Research Methodologies: Increasing Understanding of the World

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Abstract: *Though there are similarities concerning qualitative and quantitative research methodologies, both have distinguishing fundamental ontological and epistemological perspectives that are unique to their respective research design. When contemplating a methodological approach in order to answer a research question, qualitative and quantitative methodologies are not mutually exclusive. Though the characteristics of each methodology are distinct, their corresponding qualities add to their rigor, and both methodologies have the capacity to inform one another in order to generate, test, and confirm theory. To illustrate this, a qualitative collective case study and a quantitative survey research method are examined. The application of each design is considered to the extent of their usefulness in attaining a comprehensive understanding of complex phenomena. Finally, implications for future research are also offered.*

Keywords List: Research Methods, Qualitative Research, Quantitative Research, Research Design, Collective Case Study, Survey Research

Goodness of Fit in Research Design

A standard research design is not a reality and would not produce accurate results. The variation in research design facilitates the determination concerning which methodology best suits the research situation. The investigator must decide which methodology best addresses the research question under investigation. There are clear and defined operations for both qualitative and quantitative research by which the researcher must adhere in an effort to employ a rigorous investigation which enables accurate findings and produces authentic results grounded in the data (Breakwell, Hammond, Fife-Schaw, & Smith, 2010; Leedy & Ormrod, 2010; Trochim, 2001). This article describes the key characteristics distinguishing qualitative and quantitative research design, considers the application of each design with a representative methodology, and evaluates the representations for their usefulness to gain a comprehensive understanding of phenomena.

A Synopsis of Two Grand Camps

Investigating Reality

Qualitative and quantitative methodologies use diverse approaches when investigating phenomena and addressing research problems. In scientific investigation, the researcher determines whether the research problem and the resulting research question will focus on a description, an explanation, or increase understanding of an experience. When this is the case, the investigator might choose a qualitative inquiry. If the investigation necessitates objective statistical measures, characterizes operationally defined variables, and likely utilizes a structured environment, then a quantitative inquiry might be more fitting. A question to consider when deciding the best methodological fit for an investigation is: Will the focus necessitate an emergent technique discovering the salient variables revealed through data interpretation? Will it require a flexible strategy or one which is measured or controlled? This decision will help identify which methodology might be the best fit to answer the research question (Trochim, 2001).

Qualitative and quantitative studies have many corresponding qualities which enhance the field through rigorous research design. First, the researcher begins with the identification of a research problem or an area of concern in practice, theory, or scholarly literature (Sacred Heart University Library, 2018). Then, the researcher develops a research question in order to address the research problem and guide the investigation. Next, the researcher states the purpose of the study and identifies the data to be examined in an effort to answer the research question. Regardless of the methodology utilized, the researcher investigates phenomena, collects, analyzes, and interprets data, and meets rigorous scientific standards of inquiry. The researcher shows how each investigation is applicable to the field and how the findings might advance scientific knowledge. Though there are many similarities between qualitative and quantitative methodologies, the selection of an appropriate research design depends upon the research question, the goal of the research, and the way in which the research will be carried out. The identification of an appropriate strategy to answer the

research question will depend on a rigorous design in order to yield credible results (Breakwell, Hammond, Fife-Schaw, & Smith, 2010).

