies that some elements of interpretivism and positivism will be combined since mixed methods calls for the mixing of methodologies (Johnson and Onwuegbuzie, 2004). However, it is also possible in some rare circumstances, and depending on the research question, to rely more on a single paradigm, while seeking answers to the research problem (Creswell, 2003). In this case, the researcher will still find pragmatism helpful since truth is tentative, and reality is ever changing, and the ultimate goal of research is to improve human welfare,

which pragmatism advocates (Rorty, 1999).

CONCLUSION

In the preceding discussion, it has been argued that the allegations labeled against qualitative research in healthcare by positivists have been based on misinformation about the methods used by interpretivists/constructionist. Yet, interpretivists seem not to appreciate the value of quantitative research findings. It has been argued that qualitative and quantitative data are complementary. The article also points out that the qualitative-quantitative dichotomy has given birth to a third paradigm known as mixed methods or triangulation. Although, this approach has come to reconcile the debate, its main challenge arises from the ontological and epistemological differences among researchers of differing paradigms. Besides, the focus of method integration is on the practical usage of the research findings and not reconciling the conflicting approaches for its own sake.

RECOMMENDATIONS

From the discussion, it is apparent that the qualitative-quantitative debate is far from over. In fact, the discussion reveals that neither pragmatism nor mixed methods has been helpful in resolving the conflict. This is partly because scientific problems lack a homogenous originality. Such problems are discovered in different conceptual and contextual environments, and approach to them depends on the researcher's philosophical underpinning. This calls for further scientific investigations into the possibility of either strengthening the use of multi-methodology approach or developing a fourth paradigm.

REFERENCES

- Almarsdóttir AB, Traulsen JM (2009). Multimethod research into policy changes in the pharmacy sector--the Nordic case. *Res. Soc. Adm. Pharm.* 5(1):82-90.
- Ambert AM, Adler PA, Adler P, Detzner DF (1995). Understanding and Evaluating Qualitative Research. *J. Marriage and Fam.* 57(4):879-893.
- Amin M (2004). Foundations of Statistical Inference for Social Science Research. Makerere University Printery, Kampala.
- Ashatu H (2009). The use of Triangulation in Social Sciences Research: Can qualitative and quantitative methods be combined? *J. Comparative Social Work*, 2009/1G.
- Babbie E (1998). *The Practice of Social Research*, 8th edition, Wadsworth Publishing Company, New York.
- Baum F (1995). Researching public health: behind the qualitative quantitative methodological debate. *Soc. Sci. Med.* 40:459-468.
- Blaikie NWH (1991). A critique of the use of triangulation in social research. *Qual. Quant.* 25:115-136.
- Borrego M, Elliot PD, Amelink CT (2009). Quantitative, Qualitative, and Mixed Research Methods in Engineering Education. *J. Eng. Educ.* 97(2):147-162.
- Bowling A (2002). *Research methods in health: Investigating health and*

