Mixed methods studies: A guide to critical appraisal

Julie MacInnes discusses the reasoning behind mixed methods research—the use of both quantitative and qualitative data in the same study—and how to evaluate it

The use of qualitative and quantitative methods in the same study is increasingly common in nursing research yet there is little consensus or established frameworks for the evaluation of such studies. In this article, a definition of mixed methods research is presented and specific issues to consider in evaluating mixed methods studies are suggested. These include the purpose or rationale for mixing methods, the paradigm position, the research design, quality and cohesiveness. A mixed method study is given as an illustration.

Background to mixed methods research in nursing
Nursing research has traditionally drawn from a number of disciplines, most notably medicine. Early nursing research was therefore primarily focused on the development of outcome measures using predominantly quantitative measures (Twinn, 2003). Since the 1980s, qualitative research has been in ascendance, establishing at least equal dominance. However, it has been argued that nursing, health and social care research is currently experiencing a third methodological movement—that of mixed methods (Tashakkori and Teddlie, 2003).

Mixed methods can be defined as:
research in which the investigator collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches or methods in a single study (Tashakkori and Creswell, 2007: 4).

A central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone.

This growing interest in mixed methods research is evidenced by the proliferation of published research aided by the launch of the Journal of Mixed Methods Research in 2005. In terms of research funding, a review of research commissioned by the Health Research and Development Programme between 2000 and 2004 found that 30% were mixed methods studies compared with 17% before 1995 (O’Cathain et al, 2007).

However, mixed methods research is still evolving and there is continued discussion in terms of the definition of mixed methods, the research paradigm, research designs, the degree to which qualitative and quantitative findings are integrated and the techniques for evaluating mixed method studies.

Critiquing mixed methods studies
Creswell and Plano Clark (2007) argue that the evolving nature of mixed methods approaches means that researchers have yet to reach a consensus on the criteria that might be used to evaluate such studies. However, standards for evaluating qualitative and quantitative research independently are available. A number of authors present systematic, detailed approaches to critiquing nursing research (Cormack et al, 2006; Parahoo, 2006). Earlier articles in this series have discussed the critical appraisal of individual qualitative and quantitative methods (Astin, 2009; Delaney, 2009; Goodman and Gilchris, 2009; Linden and Priestley, 2009; MacInnes, 2009). The purpose of this article is not to provide a comprehensive discussion of the research process or individual methods, but to focus on specific considerations in evaluating mixed method studies.

In evaluating mixed method studies, a number of key points should be considered, namely, the rationale or purpose of combining qualitative and quantitative methods in a single study; the paradigm position; the research design; the quality of the research and the studies’ cohesiveness. These features are summarized in Table 1.

One rationale or purpose of mixed methods approaches is triangulation, where conclusions are validated through confirmatory evidence from different types of data. Frequently these data sets have different strengths and weaknesses (methodological triangulation).

Second, a combination of approaches may enable a more complete understanding of the study phenomenon, which may
However, many mixed method studies locate their research within a pragmatic paradigm. For pragmatic researchers, the research question is paramount and ‘what works’ determines the methods (Maxcy, 2003). Researchers are free to move between inductive and deductive processes during the research process. For pragmatists the methodology is the focus of the research, rather than metaphysical considerations such as the nature of truth and reality (Morgan, 2007).

**Typology**
A number of typologies exist that attempt to classify and describe mixed method research designs, most notably those based on the work of Creswell and Plano Clark (2007) (Figure 2). In this typology, four major designs are identified, each with a number of specific models. In determining the design, these authors identify three key elements, namely, timing, weighting and mixing.

Timing refers to the point(s) in the research process when qualitative and quantitative data is collected and interpreted. This may be either in sequence (denoted by →) or concurrent (+). Weighting refers to the relative importance of each method. Qualitative or quantitative methods may be emphasized or be particularly relevant in nursing due to the often complex nature of the topic. Different approaches may answer different research questions or the qualitative or quantitative approach may help explain or illustrate the findings of the other approach. A qualitative approach may allow the development of hypotheses, which can be then be tested during a quantitative phase. Similarly, a qualitative study may generate items for a questionnaire to be used in a quantitative survey (Doyle et al, 2009).

The paradigm in which research is located is also important. A paradigm, or theoretical lens through which we view the world, includes ideas about knowledge (epistemology), the nature of reality (ontology), values (axiology) and the process of the research (methodology).

Traditionally, a positivist paradigm employed mainly quantitative methods (Delaney, 2009) and a constructivist (sometimes called interpretive) paradigm employed mainly qualitative methods (Astin, 2009). These alternative paradigms have been viewed as incompatible in that it was considered impossible to hold these two opposing philosophical views (Guba and Lincoln, 1994).