Though there are many similarities between methodologies, each is concerned with different procedures and results. Qualitative research is naturalistic and data collection culminates with a large amount of raw data text for the identification of similar elements concerning the phenomena within each data set, and commonalities of elements across data sets leading to theoretical saturation. This process highlights data for interpretation, and then data analysis is employed to generate assertions (Gavin, 2008). Quantitative inquiry is often controlled and amenable to a well-defined context. It attempts to generate raw data scores and employs statistical analysis to identify a numerically average experience. Quantitative research is concerned with generalizability and reliability. Generalizability implies that the results are relevant concerning the larger population and reliability refers to the generation of the same results across multiple inquiries. Qualitative research is concerned with transferability and credibility. Transferability considers the context of the research and the capacity of the results to apply beyond the conditions in which the study conducted. Qualitative research looks at the individual experience and identifies the idiosyncratic perception of the experience within its context in an effort to induce transferability to diverse contexts (Gavin, 2008). One who attempts transferability of qualitative results must evaluate the context of the research and determine if the results are transferable to another context (Yin, 2012). Credibility concerns the substantiation of the results from the perspective of the participant with the exception of research that does not utilize participants. In such instances a hermeneutic perspective might be employed. This perspective is one in which the interpretation of the text is agreed upon within a community of interpreters. The meaning of the interpretation is negotiated and accepted through consensus of a knowledgeable research community (Schutt, 2018). Gaining in-depth insight from the perspective of the participant is vital regarding credibility, except in the absence of study participants. In this circumstance community validation is essential and it is through this lens that the credibility of the investigation is determined. Though many similarities and differences exist between qualitative and quantitative inquiry, the differences between the methodologies allows for one methodology to inform the other which is conducive to a more thorough understanding of phenomena (Patton, 2002; Trochim, 2006).

The utilization of diverse methods to address the research problem employ varied approaches (Patton, 2015). Common data collection procedures in qualitative inquiry typically employ (a) interviews with a sample of participants related to the research topic, (b) direct observations of human actions or an environment, (c) archival records of primary sources that have been collected and stored prior to the investigation, (d) documents illuminating social organization, (e) artifacts depicting physical culture, and (f) participant-observation wherein the researcher becomes a participant in the group of study in order to make observations from the "inside" (Atkinson & Coffey, 2004; Kawulich, 2005; Sadana & Omasta, 2018; Yin, 2012). Qualitative inquiry produces raw data texts and when participants are utilized, the researcher records the perspective of each and closely examines the setting in which data were collected (Schutt, 2018). The researcher identifies impressions from the data and ascertains the meaning of the experience. The investigation relies on the insight of the researcher to analyze and interpret the extensive data collected through which they will answer the research question. Quantitative inquiry employs researcher detachment when administering research measurement tools and objectivity when analyzing research data producing research results. Quantitative research looks at the representative sample as a whole and identifies norms and ranks of observations by which to predict, explain, or understand phenomena concerning the deduction of generalizability to individuals within the larger population. The ontological (what is reality?) and epistemological (how do we know reality?) debate need not influence the choice of methodology for an investigation. Patton (2002) advocates for a pragmatic view concerning research methodologies, asserting that the researcher be sensitive to the research situation, giving rise to the approach which best answers the research question. The researcher need not be influenced by any orientation, prejudice, or comfort level when choosing a methodology for an investigation (Patton, 2015; Trochim, 2001).

Qualitative and quantitative methods employ scientific standards to advance the scientific knowledge base. The qualitative research design adds to the scientific knowledge base by describing, understanding, and explaining phenomena and may identify elements that are pertinent for statistical testing in subsequent research (Tellis, 1997). The qualitative research design emphasizes the discovery of salient information, allows the participant a voice, and acknowledges the variation of perspectives. The qualitative research design focuses on the context of experience, builds outward towards general patterns, discovers the multiple perspectives of reality, and discovers emerging topics of importance which might be utilized for further investigation. Qualitative approaches assume that actions cannot be separated from context because action cannot be understood outside of the setting (Casey & Houghton, 2010). Qualitative inquiry utilizes fewer participants and collects more data (Schutt, 2018) in the natural setting to execute an in-depth investigation into subjective reality. Quantitative research designs are typically controlled, use measures to define reality, investigate the many to make predictions regarding the individual, and seek to identify the overall reality concerning experience. The selection of a large representative sample allows the proposed statistical analysis to detect the relationships and effects which the investigation might seek. Quantitative inquiry assumes that a larger sample size will better generalize the results of the inquiry to the broader population (Leedy & Ormrod, 2010).