- health services (2nd Ed.), Buckingham, Open University Press.
- Britten N (1995). Qualitative interviews in medical research. *Br. Med. J.* 311(6999):251-253.
- Brod M, Tesler LE, Christensen TL (2009). Qualitative research and content validity: developing best practices based on science and experience. *Qual. Life Res.* 18(9):1263-1278.
- Bronstein JM, Morrisey MA (1990). Determinants of rural travel distance for obstetrics care. *Med. Care* 28(9):853-865.
- Broom A, Willis E (2007). *Competing paradigms and health research*, Oxford, Rowman and Littlefield.
- Broom A (2005). Using qualitative interviews in cam research: A guide to study design, data collection and data analysis'. *Complement. Ther. Med.* 13(1):65-73.
- Bryman A (1992). *Quantitative and qualitative research: further reflections on their integration*, Aldershot: Avebury.
- Bryman A (2007). Barriers to Integrating Quantitative and Qualitative Research. *J. Mix. Methods Res.* 1(1):8-22.
- Burrell G, Morgan G (1979). *Sociological Paradigms and Organisational Analysis*, Hants: Ashgate.
- Caelli K, Ray L, Mill J (2003). 'Clear as mud': Toward greater clarity in generic qualitative research. *Int. J. Qual. Methods* 2(2).
- Caldwell K, Henshaw L, Taylor G (2005). Developing a framework for critiquing health research. *J. Health Soc. Environ. Issues* 6(1).
- Castro FG, Kellison JG, Boyd SJ, Kopak A (2010). A methodology for conducting integrative mixed methods research and data analysis. *J. Mix. Methods Res.* 4(4):342-360.
- Chi C (1998). An Event Count Model for Studying Health Services Utilization. *Med. Care* 36(12):1639-1659.
- Clark VL (2010). The Adoption and Practice of Mixed Methods: U.S. Trends in Federally Funded Health-Related Research. *Qual. Inq.* 16(6):428-440.
- Cohen DJ, Crabtree BF (2008). Evaluative criteria for qualitative research in health care: controversies and recommendations. *Ann. Fam. Med.* 6(4):331-339.
- Collins KMT, Onwuegbuzie AJ, Sutton IL (2006). A model incorporating the rationale and purpose for conducting mixed-methods research in special education and beyond. *Contemp. J.* 4(1):67-100.
- Creswell JW, Zhang W (2009). The application of mixed methods designs to trauma research. *J. Trauma. Stress* 22(6):612-621.
- Creswell JW (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, (3rd Ed.), Thousand Oaks: Sage Publications Inc.
- Curry LA, Nembhard IM, Bradley EH (2009). Qualitative and mixed methods provide unique contributions to outcomes research. *Circulation* 119(10):1442-1452.
- Curry LA, Shield RR, Wetle TT (2006). *Improving aging and public health research: Qualitative and mixed methods (1st Ed.)*, Washington D. C.: American Public Health Association.
- Davis SH (2007). Bridging the gap between research and practice: What's good, what's bad, and how can one be sure? *Phi Delta Kappan* 88(8):569-578.
- Deetz S (1996). Crossroads—Describing Differences in Approaches to Organization Science: Rethinking Burrell and Morgan and Their Legacy. *Organ. Sci.* 7(2):191-207.
- Denscombe M (1998). *The Good Research Guide to small scale research projects*, Buckingham: Open University Press.
- Denzin NK (1978). *The research act: A theoretical introduction to sociological methods*. New York: McGraw-Hill.
- Drisko JW (1997). Strengthening qualitative studies and reports: standards to promote academic integrity. *J. Soc. Work Educ.* 33(1):185-197.
- Elliott R, Fischer CT, Rennie DL (1999). Evolving guidelines for publication of qualitative research studies in psychology and related fields. *Br. J. Clin. Psychol.* 38(3):215-229.
- Ericikan K, Roth WM (2006). What good is polarizing research into qualitative and quantitative? *Educ. Res.* 35(5):14-23.
- Fidler W, Lambert T (2001). A prescription for health: a primary care based intervention to maintain the non-smoking status of young people. *Tob. Control* 10(1):23-26.
- Frankfort C, Nachmias D (2003). *Research methods in social sciences*. London, St. Martin Press.
