Integrating Quantitative and Qualitative Data in Mixed Methods Research—Challenges and Benefits

Sami Almalki[1]

[1] English Language Centre, Taif University, Taif, Saudi Arabia

Correspondence: Sami Almalki, English Language Centre, Taif University, Taif, Saudi Arabia. E-mail: ibnamri@hotmail.com

Abstract

This paper is concerned with investigating the integration of quantitative and qualitative data in mixed methods research and whether, in spite of its challenges, it can be of positive benefit to many investigative studies. The paper introduces the topic, defines the terms with which this subject deals and undertakes a literature review to outline the challenges and benefits of employing this approach to research. The specific terms research, educational research, research methodologies and methods, research design, quantitative approaches, qualitative approaches and mixed methods approaches are all defined. Mixed methods approaches are outlined in terms of their challenges and benefits, with the researcher offering a personal opinion in conclusion to the paper. The conclusion that was drawn was that provided that mixed methods research was a suitable approach to any given project, its use would yield positive benefits, in that the use of differing approaches has the potential to provide a greater depth and breadth of information which is not possible utilising singular approaches in isolation. In spite of its time-consuming nature, and the suspicion with which some quarters of academia still regard mixed methods research, it does afford opportunities for researchers to have an informed conversation or debate involving information that is generated by both quantitative and qualitative collection methods. Furthermore, evidence would suggest that, rather than restricting the opportunities for research by only utilising either qualitative or quantitative methods, a mixed methods approach provides researchers with a greater scope to investigate educational issues using both words and numbers, to the benefit of educational establishments and society as a whole.

Keywords: research, research methodologies, mixed methods, challenges, benefits

1. Introduction

We are considering research and how to go about it to its best effect. It is therefore prudent to engage with four basic questions at the outset: why are we engaged in research? How do we remain interested in it? What inherent personal characteristics might help me in the completion of the research? What skills do I have that might help in the process (Dawson, 2002; Miller-Cochran & Rodrigo, 2011; Beardsmore, 2013)? The answer to the first question is likely to be that it is part of your course; with any luck, or careful planning on your part, your inquiry will be of your own choosing and be something in which you have an interest, which in turn should provide you with intrinsic motivation. If however, a topic has been selected for you, it is important that you select a method that will enable you to remain motivated. It is important to have a good grasp of the things that motivate you and that you are good at, prior to selecting your methods—if you are gregarious and find that people engage well with you, interviews or focus groups might be an appropriate vehicle for you. However, if you prefer to crunch numbers and spend hours analysing statistical data, surveys might be the method best suited to you. Allied to this, it is important to consider your skills set when deciding on how to organise your research: do you have research skills (hopefully…)? Organisational skills? Good time management (Dawson, 2002; Miller-Cochran & Rodrigo, 2011; Beardsmore, 2013)? Do we really think all of this through? Dawson (2002) attests that there are five essential questions must be answered at the beginning of any piece of research—what, why, who, where, when? The what, in many ways, can be the hardest part in the sense that it is often difficult to the specific about the research you wish to undertake in the initial stages. Dawson (2002, p. 5) advises that if you are unable to sum up your research in one sentence, "… the chances are your research topic is too broad, ill thought out or too obscure." Answering why you are undertaking research can often be somewhat easier—it is a requirement of

your course, it is something that your employers wishing to do, it might be something of interest to you (Dawson, 2002) or a combination of all three. It is critical for the success of any research that you are aware of why you are conducting an inquiry, as it will have an effect on the way in which you administer your research and report your findings (Dawson, 2002). The third question, who, requires any researcher to identify those who will potentially participate in their study. It is important that you have a grasp on the type of people who will need to be targeted, in order to generate the information required to answer the central question of your study. Where, concerns itself with the location of your investigation which will be dependent upon, to some extent, your budget and the time that you have available to complete your study. It is important that you find a venue that is suitable so that the participants feel comfortable and that they are contributing to a worthwhile project (Dawson, 2002). The final question, when, covers the timescale for the conduct of your project. Consideration needs to be made of the proposed participants, particularly if you are intending to conduct interviews, asking them to complete questionnaires and/or observing them (Dawson, 2002).