The instruments utilized in both types of approaches have assumptions associated with administration. Quantitative inquiry customarily starts with a hypothesis and employs measures to focus on testing established theory with confirmatory or predictive research questions. It focuses on detached and objective processes by which to gain an understanding of phenomena under investigation. The setting might be controlled and separate from the participant context, such as a laboratory that is utilized for testing and controlling external influential factors in consideration of answering the research question. It assumes that an attachment of the researcher with the investigation or the participants might bias the outcomes and yield invalid results. The qualitative research design relies upon the researcher's subjective perspective concerning the research problem. The investigation unfolds in the natural setting in

which the researcher interacts with the study elements and might employ interviews to gain insight into the participant perspective of intricate phenomena. The investigator is the tool of measure within qualitative investigation, and the outcomes rely on skill and insight looking through the lens of subjective reality. Qualitative investigation assumes that objectivity is a barrier to understanding the phenomena under investigation and the only way one can truly know the experience is through a subjective awareness and an empathic view of the context concerning the experience. Though each methodology is useful when investigating phenomena, the sequential arrangement of approaches in which one methodology follows the other in a cycle of administration utilizing diverse assumptions allowing researchers to gain increased insight concerning entangled phenomena might be optimal (Gavin, 2008).

Thus far, the discussion has focused on qualitative and quantitative research; however the use of the one does not exclude the use of the other. One may decide that a mixed methods design offers a more inclusive approach to understanding phenomena under investigation by utilizing both of the methodologies in a single study. For example, a qualitative researcher might count the number of times a particular category is identified within the investigation. This strategy utilizes a quantitative approach within a qualitative design. Conversely, a quantitative researcher may want to collect data concerning the perception of participants to the treatment in the experiment. This strategy utilizes a qualitative approach within a quantitative design. The mixed methods design facilitates a more comprehensive understanding of phenomena under investigation by employing both a qualitative and a quantitative strategy within a single inquiry. This paper does not focus on any particular approach, but emphasizes a sequential, or cyclical, methodological approach to research in general, where one investigation informs another, whether it is a qualitative methodology or a quantitative methodology or a combination of the two in a mixed methods design. This work advocates for further investigation concerning accepted or established research results in the scientific literature, in an effort to gain added insight concerning complex phenomena in a progressive climate. No investigation, no matter what methodology is employed, will offer comprehensive, on-going understanding concerning the research problem and its evolution. Investigating the intricacies of experience relies on various approaches to develop and refine theory without bias to any particular methodology in an effort to elaborate upon initial findings.

Representative Methodologies

Qualitative Collective Case Study

According to Saldana (2013), qualitative investigation begins with the formulation of either an epistemological research question that allows the investigator to increase understanding of phenomena (What does it mean to be a parent?) or an ontological research question that captures the idiographic reality of the participant (What is the lived experience of adults with depression?). Through the course of the investigation, the researcher collects data from multiple sources and seeks interpretation of reality through data texts. The qualitative methodologies are naturalistic and emergent utilizing the data collected to discover the salient information in the investigation. The investigator does not determine the variables of importance before data collection. When utilizing interviews, the participants reveal their subjective salient variables in the natural setting which allows the research to unfold using the investigator as the research instrument. No matter which type of research question the investigator examines, the researcher must rely on personal skill and creativity, while employing epoche, for data analysis and the interpretation of the data. The process of qualitative inquiry is subjective and relies on the experience and orientation of the investigator in pursuit of crafting a narrative in which artistic ability meets scientific rigor (Trochim, 2001).

