Issues in Mixing Qualitative and Quantitative Approaches to Research

Pat Bazeley

Research Support P/L, Bowral, Australia

pat@researchsupport.com.au

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Abstract

That mixed methods studies have become "trendy" again after a period of disrepute does not mean the issues such methods raise have gone away. Definitional, paradigmatic and methodological issues continue to be raised when researchers write about mixed methods, while design issues, issues in sampling, analysis and reporting and wide-ranging demands on researcher skills, finances and time are faced daily by those involved in a mixed methods study. Mixed methods researchers, in bringing together the benefits of both qualitative and quantitative approaches to research, often claim greater validity of results as a reason for their methodological choices, but without adequate consideration of the issues involved such validity may be more imagined than real.

Keywords

mixed methods; quantitative; qualitative; methodology

Introduction

After a period in the paradigmatic wilderness, mixed methods research has regained not just acceptability, but popularity, with a significant number of studies arguing its virtues in terms of greater understanding and/or validation of results. But all is not "plain sailing"—working with mixed methods raises a range of issues above and beyond those encountered within a particular methodology. Not the least of these is that there is no one mixed methods methodology, and the term can be applied to widely divergent approaches to research.

Defining mixed methods

Tashakkori and Teddlie (1998) argued that the term "mixed model" is more appropriate than "mixed method" for research in which different approaches are applied at any or all of a number of stages through the research, their point being that mixing often extends beyond just the methods used in the research. Indeed, mixing of methodologies *within* a broad quantitative or qualitative approach may raise almost as many issues as when working across approaches (Barbour, 1998); mixing may also occur across different disciplinary traditions, for example, in social history, or when scientists engage in social research to evaluate the impact of their work. It becomes necessary, therefore, to clarify just *what* is being mixed—and *how* it is being mixed. The "mixing" may be nothing more than a side-by-side or sequential use of different methods, or it may be that different methods are being fully integrated in a single analysis (Caracelli & Greene, 1997).

Defining qualitative and quantitative

When thinking mixed methods, most social scientists think in terms of some combination of qualitative and quantitative approaches to research, and these kinds of combinations will be the focus of this paper. Here too there are definitional problems—problems which relate to paradigmatic and other issues typically associated with mixing methods. Qualitative and quantitative approaches have been distinguished (and thereby defined) on the basis of the type of data used (textual or numeric; structured or unstructured), the logic employed (inductive or deductive), the type of investigation (exploratory or confirmatory), the method of analysis (interpretive or statistical), the approach to explanation (variance theory or process theory), and for some, on the basis of the presumed underlying paradigm (positivist or interpretive/critical; rationalistic or naturalistic). Perhaps our inability to clearly specify what all of us have a general sense of is indicative of the lack of a clear distinction—that what we are talking about is a continuum with a number of independent dimensions along which any particular research may be placed. If one uses numbers, interpretation is still involved. If one's data are texts, counting may still be appropriate. Variables do not necessarily have clear-cut meanings; processes can be revealed through numeric analysis as well as through narrative, and so on. This inability to definitively distinguish one approach from another has implications for the acceptability of mixing methods in that "lines of conflict" cannot be clearly drawn.

Because there is no necessary congruence between the different dimensions of the quantitative-qualitative distinction, the terms themselves are most useful either for giving a sense of overall direction in a study (hence my use of the term *approaches*), or simply as descriptors of the type of data being used (textual or numeric). Even the latter is problematic (suggesting that approach and data type are necessarily linked), but it at least avoids the problems associated with suggesting there are such things as quantitative or qualitative paradigms or methodologies.

Paradigms

Approaches taken to defining "qualitative" and "quantitative" have long been associated with different paradigmatic approaches to research—different assumptions about the nature of knowledge (ontology) and the means of generating it (epistemology). The idea that one's paradigmatic view of the world might be related to the way one went about researching the world was prompted by Kuhn (1963), while Guba and Lincoln's work on naturalistic inquiry (e.g. Lincoln & Guba, 1985) contributed significantly to the "paradigm wars" of the '80s. Their concerns about the paradigmatic

assumptions underlying research were taken up by many writing about approaches to social research and social research methodology in that period. Much of the concern arose as a reaction to the earlier dominance of the "positivist" world view that privileged objective observation and precise measurement over interpretation of subjective experience and constructed social realities. Researchers holding the belief that there were strong associations between paradigm, methodology and methods consequently considered different methodologies and methods to be philosophically incompatible, making their combination logically impossible. During this period, therefore, mixed methods research was strongly attacked and fell from favour amongst methodologists.

The positivist approach to social and behavioural science, adopted at the urging of John Stuart Mill and others in order to build respectability among scientists (Guba & Lincoln, 1994), has, Howe and Eisenhardt (1990) have suggested, not only served social science badly, but also has largely been ignored as a basis for natural science. They argue that all scientific observation, analysis and theorising involves acts of interpretation, and all investigation is theory laden. It may be too simplistic to suggest, however, that if all research is interpretive, there is no problem. Following their review of 56 mixed methods studies, Greene, Caracelli and Graham (1989) concluded: "Our own thinking to date suggests that the notion of mixing paradigms is problematic for designs with triangulation or complementary purposes, acceptable but still problematic for designs with a development or expansion intent, and actively encouraged for designs with an initiation intent" (Greene et al., 1989, p.271).