It is of great comfort that Willig (2013) suggests that there are no right and wrong means of going about conducting a piece of research. However, it is critical that researchers are able to pinpoint what they are doing and why, with whom, where and when they are undertaking a specific inquiry. To that end, my "what" today is to investigate the integration of quantitative and qualitative data in mixed methods research, with the hypothesis that, in spite of its challenges, it is of positive benefit to many studies. "Why"—because I have to, but fortunately, it is a subject in which I have considerable interest. "Who" is a simple one in this instance, in that this investigation will be in the form of a literature review which I will be presenting to you today. The questions of "where" and "when" are also straightforward in that they have already been done; the literature review was conducted across a variety of media platforms, including library based research utilising texts, and online resources accessed via the Internet over the course of the last month. In the first instance, I will be defining the terms which will be covered as a part of the literature review in order that I, as the presenter, and you, as the audience, have some form of agreed understanding about the topic at hand. Following this, there will be a discussion of the reasons behind conducting a Mixed Methods approach to research, covering both its challenges and its benefits, concluding with an assessment of whether my hypothesis has been proven.

2. Definition of Terms

2.1 Research

Research has a number of different definitions as a result of there being more than one type. It can be regarded as "studious inquiry or examination… investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical applications of such new or revised theories or laws" Merriam-Webster Online Dictionary (2010).

Thomas et al. (2011, p. 3; endorsed by Tuckman & Harper, 2012) state that it is "a careful and systematic means of solving problems" and gaining new knowledge (Bhattacharyya, 2006), with Mouly (1978, p. 12) suggesting that it is best regarded as being

"… the process of arriving at dependable solutions to problems through the planned and systematic collection, analysis and interpretation of data."

Gratton and Jones (2010, p. 4; echoed by Godddard & Melville, 2001; Brink et al., 2006) define research as being "… a systematic process of discovery and advancement of human knowledge," which Kumar (2008) believes should make some form of innovative contribution to existing knowledge or in solving a problem.

2.2 Educational Research

Educational research can be described as "…critical enquiry aimed at informing educational judgements and decisions in order to improve action" (Bassey, 1999; cited in Foreman-Peck & Winch, 2010, p. 8) which is conducted carefully and systematically (Picciano, 2004). It is the gathering and evaluation of data within the educational world, in order to understand and to make improvements to it (Opie, 2004). Educational research covers a wide spectrum of things from the administration and structure of education, to issues of equality and social justice, the curriculum, assessment, special educational needs, creativity and the impact of education on the economy (Gardner, 2011). It is driven by the need to improve provision and to have a positive impact on both individual learners and society as a whole (Reiss et al., 2010) through informing all stakeholders including the government, practitioners and parents (Gardner, 2011). The British Educational Research Association [BERA] (2013) believes that educational research should support the development of education in the future, as well as highlighting what works at the present time (endorsed by Whitty, 2006; Wallen & Fraenkel, 2011; James, 2012), which concurs with the ideas of Newby (2013) who believes that there are three reasons for engaging in

educational research—to explore current and potential issues, to influence policy decisions, and to evaluate and progress classroom practice.

3. Research Methodologies and Methods

Rajasekar et al. (2013, p. 5) describe research methodology as "…the procedures by which researchers go about their work of describing, explaining and predicting phenomena".

A methodology provides a piece of research with its philosophy, the values and assumptions which drive the rationale for the investigation as well as the standards that will be utilised for the interpretation information and the drawing of conclusions (Bailey, 1994). It will provide the focus and approach for the study and is the process through which researchers pinpoint the methods that will be used in order to address their specific question (Crotty, 1998). The methodology will take an overview which considers the ethics, potential risks and problems, and the limitations of any approach (Dawson, 2002) and can be regarded as the discipline of applying (and understanding) appropriate methods and processes for specific pieces of research (Kaplan, 1973; cited in Cohen et al., 2007, p. 47; Kinash, n.d.). Kothari (2004; endorsed by Rajasekar et al., 2013) states that it is the science of how research project can be undertaken and describes the stages that researchers go through whilst they decide upon the best means of addressing their research problem, and the logic behind their reasoning.

Research methods are the instruments and/or tools that researchers employ whilst they administer any form of inquiry or investigation (Walliman, 2011; Bailey, 1994). There are a myriad of tools which can be utilised to administer different enquiries (Walliman, 2011; Cohen et al., 2007) and it is the researcher's responsibility to select the most appropriate tool for their specific study (Wilkinson & Birmingham, 2002). Each of the tools selected must compliment other, in order that the information that is generated is pertinent to the subject of the study and follow in a logical progression (Jonker & Pennink, 2010), although it is apposite to note, as mentioned earlier, that there is no right or wrong method for conducting a specific piece of research. However, it is essential that the method selected by each individual researcher for their project is one which is appropriate to the task, is commensurate with their skills set and is one which has more strengths and less weaknesses (Tashakkori & Teddlie, 2010; Buchanan & Bryman, 2009; Wilkinson & Birmingham, 2003) than others that might have been employed.