A qualitative case study is concerned with exploring a bounded system within a defined period of time (Stake, 1995). The case is easily recognized and separated from other cases by the boundaries established, either as a single case or as a collective case for study. The researcher utilizing the collective case study approach identifies a research problem and forms a research question. The research problem and the research question identify the key phenomena under investigation. The research question guiding the case study is concerned with "What is the experience of…?" and identifies an activity, event, or program which is poorly understood or investigates changes in the case over time. The researcher acquires a purposive sample of participants that have the information sought by the inquiry within the bounded system. The recommended number of sample participants for a single case study is one, and eight to 12 for a collective case study (Patton, 2002). However, there is evidence for either more or fewer participants in a collective case study because the number of participants in a collective case study is not prescriptive and sampling continues until data saturation is reached and theme identification and within- and across-case analysis can be employed (Yin, 2009). The weakness of utilizing a small number of participants in any study has limitations for generalizability to the larger population. The case study is not concerned with generalizability and must be viewed as exploratory and in light of confirming or conflicting results from other investigations (Baxter & Jack, 2008).

The case study investigation might utilize multiple forms of data collection, depending on the case for study. Data collection in collective case study may include observations, which include field notes; interviews, which are audio-taped and transcribed; written documents, such as diaries or journals of study participants; and audiovisual material such as video diaries of study participants. The case determines the types of data necessary for the investigation to answer the research question. The researcher interacts with the participant in the natural setting and dedicates an extended period of time recording the rich description of the setting and factors surrounding the case. The detailed description of the social environment and cultural climate, extracted from multiple sources of data collection, allows the audience to determine the similarities in study conditions and judge the degree of transferability to diverse situations (Creswell, 2007; CSU, 2018; Patton, 2002; Stake, 2010).

The data analysis portion of collective case study research is guided by a strategic process yielding credible results. Stake's (1995) formulation of the case study in his work *The Art of Case Study Research* outlines the data analysis phase of the case study investigation in which data analysis starts with a detailed description of the case as a whole. Then, the researcher employs direct interpretation, drawing meaning from single instances, without comparisons with other cases. After that, meaning-rich instances aggregate into categories of meaning. Following that, within-case analysis identifies themes by analyzing the categories. In a collective case study, data analysis begins with each case as an analysis unto itself. Then, the researcher engages across-case analysis, identifies similarities in the cases, and then makes assertions about the integrated meaning of all of the cases examined. The culmination of case study research depends on data convergence, answers the research question, and offers lessons learned through the process of the investigation. The data analysis phase of case study research is subjective and dependent on the experience and skill of the researcher, and facilitates a dependable and credible inclusive understanding of the elaborate phenomena under investigation (Baxter & Jack, 2008).

Case study investigation is a qualitative approach allowing the investigator to discover salient information about interwoven phenomena within the context of the experience from the perspective of the participant (Tellis, 1997). The case study concerns itself with experience, identifying emerging themes, utilizing researcher interpretation of the data, engaging dependable and credible data analysis, and ultimately asserting the lessons learned from the case. The rich in-depth description of the case context allows the consumer of the research to determine the transferability of the case study outside of the setting in which it was conducted (Stake, 2006). As previously noted, qualitative and quantitative research may cooperate to facilitate the investigation of phenomena. For example, a qualitative inquiry might be used to identify the salient variables as elements of phenomena, and then might inform a quantitative investigation in an effort to test the variables for saliency, and generalize the findings to the larger population. As an illustration, survey research has the capacity to inform the case study in the cycle of understanding in regard to generating, confirming, and testing theory. The use of both methodologies in sequential, or cyclical, investigation may reveal a broader understanding of phenomena over any single inquiry (Creswell, 2007; Leedy & Ormrod, 2010; Patton, 2002; Trochim, 2001).

Quantitative Survey Research

There is a diversity of approaches in which to generate, confirm, and test theory. Within quantitative research there are multiple approaches to choose how best to address the research problem and answer the research question. When choosing a quantitative approach some points to consider are: Will the research method address participant attitudes or experience? Will the research need to compare groups? Will the research measure a change over time? Does the research seek to identify relationships between variables? These questions will help the researcher identify the quantitative design most appropriate to answer the research question. The survey research design is examined because of its focus on description and the normative participant experience. When utilized following a collective case study design the qualitative inquiry informs the quantitative investigation in an effort to develop and refine theory. Collective case study investigation identifies the idiosyncratic reality pertaining to experience and survey research identifies the collective reality proceeding from experience. Both approaches are useful in scientific investigation and inform the scientific knowledge base (Breakwell et al., 2010).

