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**Article Title: Content Analysis and a Critical Review of the Exploratory Design in
the Light of Mixed Methods Research**

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Abstract

There has been growing advocacy for a shift towards Mixed Method Research (MMR) from the purists' traditional paradigms. The fundamental principle of mixed methods research is that researchers should collect multiple data using different strategies, approaches and methods in such a way that the resulting mixture is likely to result in grander research outcome compared to single-method research. This paper gives a precise and comprehensible explanation of the exploratory mixed methods design as one of the MMR designs. Exploratory mixed method is a two-phase design which begins with and prioritizes the collection and analysis of qualitative data. From the studies reviewed, it is not clear whether the same samples would be used in the two phases of the study. The available literature indicates that there are only two variant models under this design. This paper underscores the clarity of the taxonomy model in fitting in well with the various qualitative research designs since quantitative data is incorporated into the major qualitative design, and more weight is laid on qualitative data. On the contrary, the suitability of the various qualitative designs with instrument development model may prove a bit challenging as the quantitative data is given priority. For instance, it is not clear how quantitative data can be given more emphasis in a biography, an ethnography or phenomenological study in the development of an instrument to test or study the qualitative results generated in a more detailed way. This paper therefore sought to address this gap and ends with the recommendation for designing a superior variant model under this design that would address the weaknesses of the two variant models in the literature that would result to a more rich study.

Key words: Mixed methods research, Exploratory mixed methods design, Sequential, Instrument development, Taxonomy model, Variant model

Introduction

Several authors have developed typologies of mixed methods research designs, drawing mostly from approaches used by researchers in evaluation, nursing, public health and education research (Creswell, 2002). According to Creswell et al. (2003), there are six primary types of mixed methods designs namely: three sequential (explanatory, exploratory, and transformative) designs and three concurrent (triangulation, embedded, and transformative) designs. Each of these research designs vary with respect to the use of an explicit theoretical framework, approach in which the design is implemented (either sequential or concurrent), and data collection procedures. The designs also differ depending on whether priority is given to the quantitative or qualitative or both types of data (equal or unequal weight), stage at which the data are analyzed and integrated in the research study (separated, transformed, or connected), and procedural notations for illustrating each design.

Exploratory research study is sequential in nature in that one phase follows and builds on the next with results from the two phases used in the overall interpretation of the research study (Creswell, 2005). Exploratory research is a kind of research carried out for an issue which has not been clearly defined (Dudovsky, 2011). It assists to identify the best research approach, data collection method and selection of subjects. The sequential exploratory research design involves a first phase of qualitative data collection and analysis, followed by a second phase of quantitative data collection and analysis that builds on the results of the first qualitative phase (Creswell, 2009). It functions as a source for developing ideas in the first phase which are then put through further research investigation to validate the results.

When a researcher has minimal level of experience with or understanding of the research issue, exploratory research is a good tool to set a preliminary step. It helps to ensure that a more thorough, definite future study will not start with an insufficient knowledge of the nature of the problem. Weight is generally placed on the first phase, and the data are mixed through being connected between the qualitative data analysis

and the quantitative data collection. The design may or may not be implemented within an explicit theoretical perspective (Creswell, 2007).

Building from the exploratory results, the researcher conducts a second, quantitative phase to test or generalize the initial findings. Since it uses sequential timing, the results of qualitative method are used to aid in informing the quantitative method (Greene et al., 1998). The researcher interprets how the quantitative results build on the initial qualitative results. Considering the resulting categories as variables, the researcher develops a quantitative instrument and uses it to assess the overall prevalence of the variables over the other.

According to Creswell et al. (2005), in a sequential exploratory mixed methods design, the qualitative component is primary and is used to generate theory or specific theoretical constructs. The quantitative component is used in the service of the qualitative in that it is used to validate the ideas generated from the qualitative component. The model itself is an interactive design in which theory generated from the qualitative component is tested out on a representative population, findings are compared, and then, if need be the theory is revised and tested out again in an ongoing process of theory generation and testing in a series of repeated studies. In sequential exploratory design, quantitative data results assist in the interpretation of qualitative findings through: testing aspects of an emergent theory, generalizing qualitative findings to different samples, and validating a specific set of survey items (Creswell, 2003).