3.1 Research Design

Hakim (2000, p. 1) observes that design is primarily concerned with "… aims, uses, purposes, intentions and plans within the practical constraint of location, time, money" and the availability of the researcher. She also comments that any research design will also be a reflection upon a researcher's ideas although, in order to be successful, the investigator must address three critical questions when engaged in this process (Creswell, 2003). Creswell (2014) believes that researchers must question themselves about the knowledge claims and theoretical perspectives that they are bringing to any research, they must reflect upon the strategies they intend to use within their study which will in turn inform their methods, and have questioned how they will collect and analyse information. This must be done in order that researchers are cognisant of any bias that they might bring to any research investigation, how it will affect the choice of approach that they utilise and the tools with which they choose to collect their data (Vogt et al., 2012). Broadly speaking, there are three distinct approaches to connecting research—quantitative, qualitative and mixed methods. Creswell (2014) considers research designs to be different types of inquiry within these different approaches which Denzin and Lincoln (2011, cited in Creswell, 2014, p. 12) called "strategies of inquiry". Furthermore, Creswell (2014) regards the development of modern technology as providing a multitude of opportunities for innovative research design and advanced procedures in social sciences.

3.2 Quantitative Approach

Quantitative research is regarded as a deductive approach towards research (Rovai et al., 2014). Quantitative researchers regard the world as being outside of themselves and that there is "… an objective reality independent of any observations" (Rovai et al., 2014, p. 4). They contend that by subdividing this reality into smaller, manageable pieces, for the purposes of study, that this reality can be understood. It is within these smaller subdivisions that observations can be made and that hypotheses can be tested and reproduced with regard to the relationships among variables. This approach is typified by the researcher putting forward a theory that is exemplified within a specific hypothesis, which is then put to the test; conclusions can then be drawn with regard to this hypothesis, following a series of observations and an analysis of data (Rovai et al., 2014). A feature of this approach towards research is that the collection and analysis of information is conducted utilizing "… mathematically based methods…" (Aliaga & Gunderson, 2000; cited in Muijs, 2011, p. 1) which focus upon

"…polls, or surveys… [focusing] on gathering numerical data and generalising it across groups of people" (Babbie, 2010; cited in University of Southern California, n.d., para 1; endorsed by Bryman, 1988; cited in Blaikie, 2010, p. 215; Harwell, n.d.).

3.3 Qualitative Approach

Qualitative research places emphasis upon exploring and understanding "… the meaning individuals or groups ascribe to a social or human problem" (Creswell, 2014, p. 4; echoed by Holliday, 2007). Denzin and Lincoln (2005) describes this approach as gaining a perspective of issues from investigating them in their own specific context and the meaning that individuals bring to them. It focuses upon drawing meaning from the experiences and opinions of participants—it pinpoints "… meaning, purpose or reality" (paraphrase of Hiatt, 1986; in Harwell, n.d., p. 148; Cohen et al., 2011; Merriam, 2009). Qualitative methods are usually described as inductive, with the underlying assumptions being that reality is a social construct, that variables are difficult to measure, complex and interwoven, that there is a primacy of subject matter and that the data collected will consist of an insider's viewpoint (Rovai et al., 2014). Rovai et al. (2014, p. 4) make the point that this approach towards research "… values individuality, culture, and social justice" which provides a content and context rich breadth of information which, although subjective in nature, is current (Tracy, 2013). Having said that, the employment of qualitative approach methods does not prevent the administration of a critical, disciplined and balanced study into any educational issue (Thomas, 2009; Silverman, 2009; Bell, 2010).

3.4 Mixed Methods Approach—A Literature Review

3.4.1 Mixed Methods Research

Mixed methods research has been described in a variety of ways which can make it a difficult concept to understand (Niglas, 2009). It has been referenced as "empirical research that involves the collection and analysis of both qualitative and quantitative data" (Allan, n.d., Slide 4), whereas Burke Johnson et al. (2007, p. 123) define it as:

"… the type of research in which a researcher or team of researchers combine elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration."