- Fine K (1991). The Study of Ontology. *Nous* 25(3):263-294.
- Fry G, Chantavanich S, Chantavanich A (1981). Merging quantitative and qualitative research techniques: Toward a New Research Paradigm. *Anthropol. Educ. Q.* 12(2):145-158.
- Gilgun J (2005). The four cornerstones of evidence-based practice in social work. *Res. Soc. Work Pract.* 15(1):52-61.
- Golafshani N (2003). *Understanding Reliability and Validity in Qualitative Research*, University of Toronto, Toronto, Ontario, Canada. *Qual. Rep.* 8(4):597-607.
- Goldkuhl G (2012). Pragmatism vs interpretivism in qualitative information systems research. *Eur. J. Inf. Syst.* 21(2):135-146.
- Greene JC (2007). *Mixed methods in social inquiry*. San Francisco: John Wiley & Sons.
- Greenwood DJ, Levin M (1998). *Introduction to Action Research: Social research for social change*. Thousand Oaks: Sage Publications.
- Greenhalgh T, Taylor R (1997). How to read a paper: Papers that go beyond numbers (qualitative research) *Methods in education and debate. BMJ.* 315:740-743.
- Guba EG, Lincoln YS (1994). Competing paradigms in qualitative research. In: Denzin NK, Lincoln YS (Eds.), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage.
- Haase JE, Myers ST (1988). Reconciling paradigm assumptions of qualitative and quantitative research. *Western J. Nurs. Res.* 10:128-137.
- Hall JR (1990). Epistemology and Socio-historical Inquiry. *Annu. Rev. Sociol.* 16:329-351.
- Hamilton CJH (2003). *Writing research transforming data into text*. London, Churchill.
- Hamm VM (1970). From Ontology to Axiology: A Critical Problem. *Coll. English* 32(2):146-154.
- Hancock B (2002). *Trent Focus for Research and Development in Primary Health Care: An Introduction to Qualitative Research*. Trent Focus Group, University of Nottingham.
- Hart C (2001). *Doing a literature review: Releasing the social science research imagination*. London, Sage Publications.
- Hartmann D, Lange R (2000). Epistemology culturalized. *J. Gen. Philos. Sci.* 31(1):75-107.
- Hischheim AR (1985). Information systems in Epistemology: An Historical Perspective. In: Mumford E, Fitzgerald G, Hirschheim R (Eds.), *Research methods in Information Systems*. Proceedings of the IFIP (International Federation for Information Processing) WG 8.2 Colloquium, Manchester Business School, 1-3rd September 1984; 13-35, Amsterdam.
- Howe K, Eisenhart M (1990). Standard for qualitative and quantitative research. *Educ. Res.* 19(4):2-9.
- Ihantola EM, Kihn LA (2011). Threats to Validity and Reliability in Mixed Methods in Accounting Research. *Qual. Res. Account. Manag.* 8(1):39-58.
- Janicke DM, Finney JW, Riley AW (2001). Children's health care use a prospective investigation of factors related to care-seeking. *Med. Care* 39(9):990-1001.
- Johnson RB, Onwuegbuzie AJ (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educ. Educ. Res.* 33(7):14-26
- Johnson RB, Onwuegbuzie AJ, Turner LA (2007). Toward a Definition of Mixed Methods Research. *J. Mix. Methods Res.* 1(2):112-133.
- Kadlec A (2006). Reconstructing Dewey: The Philosophy of Critical Pragmatism. *Polity* 38(4).
- Kaplan B, Duchon D (1988). Combining qualitative and quantitative methods in information systems research: A case study. *MIS Quarterly* 12(4):571-586.
- Karri AH, Colyar J (2009). Rethinking Texts: Narrative and the Construction of Qualitative Research. *Educ. Res.* 38(9):680-686.
- Kerlinger FN (2004). *Foundations of Behavioural Research*. Rinehart and Winston, New Delhi.
- Klassen AC, Smith KC, Black MM, Caulfield LE (2009). Mixed method approaches to understanding cancer-related dietary risk reduction among public housing residents. *J. Urban Health* 86(4):624-640.
- Kramer AM, Fuhrer MJ, Keith RA, Materson R (1997). Rehabilitation care and outcomes from the patient's perspective. *Med. Care* 35(6 Suppl):JS48-57.
- Krantz DL (1995). Sustaining Vs. Resolving the Quantitative-Qualitative Debate. *Eval. Plann.* 18(1):89-96.