This has led to the belief that qualitative and quantitative methods are mutually exclusive; a view that is rejected by mixed methods researchers. Creswell and Plano Clark (2007) argue that within mixed method studies, alternative paradigms are possible as long as it is made explicit when and how each are used.

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**Table 1.**
**Key features of mixed methods evaluation**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Examples of questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of mixing methods</td>
<td>Is the reason for using a mixed methods approach explicit? Does the mixed methods approach add value compared to a single method?</td>
</tr>
<tr>
<td>Paradigm position</td>
<td>Is the paradigm position stated? (for example, positivism, constructivism, pragmatism, or more than one paradigm)</td>
</tr>
<tr>
<td>Research design</td>
<td>Is the design mixed methods? Can the research design be recognised according to existing typologies?</td>
</tr>
<tr>
<td>Quality</td>
<td>Are issues of quality addressed? Are quality standards appropriate for each method? (for example standards of validity, reliability for quantitative methods; trustworthiness for qualitative methods)</td>
</tr>
<tr>
<td>Cohesiveness</td>
<td>Is the study cohesive and consistent with a mixed methods approach in relation to purpose, the research question, study design, data collection methods, data analysis and conclusions?</td>
</tr>
</tbody>
</table>
they can be given equal priority. The notation QUAN/quan or QUAL/qual may be used where upper case signifies priority.

Mixing refers to the relationship between the qualitative and quantitative data. That is, when and how the data is mixed. Data sets may be merged or integrated or one data set may be embedded within another. Commonly, the data is connected by the analysis of one data set leading to the collection and analysis of another.

Quality
The quality of any research is of paramount importance. In mixed methods research the terminology and processes are necessarily dependent on the methods employed and the research paradigm.

In quantitative research, quality is often defined as ‘rigour’ and determined by concepts of reliability and validity. The degree to which the findings can be generalized is important. In qualitative research the term rigour is rejected in favour of ‘validity’ or ‘trustworthiness’. Trustworthiness, according to Lincoln and Guba (1985) includes the criteria of credibility, transferability, dependability and confirmability.

Creswell and Plano Clark (2007) suggest that in evaluating mixed methods studies, the standards of both qualitative and quantitative approaches should be used according to such established criteria. Andrews and Halcomb (2009) argue that using mixed methods requires the researcher to be ‘vigorously self-aware’ of the paradigm position and its influences on validity. In mixed methods research, then, there is no one way to ensure quality, what is important is that appropriate quality is ensured at each stage of the research process.

Finally, there should be cohesiveness between all phases of the research so that the purpose of the research, the research question, data collection, data analysis and conclusions are clearly identified and consistent with a mixed method approach, within a given paradigm stance.

An example of a mixed methods study
A study by Astin et al (2008) used a mixed methods approach to explore patients’ experiences of primary angioplasty and assess their illness perceptions during early recovery. Data were collected by semi-structured interviews with accompanying field notes (qualitative) and the Revised Illness Perception Questionnaire (IPQ-R) (Moss-Morris et al, 2002) (quantitative). While not explicit, the purpose of mixing methods in this study seems to be to enable a more complete understanding of a previously unexplored phenomenon (Doyle et al, 2009).

The research design is identified as a ‘mixed methods exploratory study’ in which the timing and mixing of data are explicitly addressed. In relation to timing, qualitative and quantitative data were collected concurrently, with the IPQ-R completed immediately following the interview, that is, before both data sets are analysed. Data were mixed or integrated at the level of analysis with the questionnaire data used to inform the qualitative findings before the development of a theoretical model.

Although not explicitly stated, in this study the weighting or relative importance of each method appears to be equal or the qualitative phase is dominant given the exploratory design of the study and the supporting use of the questionnaire data.

![Figure 1. Types and features of mixed method designs. Adapted from Creswell and Plano Clark (2007)](image-url)
In common with much published research, the paradigm position is not stated. The quality of the findings is expressed in terms of trustworthiness, credibility and dependability, again suggesting a constructivist paradigm and a dominant qualitative approach.

The challenges of using a mixed method study are addressed. In this case the possibility that taking part in the interview may have influenced the participants responses in the questionnaire. In relation to cohesiveness, the aim of the study, data collection methods, and data analysis are congruent with each other and consistent with a mixed methods approach.

Conclusions
Mixed methods research is a relatively new and evolving research methodology. However, given the proliferation of published articles in nursing research using mixed methods, a need exists for robust evaluation criteria. As well as established frameworks for critiquing qualitative and quantitative research independently, specific questions for mixed methods research are recommended, including an analysis of the purpose and value of mixing methods, the paradigm position, the type of mixed methods design, questions of quality and the cohesiveness of the approach. In this way, 'mixed-up' methods can be differentiated from well developed, mixed method studies.


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