Greene (2007, p. xiii; endorsed by Johnson & Onwuegbuzie, 2004) believes that this approach provides researchers with opportunities to "… compensate for inherent method weaknesses, on inherent method strengths, and offset inevitable method biases". Creswell and Plano Clark (2011) comment that this approach enables a greater degree of understanding to be formulated than if a single approach were adopted to specific studies. Furthermore, they also put forward a collection of core characteristics which highlight key elements within mixed methods research. They state that researchers collect and analyse both qualitative and quantitative data in a sequential and/or simultaneous and rigorous manner which integrates the two forms of data. The way in which this data is combined will depend upon the nature of the inquiry and the philosophical outlook of the person conducting the research.

Greene et al. (1989) provide five distinct justifications for the integration of quantitative and qualitative research data. Triangulation provides opportunities for convergence and corroboration of results that are derived from different research methods. Complementarity "seeks elaboration, enhancement, illustration, clarification of the results from one method with the results from another" (Greene et al., 1989, p. 259).

Development sees researchers utilising the results from one method to inform another method which covers all aspects of the inquiry. Initiation involves the discoveries of contradictions or inconsistencies within the data sets which can result in the reformulation of questions or additional questions being raised.

I, as a researcher, share this worldview in that I believe it is far more important to focus on understanding an issue and finding solutions to problems than focusing upon specific methods or approaches.

4. Challenges and Benefits

To my mind, there are a number of distinct challenges that face any researcher who decides to embark upon utilising mixed methods for their research study. The first is that of skills - it is critical that researchers are aware of their skills sets and whether they are able to cope with the demands of utilising a mixed methods approach (Creswell & Plano Clark, 2011). The second, and in many ways the most pressing challenge, is that of deciding which mixed method research design is most appropriate for your particular study. This will depend upon where you feel your project lies on the continuum of research approaches—will your approach be purely mixed which gives equal status to both quantitative and qualitative information or will it be dominated by one approach or the

other (Burke Johnson et al., 2007)? In order to make sense of the multitude of mixed method research designs, Creswell and Plano Clark (2007) have synthesised these into four main typologies—the triangulation design, the embedded design, the explanatory design and the exploratory design.

4.1 The Triangulation Design

Figure 1. The triangulation mixed methods design (Creswell & Clark, 2007)

The triangulation design is one which seeks to gather complimentary yet distinctly different data on the same topic which can then be integrated for analysis and interpretation. Allan (n.d., Slide 24) identifies the benefits of this model lying in its sensibility.

Benefits: it makes intuitive sense to gather information from different sources, utilising different methods, which work together as an efficient design.

Challenges: its lie in the considerable effort and expertise that is required to draw everything together and the potential for further research and/or investigation being required as a result of discrepancies within the data sets.
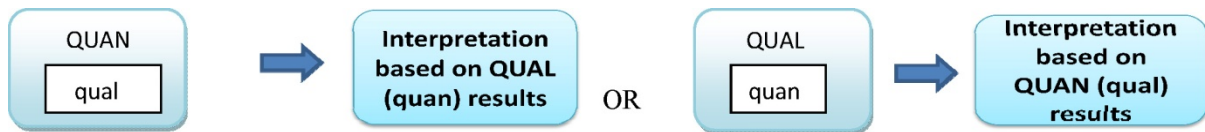
4.2 The Embedded Design

Figure 2. The embedded mixed methods design (Creswell & Plano Clark, 2007)

The embedded design sees one method of enquiry being used in a supportive secondary role which enables researchers and readers to make sense of the study in its entirety.

Benefits: it is that it requires less resources and produces less data which makes it an easier prospect for researchers to tackle. This method is used in quantitative experimental designs where only a limited quantity of qualitative data is necessary (Allan, n.d., Slide 25). **Challenges:** are that it can often be difficult to integrate results, and that this approach is very difficult within qualitative research and that few examples exist from which researchers can model their study.
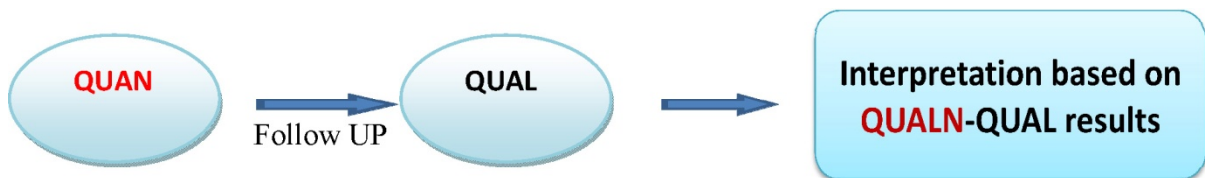
4.3 Explanatory Designs

Figure 3. Sequential mixed methods design (Creswell & Plano Clark, 2007)

Explanatory designs are described as a two stage design which sees quantitative data being used as the basis on which to build and explain qualitative data. The quantitative data informs the qualitative data selection process which, to my mind, is a great strength in that it enables researchers to specifically pinpoint data that is relevant to specific research project. Allan (n.d., Slide 26) points out that this design is commonly used in educational research, being referred to as a participant selection model.