Exploratory mixed methods research being a two phase design warrants clear articulation of the time frame within which the two phases occur. From the articles reviewed, the various authors fail to indicate the time frame within which the second phase should be undertaken after the qualitative phase. A delay in commencement of the second phase may have a serious implication on validity of the results generated in the second phase. For this reason the second phase should commence immediately after the collection and analysis of data in the first phase without any break.

When the Design is Appropriate to Use in Research

Sequential exploratory design may be applied when variables are unknown; some vital information is lacking or where there is no guiding framework or theory. A researcher may also want to generalize results to different groups, which leads to testing aspects of an emergent theory or classification (Morgan, 1998, Morse, 1991). At the most basic level, the purpose of this strategy is to use quantitative data and results to assist in the interpretation of qualitative findings (Creswell, 2009). Unlike the sequential explanatory approach, which is better suited to explaining and interpreting relationships, the primary focus of this model is to initially explore a phenomenon. The researcher may want to generalize results to explore a phenomenon in depth and then measure its prevalence. According to Creswell et al (2003), the design best suits an exploration of a phenomenon since it begins with a qualitative method.

Morgan (1998) suggested that this design is appropriate to use when testing elements of an emergent theory resulting from the qualitative phase and that it can also be used to generalize qualitative findings to different samples or groups. Similarly, Morse (1991) cited one purpose for selecting this approach, which is to determine the distribution of a phenomenon within a chosen population. Finally, the sequential exploratory strategy is often discussed as the procedure of choice when a researcher needs to develop and test an instrument because existing instruments are inadequate or not available. According to Creswell et al(2005), exploratory designs are useful for exploring relationships when study variables are not known, refining and testing an emerging theory, developing new psychological assessment instruments based on an initial qualitative analysis, and generalizing qualitative findings to a specific population.

Notation of the Design

According to Creswell (2009), the notation of the exploratory research design is as follows: QUAL →quan. From the notation, it indicates that qualitative data is prioritized and low priority is given to quantitative data. This is a two-phase approach which begins with qualitative methods as an Exploratory Design and ends with quantitative methods.

In this case, the study emphasizes the quantitative findings and instrument validation. It therefore demonstrates the importance of quantitative data and results to assisting the interpretations of the qualitative findings in the research study (Creswell, 2009).

Strengths of Exploratory Design

According to Creswell (2009), the sequential exploratory strategy has many of the same advantages as the sequential explanatory model. Its two-phase approach (qualitative research followed by quantitative research) makes it easy to implement and straightforward to describe and report. It is useful to a researcher who wants to explore a phenomenon but also wants to expand on the qualitative findings. This model is especially advantageous when a researcher is building a new instrument (Creswell, 2009). In addition, this model could make a largely qualitative study more palatable to an adviser, committee, or research community well versed in quantitative research and that may be unfamiliar with the qualitative approaches.

Creswell and Clark (2007) observe that this design is straight forward to describe, implement and report due to the separate phases that makes the design. Although the design typically emphasizes the qualitative aspect, the inclusion of a quantitative component can make the qualitative more acceptable to quantitative-biased audiences.

According to Creswell (2009), as with the sequential explanatory approach, the sequential exploratory model requires a substantial length of time to complete both data collection phases, which can be a drawback for some research situations. In addition, the researcher has to make some key decisions about which findings from the initial qualitative phase will be focused on in the subsequent quantitative phase (e.g., one theme, comparisons among groups, multiple themes).

Researchers should discuss whether the same individuals will serve as participants in both the qualitative and quantitative phases. For the instrument development model, the challenge is that the researchers need to decide which data to use from the qualitative phase to build the quantitative instrument and how to use these data to generate

quantitative measures. In addition, procedures should be undertaken to ensure that the resources developed on the instrument are valid and reliable. For the taxonomy development model variant, the main challenge is that decisions must be made in determining the relevant quantitative findings to use with options including using themes for the variables and the relationships between themes and subthemes/codes (Creswell & Clark, 2007).

According to Creswell and Clark, (2007) this design has main two phases, starting with a qualitative phase and ending with a quantitative phase and thus referred to as exploratory sequential design. It starts with qualitative data to explore a phenomenon and builds in to the second phase which is quantitative. This shows the timing for this design. Researchers using this design build on the results of the qualitative phase by developing an instrument, identifying variables, or stating propositions for testing based on the emergent theory or framework. These developments connect the initial qualitative phase to the subsequent quantitative component of the study.