Survey research is a conventional quantitative approach investigating opinions, attitudes, or experiences of one or more groups of people. A survey might be administered to describe how safe people feel when using social media. The characteristics of the inquiry are pre-determined and the participants respond to the categories for testing in an interview or on a questionnaire. The responses are then tabulated. The survey research approach utilizes a large representative sample of participants to learn about the broader population. The researcher chooses the administration method of meticulously constructed survey questions and gathers responses from the selected sample of volunteers, and through statistical indexes draws inferences about the relevant wider population. The survey research design is a fairly straightforward structure; however, carrying out the process is rigorous and painstaking in an effort to reduce bias and increase accuracy of the results (Gavin, 2008).

There are multiple domains which classify survey research: descriptive, analytical, and evaluative. When choosing a survey research design one must consider the purpose of the research. Descriptive survey research seeks to draw conclusions about features in the wider population. Analytical survey research highlights the trajectory of detected effects of one variable on another. Evaluative survey research determines the influences of factors for change. Survey research is a non-experimental method and does not separate participants into control and treatment groups for comparisons or manipulate applications. Survey research is focused on learning about and describing the larger population. This is accomplished by the researcher administering a survey for the collection of responses from the representative sample and drawing inferences about the broader population (Kelley, Clark, Brown, & Sitzia, 2003).

Though the defined process of conducting survey research is rigorous and allows for reliability and validity, the researcher must be cognizant of the limitations of this design. Limitations associated with this research include: the previous identification of categories, participants must respond with the best fit from available response items, statistical analysis constrains and defines the types of inferences which can be drawn, focusing on particular categories of inquiry may result in simultaneous categories being missed, and a large sample is necessary for distinguishing relationships and effects through statistical analysis. This approach looks at one moment in time from which to collect data and extrapolate the findings to the larger population. It assumes that the results are generalizable over longer periods of time concerning ongoing activities. Survey research allows the researcher to generalize the results to the larger population and offers supposition from which to conduct further research for more accurate results, over longer

periods of time, with on-going activity, and within a changing world. There are limitations to consider when employing a quantitative methodology including survey research regarding the expectation of generalizability and the findings (Leedy & Ormrod, 2010).

The limitations of any research project must be addressed in an effort to reduce bias and determine the accuracy of the research findings. For example, the recent use of conventional large-scale, on-line surveys are not amenable to exhaustive assessment concerning participant inclusion and exclusion criteria in the acquisition of a representative sample (Ausderau, Furlong, Sideris, Bulluck, Little, Watson, Boyd, Belger, Dickie, & Baranek, 2014). This depicts limitations regarding fraudulent surveys wherein survey takers might take several surveys under different identifiers for whatever reason. Survey research conducted online does not offer the most secure setting for the collection of data. Another limitation of survey research is the *self-report* tool for data collection. The challenge of self-reports present as response bias; each participant may answer the survey questions in a way that they think the researcher wants them to answer, the participant may not remember accurately, or their responses may be hasty due to never having thought about the questions before the survey. Whatever the reason, self-reports are not the most valid measure however, the use of online surveys and self-reports offers the researcher a point at which to start and move forward with further investigation. There are limitations that exist regarding all research methods and with reference to survey research specifically. However, survey research allows investigators the opportunity to increase understanding of phenomena, examine a premise, build the knowledge base, and develop a trajectory for further inquiry concerning theory (Breakwell et al., 2010).