- Krefting L (1991). Rigor in Qualitative Research: The Assessment of Trustworthiness. *Am. J. Occup. Ther.* 45(3):214-222.
- Kuhn TS (1962). *The Structure of Scientific Revolutions: The Response to Crisis*, (1st ed.), University of Chicago Press. p 172.
- Lafaille R (1995) Investigating biographies: the formulation of a meta-model. Antwerp: International Placebo/23 Institute for Advanced Health Studies.
- Lee JSK (1992). Qualitative and quantitative methods-two approaches to organization studies. *Asia Pac. J. Manag.* 9(1):87-94.
- Leedy PD, Ormrod JE (2005). *Practical research: Planning and design* (8th ed.), Upper Saddle River, NJ: Prentice Hall.
- Levin JS, Glass TA, Kushi LH, Schuck JR, Steele L, Jonas WB (1997). Quantitative methods in research on complementary and alternative medicine. *Med. Care* 35:1079-1094.
- Levy Y, Ellis TJ (2006). A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research. *Informing Sci. J.* 9:181-212.
- Lloyd GJ (2003). Design and control issues in qualitative case study research. *Int. J. Qual. Methods* 2(2).
- Mahoney J, Goertz G (2006). A Tale of Two Cultures: Contrasting Quantitative and Qualitative Research. *Polit. Anal.* 14(3):227-249.
- Marshall MN (1996). Sampling for qualitative research, *Fam. Pract.* 13(6).
- McDowell I, MacLean L (1998). Blending qualitative and quantitative study methods in health services research. *Health Inform. J.* 4:15-22.
- McVea K, Crabtree BF, Medder JD, Susman JL, Lukas L, McIlvain HE, Davis CM, Gilbert CS, Hawver M (1996). An ounce of prevention? Evaluation of the 'Put Prevention into Practice' program. *J. Fam. Pract.* 43(4):361-369.
- Merriam S (2009). *Qualitative research: A guide to design and implementation*. John Wiley & Sons, San Francisco.
- Meyer J (2000). Qualitative research in health care. Using qualitative methods in health related action research. *Br. Med. J.* 320(7228):178-181.
- Micheline T, Chi H (1997). Quantifying qualitative analyses of verbal data: A Practical guide. *J. Learn. Sci.* 6(3):271-315.
- Miles MB, Huberman M (1994). *Qualitative data analysis*, (2nd Ed.), London, Sage Publications.
- Mitchell K, Wellings K, Elam G, Erens B, Fenton K, Johnson A (2007). How can we facilitate reliable reporting in surveys of sexual behaviour? Evidence from qualitative research. *Cult. Health Sex.* 9(5):519-531.
- Moriarty J (2011). *Qualitative Methods Overview*. School for Social Care Research, National Institute for Health Research, London.
- Morgan DL (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *J. Mix. Methods Res.* 1(1):48-76.
- Morse JM (1991). Approaches to qualitative-quantitative methodological triangulation. *Nurs. Res.* 40:120-123.
- Murphy E, Dingwall R, Greatbatch D, Parker S, Watson P (1998). Qualitative research methods in health technology assessment: A review of the literature. *Health Technol. Assess.* 2(16):iii-ix, 1-274.
- Myers P, Barnes J (2005). *Qualitative Research Methods in Sure Start Local Programme Evaluations: An Introduction*. National Evaluation of Sure Start Institute for the Study of Children, Families & Social Issues.
- Nicholls C (2011). *The Advantages of using Qualitative Research Methods*, Alexander Technique College, pp. 1-9.
- Onwuegbuzie AJ, Leech NL, Collins K (2012). Qualitative Analysis Techniques for the Review of the Literature. *Qual. Rep.* 17(56):1-28.
- Pansiri J (2005). Pragmatism: A methodological approach to researching strategic alliances in tourism. *Tourism Hosp. Plann. Dev.* 2(3):191-206.
- Parker RG, Carballo M (1990). Qualitative research on homosexual and bisexual behavior relevant to HIV/AIDS. *The Journal of Sex Research*, 27(4):497-525.
- Perone JS, Tucker L (2003). An exploration of triangulation of methodologies: Quantitative and qualitative methodology fusion in an investigation of perceptions of transit safety. Center for Urban Transportation Research, National Center for Transportation Research, University of South Florida College of Engineering, Tampa, FL 33620.