Benefits: is that it is easy to implement and that it enables the focus of the research to be maintained, as a result of one set of data building upon the other. Clearly, **the challenge** lies in the selection of participants in order that pertinent information is available and the time consuming nature of this method of approach.
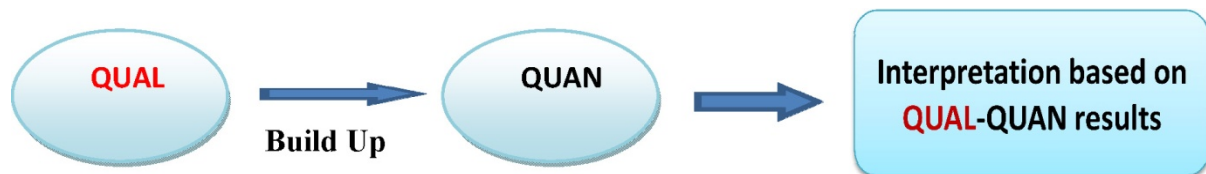
4.4 The Exploratory Design

Figure 4. The exploratory mixed methods design (Creswell & Clark, 2007)

The exploratory design is the reverse of the explanatory model, with the qualitative data in forming the quantitative information gathering process.

Benefits: are that the separate stages are easy to implement and that the qualitative data is acceptable to quantitative researchers.

Challenges: being its time-consuming nature and the risk that participants might not be willing/able to participate in both phases, as a result of the second phase not being planned well enough in advance (Allan, n.d., Slide 27).

Further challenges facing those who utilise mixed methods research are that of time and resources, and in convincing others of its value (Creswell & Plano Clark, 2011).

A further benefit of this method is the flexibility that this research design provides in answering important questions which Harwell (n.d., p. 160; endorsed by Bryman,) contends offers a "… promising path towards using research design in ways that support rigorous examinations of promising educational ideas".

Moreover, Creswell and Plano Clark (2011) emphasised the fact that mixed methods studies may require a good deal of time, effort and resources on the part of researchers and it is important that they are aware of this, particularly if they are working alone. They also highlight the fact that some sections of academia object to mixed methods approaches on philosophical grounds, in that they believe it to be a conglomeration of different attitudes which leaves them closed to the possibility of the veracity of mixed methods research. It is, in my opinion, also quite obvious that this method of approach is eminently practical, in that the researcher is afforded the opportunity to address an issue through utilising numbers and words and approaching their study employing the methods with which they feel most comfortable

5. Conclusion

It would seem to me that mixed method research does provide positive benefits to research inquiries, provided that this is a suitable approach towards a specific issue. Given that is the case, it provides opportunities for researchers to forge "… an overall or negotiated account of the findings that brings together both components of the conversational debate" (Bryman, 2007, p. 21; cited in Rovai et al., 2014, p. 5). It is critical that, no matter which particular typology of mixed method research is employed, there is a purposeful and carefully implemented sequence to the study which is conscientiously documented and evaluated (Rovai et al., 2014). I concur with the opinions of Deacon et al. (1998, p. 61; cited in Allan, n.d., Slide 12) who state that "whatever short-term inconvenience this may cause, in many cases the reappraisal and reanalysis required can reap long-term analytical rewards: alerting the researcher to the possibility that issues are more multi-facted than they may have initially supposed, and offering the opportunity to develop more convincing and robust social explanations of the social processes being investigated".

Mixed methods would appear to provide a realistic link between quantitative and qualitative studies, and indeed, those who conduct them. At the end of the day, as Creswell and Plano Clark (2014, p. 12) point out "we are social, behavioural, and human sciences researchers first, and divisions between quantitative and qualitative research only served to narrow the approaches and the opportunities for collaboration." It would seem churlish to deny the opportunities for researchers and society in general to have a greater understanding of the issues which face education today, irrespective of whether discoveries are made as a result of qualitative, quantitative or mixed methods research.

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