Qualitative and quantitative methodologies have similarities and differences with respect to conducting research. The collective case study allows the experience of the participant to be heard, identifies variations in reality, utilizes the subjective skill and creativity of the researcher, identifies emergent themes and patterns of salient information, and develops or refines theory (Crowe, Cresswell, Robertson, Huby, Avery, & Sheikh, 2011). Survey research starts with the identification of the characteristics of the investigation, employs statistical analysis, identifies the salient data in the investigation, and is utilized for description, exploration, explanation, or testing hypotheses. Both collective case study and survey research inform one another in the research process. Utilizing both of these representations of qualitative and quantitative investigation informing one another, offers a more expansive view of phenomena and the impact on the individual, which highlights implications for practice (Creswell, 2007; Kelley, Clark, Brown, & Sitzia, 2003; Leedy & Ormrod, 2010; Patton, 2002; Trochim, 2001).

Usefulness of Case Study and Survey Research to Develop Theory

A Sequential Approach

Both survey research and case study are relevant concerning theory development. The collective case study identifies themes and patterns of essential information from the perspective of the participant, and is influenced by the contextual setting of the bounded system. Collective case studies allow the researcher to confirm characteristics identified in the survey research, and survey research allows investigators to confirm characteristics identified in the collective case study. The collective case study and survey research approaches can inform one another and establish the evolution and precision of gathering evidence for theory. When used consecutively, they have the potential to augment a broader understanding of the impact of phenomena relative to the study participants.

The collective case study is contributory regarding detailed insight relevant to the impact of the phenomena regarding study participants. The use of the collective case study seeks the identification of key themes from emerging categories, through the perspective of the participant in context. Then, the use of survey research strengthens the broad understanding of the impact of the phenomena regarding the study participants by investigating the key themes in the emergent categories which were identified by the participants in the collective case study. The collective case study utilizes a smaller sample of participants and informs the survey research, and survey research utilizes a larger sample for statistical indexes associated with the categories through which to detect norms and ranks of information, enabling the researcher to make predictions and describe the larger population. Once the survey research describes the larger population, further investigation might be utilized in an experiment to continue the sequence of inquiry. For example, successive inquiry might test predictions about the relationship of cause-and-effect between the identified variables (i.e. a study of the effect of an employee exercise program on work satisfaction). The execution of diverse approaches by various researchers facilitates a broader perspective to sufficiently answer the research question beyond any one investigation. No matter the approach, utilizing one methodological procedure will not advance a comprehensive understanding of the impact of phenomena concerning a population. It is optimal to utilize both qualitative and quantitative methodologies in a sequential manner to generate, test, and confirm theory in an effort to gain increased insight with respect to obscure phenomena.

Both qualitative and quantitative methodologies can be integrated by utilizing a mixed methods design. However, the approaches might be optimally applied through a process of sequentially or cyclically utilizing each methodology concerning ongoing investigation in an effort to address a research problem, design inquiry, study a representative sample, interpret results, and implement consecutive investigations in an effort to develop, test, confirm, and refine theory. Qualitative research is founded upon the natural setting of the inquiry, the subjective perspective of the researcher concerning the research problem and the investigation, and the analysis is carried out with strict attention to managing researcher bias through epoche. Quantitative research might control the setting of the investigation which is consistent with an experimental design, or utilize the natural setting of the participants which is compatible with survey research. Moreover quantitative inquiry utilizes previously identified characteristics for investigation, focuses on researcher detachment, and decreases the opportunity for researcher bias through the use of statistical operations. The sequential or cyclical methodological design concerning these diverse approaches adds to the broad understanding of phenomena regarding each

study, where one investigation informs the other and allows for increased understanding of the phenomena and advances scientific knowledge (Breakwell et al., 2010; Creswell, 2007; Leedy & Ormrod, 2010; Patton, 2002; Trochim, 2001).

Conclusion

The similarities and differences between qualitative and quantitative research adds to the understanding of complex phenomena. Each methodology has its own ontology and epistemology, allowing the researcher an option for the generation, confirmation, and testing of theory from different vantage points. Employing diverse methodologies across various inquiries enhances scientific investigation and informs the scientific knowledge base. The insight that has been gained from previous research might benefit from a continued sequence or cycle of inquiry in order to develop and refine theory from various ontological and epistemological perspectives in an effort to increase the scientific knowledge base in an evolving world.

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