- Pope C, Ziebland S, Mays N (2000). Analyzing qualitative data. *Br. Med. J.* 320(7227):114-116.
- Rambaree K (2007). Bringing Rigour in Qualitative Social Research: The Use of a CAQDAS. *UoM, Res. J.* 13A(1):1-16.
- Randolph JJ (2009). A Guide to Writing the Dissertation Literature Review. *Pract. Assess. Research Eval.* 14(13).
- Reason P, Bradbury H (2001). *Handbook of Action Research: Participative inquiry and practice*. London: Sage Publications.
- Reed I (2008). Justifying Sociological Knowledge: From Realism to Interpretation. *Am. Sociol. Assoc.* 26(2):101-129.
- Rorty R (1999). *Philosophy and Social Hope*. London: Penguin Books.
- Roth WD, Mehta J (2008). The Rashomon effect of combining positivist and interpretivist approaches in the analysis of contested events. USA, Harvard University press.
- Rubin H, Rubin I (2005). *Qualitative Interviewing: The Art of Hearing Data*, (2nd Ed.), London: Sage publications.
- Ryan F, Coughlan M, Cronin P (2007). Step-by-step guide to critiquing research. *Br. J. Nurs.* 16(12).
- Rylander A (2012). Pragmatism and Design Research – An Overview. Ingår i Designfakultetens serie kunskapssammanställningar.
- Sale JEM, Lohfeld L, Brazil K (2002). Revisiting the quantitative-qualitative debate: Implications for mixed methods research. *Qual. Quant.* 36:43-53.
- Sandelowski M, Barroso J (2002). Reading qualitative studies. *Int. J. Qual. Methods* 1(1), Article 5. Retrieved DATE from <http://www.ualberta.ca/~ijqm/>
- Sarantakos S (1998). *Social Research*. London Macmillan Press.
- Scammell MK (2010). Qualitative environmental health research: an analysis of the literature, 1991–2008. *Environ. Health Perspect.* 118(8):1146-1154.
- Schwerdtfeger KL (2009). The appraisal of quantitative and qualitative trauma-focused research procedures among pregnant participants. *J. Empir. Res. Human Res. Ethics* 4(4):39-51.
- Shamai M (2003). Therapeutic effects of qualitative research: reconstructing the experience of treatment as a by-product of qualitative evaluation. *Soc. Serv. Rev.* 77(3):455-467.
- Shank G, Villella O (2004). Building on New Foundations: Core Principles and New Directions for Qualitative Research. *J. Educ. Res.* 98(1):46-55.
- Sherman LW, Strang H (2004). Experimental Ethnography: The Marriage of Qualitative and Quantitative Research. *Ann. Am. Acad. Polit. Soc. Sci.* 595:204-222.
- Silverman D (2000). *Doing Qualitative Research: A Practical Handbook*. London: Sage.
- Silverman D (2001). *Interpreting qualitative data*. London, Sage Publications.
- Smith JA (2003). *Qualitative Psychology: A Practical Guide to Research Methods*. London, Sage Publications.
- Snider J (2010). The cult of statistical pyrotechnics. *Educ. Week* 29(21):20-21.
- Taylor C (1959). *Ontology*. *Philosophy* 34(129):125-141.
- Tewksbury R (2009). Qualitative versus quantitative methods: Understanding why qualitative methods are superior for criminology and criminal justice. *J. Theor. Philos. Criminol.* 1(1):38.
- Thorne S, Kirkham SR, MacDonald-Emes J (1997). Interpretive description: A non-categorical qualitative alternative for developing nursing knowledge. *Res. Nurs. Health* 20:169-177.
- Tobin GA, Begley CM (2004). Methodological issues in nursing research: methodological rigour within a qualitative framework. *J. Adv. Nurs.* 48(4):388-396.
- Vishnevsky T, Beanlands H (2004). Qualitative research. *Nephrol. Nurs. J.* 31(2):234-238.
- Walsham G (1993). *Interpreting information systems in organizations*. Chichester, NH: Wiley.
- Wing S (2003). Objectivity and ethics in environmental health science. *Environ. Health Perspect.* 111:1809-1818.
- Yin RK (2009). *Case study research: Design and methods*, (4th ed.), London, Sage publications.