The weighting in exploratory research design is realized with the qualitative research methods seen in the initial phase carrying greater emphasis, and which is also often placed on the qualitative data. The researcher first explores the research topic qualitatively and develops themes from the qualitative data. The researcher then develops an instrument based on these results and subsequently uses this instrument in the second, quantitative phase (Creswell & Clark, 2007). The researcher may use one form of data in a supportive role to a larger study.

Mixing involves the connecting or merging of data from more than one phase. It may entail mixing the research questions, philosophy or interpretation. Mixing may also be done at different stages, either at data collection, data analysis or interpretation stage. Mixing using exploratory method may not be easy since the predominant qualitative phase has text and images as opposed to numbers for the quantitative phase. This therefore requires the researcher to make a decision on which of the results generated in the first phase would connect with the quantitative as in the case of instrument development. It is possible to use a three-phase approach, the researcher first gathers

qualitative data and analyzes it (Phase 1), and uses the analysis to develop an instrument (Phase 2) that is subsequently administered to a sample of a population (Phase 3) as summarized in figure 1 (Creswell et al., 2005).

- i) QUAL → quan.
- ii) QUAL → QUAL → quan → quan → Interpretation of entire analysis.
- iii) QUAL data collection → QUAL data analysis → QUAL results → quan data collection → quan data analysis → quan results → Interpretation based on QUAL → quan results.

Visual Diagram Showing an Illustration of Sequential Exploratory Design

Source: Creswell and Clark (2007)

Like in any other mixed methods design, the following steps need to be considered for sampling procedure, according to Onweugbuzie and Collins (2007). The researcher needs to determine the goal of the study, formulate research objectives and determine the purpose of the study. It is also important to determine the research questions, followed by selecting the research design then select the individual sampling schemes to guide the study.

A multi-level relationship like in exploratory design involves the use of two or more sets of samples that are extracted from different levels of study (i.e. different populations). An example is, using qualitative data collection techniques like interview schedule for teachers in the first phase of an investigation and in the next quantitative phase use relevant tools to collect data on learners.

As Sandelowski (1995) stated, “a common misconception about sampling in qualitative research is that numbers are unimportant in ensuring the adequacy of a sampling strategy” (p. 179). However, some methodologists have provided guidelines for selecting samples in qualitative studies based on the research design (e.g. ethnography, phenomenology, biography, grounded theory and case study) for sampling design or

data collection procedure. They recommend that sample sizes should not be so small as to make it difficult to achieve data saturation. At the same time, the sample should not be so large that it is difficult to take a deep, qualitative –oriented analysis. For interviews, 12 participants are recommended (Guest, Bunce & Johnson, 2006). For focus group discussion 6-9 participants (Krueger, 1994; Morgan, 1997), 6-12 participants (Johnson & Christensen, 2004). Krueger (1994), Morgan (1997) and Onweugbuzie, Dickinson, Leech & Zoran (2007) recommend 3 to 6 participants for focus groups in a study.

From the studies reviewed, it is not clear whether the same samples would be used in the two phases of the study or the researcher will need to sample differently in order to avoid the same participants in the two phases of the study. Using some participants in both phases may influence the outcome of the results. It is therefore advisable for the researcher to avoid using the same participants in the two phases of exploratory research design.

Variant Models

According to Creswell and Clark (2009), sequential exploratory research designs have two common variants; the instrument development model and the taxonomy development model. Each of these models begins with a qualitative phase culminating in a quantitative phase. The two variant models mainly differ is the way the researcher connects the two phases and in the relative emphasis of the two types of data (QUAN or QUAL) collected in the study

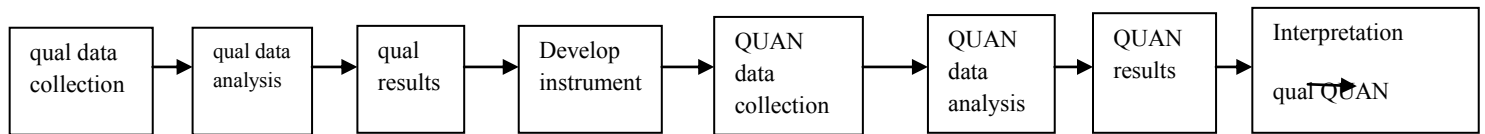


Figure 2: *Visual Diagram Showing Instrument Development Model*

Source: Creswell and Clark (2007)

The instrument development model is used by a researcher when there is need to develop and implement a quantitative instrument based on qualitative findings. The researcher begins by exploring the research topic with a few participants. The qualitative findings then guide the development of items and scales for a quantitative survey instrument. During the second data collection phase, the researcher implements and validates the instrument quantitatively. The qualitative and quantitative methods are connected through the development of the instrument items. Researchers using this variant often emphasizes on the quantitative aspect of the study (Creswell& Clark, 2007).For example, by the use of this model, Mak and Marshall (2004) as cited by Creswell and Clark (2007), initially qualitatively explored young adults' perceptions about the significance of the self to others in romantic relationships, that is, how they perceive that they matter to someone else. Basing on their qualitative results, they developed an instrument and then implemented it during the second phase in their study.

Creswell and Clark (2007), state that in the taxonomy development model occurs when the first qualitative phase is conducted to identify important variables, develop a taxonomy or classification system or to develop an emergent theory. The second, quantitative phase tests or studies these results in a more detailed way. (Morgan, 1998; Tashakkori and Teddlie, 1998 as cited by Creswell & Clark, 2007).

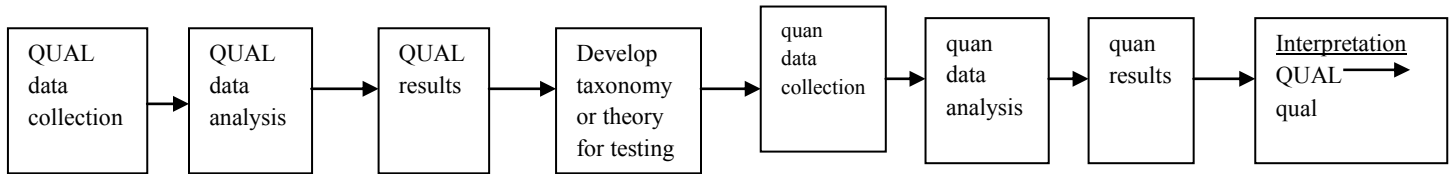


Figure 3: Visual Diagram showing Taxonomy Development Model

Source: Creswell and Clark (2007)

The initial phase of the taxonomy development model produces specific categories or relationships. These categories or relationships are then used to direct the research questions and data collection in the second, quantitative phase. According to Creswell and Clark (2007), this variant of exploratory design is used when a researcher formulates quantitative research questions or hypothesis based on qualitative findings and then proceeds to conduct a quantitative study to answer the research questions. In addition, a researcher may identify emergent categories from the qualitative data and then use the quantitative phase to examine the prevalence of these categories within different samples (Morse, 1991 as cited by Creswell & Clark, 2007) or use taxonomy affiliation as a basis for identifying comparison groups. For example, by use of the model, Goldenberg et al. (2005) as cited by Creswell and Clark (2007) described how they identified new variables and hypothesis about predictors of family literacy based on their qualitative case study. They then conducted a quantitative path analysis study to test these qualitatively identified variables and relationships.

The taxonomy development model fits in well with the various qualitative research designs where quantitative data is incorporated into the major qualitative designs and more weight is laid on the quantitative data in a mixed method study. On the contrary, the use of the various qualitative designs with instrument development model in a mixed method study may prove a bit challenging as the quantitative data is given priority. For instance, it is not clear how quantitative data can be given more emphasis in a biography, an ethnography or phenomenological study in the development of an instrument to test or study the qualitative results generated in a more detailed way. In

these qualitative designs more emphasis is given to the qualitative data in the interpretation of the results of the entire study and thus instrument development variant model may not practically be applied. A mixed method study for these designs may only fit in well with the taxonomy development model where low priority is given to the quantitative data.

Conclusion and Recommendation

In a sequential exploratory mixed methods design, the qualitative component is primary and is used to generate theory or specific theoretical constructs. The quantitative component is used in the service of the qualitative in that it helps to test out ideas generated from the qualitative component. Exploratory design is detailed and time consuming. It is prone to bias as it accommodates both sides of research dimensions, the qualitative and the quantitative approaches in a single study. The model itself is an iterative design in which theory generated from the qualitative component is tested out on a representative population, findings are compared, and then, if need be, the theory is revised and tested out again in an ongoing process of theory generation and testing in a series of repeated studies.

In the reviewed literature we observed that the two variant models have weaknesses which may impact on how valid and reliable the findings of the exploratory design may be. We therefore propose the need for researchers to come up with a superior variant model under this design that would address the weaknesses of the two variant models in the literature that would result to a more rich study.

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