It could be said that paradigmatic issues raised by mixed methods research remain unresolved. Indeed, one can't research or prove paradigms, and paradigmatic debates can never be resolved. The early 1990s saw a series of rejoinders to those who had given paradigms so much attention (particularly evident in the *Educational Researcher*) and a shift in emphasis to the more tractable issues of design and methods (Krantz, 1995) and features of the knowledge claims that could be generated (Greene & Caracelli, 1997). Pragmatism increasingly overruled purity (Rossman & Wilson, 1985) as the perceived benefits of mixing methods in "getting research done" came to be seen as outweighing the importance of the philosophical difficulties in their use (Miles and Huberman, 1994). Thus, according to Miles and Huberman (1994, p.41): "The question, then, is not whether the two sorts of data and associated methods can be linked during study design, but whether it should be done, how it will be done, and for what purposes."

Purpose and design

Often the purpose for choosing a mixed methods design is not made clear by the researcher (Greene et al., 1989), potentially leading to confusion in the design phase of the study. Some studies may not be considered to have employed mixed methods at all in so far as they do not give recognition to the full contribution of each method (Patton, 1988). Purposes necessitating mixed methods may be corroboration, expansion or initiation (Rossman & Wilson, 1985). Initiation, in the form of an iterative, nested, holistic or transformative design (Caracelli and Greene, 1997), requires an integration of methods in contrast to the simpler component designs typically used for corroboration or expansion. Where the purpose of the research is made clear, and is theory-driven (i.e. presented through a logical chain of evidence) then that substantive focus becomes a superordinate goal which limits tensions in mixing of methods (Chen, 1997).

Much of the writing about mixed methods designs (e.g. Creswell, 1994; Morse, 1991; Morgan, 1998) has focused on the use of component (parallel or sequential) designs in which the different elements are kept separate, thus allowing each element to be true to its own paradigmatic and design requirements (but raising the issue of whether, in such cases, these really do constitute a mixed methods study or rather, are two separate studies which happen to be about the same topic). Likewise, most reports of mixed methods studies report either parallel or sequential component designs. Few studies report truly integrated designs (Greene et al., 1989)—perhaps because the technology for managing integrated analyses is still in development (Bazeley, 2002).

Triangulation is a term which has been greatly misused in relation to both purpose and design since Denzin's (1970/78) popularisation of it. It was initially conceived as the conduct of parallel (or

otherwise duplicated) studies using different methods to achieve the same purpose, with a view to providing corroborating evidence for the conclusions drawn, i.e. as a technique of validation (drawn from the concept of triangulation in surveying). It has, in more recent years, often been used loosely as a synonym for mixed methods without regard to either of the conditions inherent in the original concept and has as a consequence lost the power of its original meaning. It has been argued that, in any case, triangulation does not assist validation as each source must be understood on its own terms (Fielding & Fielding, 1986; Flick, 1992). The original model of triangulation assumes a single reality and ignores the symbolic interactionist foundation of much qualitative work which proposes that different methods (or researchers or participants) will necessarily view or construe the object of the research in different ways. And as researchers use different methods, they play different roles and have different relationships with the researched—the latter, for example, being variously labelled as respondents, subjects, participants or informants (Barbour, 1998).

Alternative methods may also "tap different domains of knowing" (Mathison, 1988, p.14) or encourage or allow expression of different facets of knowledge or experience. For example, people responding to interviews or open ended questions will often raise quite different issues to those provided for in a structured questionnaire asking essentially the same question. Interviews and focus groups generate different information, reflecting public versus private views (Morgan, 1993) and a preparedness to deal with more sensitive issues in interviews (Kaplowitz, 2000). While the use of parallel methods may not, therefore, provide corroborative evidence, they may well add depth or breadth to a study and perhaps even hold the key to understanding the processes which are occurring (Jick, 1979; Mark, Feller & Button, 1997). In the third edition of his work, Denzin (1989) himself abandons the idea of triangulation as a tool of validity, suggesting rather that it overcomes personal biases from single methodologies. "The goal of multiple triangulation is a fully grounded interpretive research approach. Objective reality will never be captured. In-depth understanding, not validity, is sought in any interpretive study" (Denzin, 1989 p.246). (This statement implies that objective reality and validity are the same thing, and that each is unrelated to in-depth understanding. It seems that it is difficult not to tie oneself in knots, whichever way one turns!)

Despite its being one of the more common reasons given for engaging in a mixed methods study, it would appear that corroboration of findings is not only a dubious intention but one that is almost doomed to failure.

Methods

Although they may be implied, when it comes to reporting studies, paradigms are rarely mentioned (Riggin, 1997). The focus is much more on the actual methods used and results obtained. Despite the tendency for some to write about quantitative and qualitative paradigms, or to assume that someone working with numbers and statistics has a positivist perspective, it is generally recognised that there are no direct or exclusive correspondences between paradigms, methodology and methods. Indeed, "…research methodologies are merely tools, instruments to be used to facilitate understanding" (Morse 1991, p.122). With debate on the value of quantitative versus qualitative methods moderating to a recognition that both have a place, the "real issues", according to Patton (1989, p.181), have become "methodological flexibility and appropriateness".

When methods are mixed without careful consideration of the particular assumptions or rules and expectations regarding their conduct, corruption of those methods can occur such that results obtained by them become subject to question. Assumptions regarding sampling, which will be discussed separately, provide the most blatant but not the only example of this problem. Mixed method studies in which just a few observations or interviews are conducted to supplement quantitative data collection "cheapen" qualitative methods in a way which Patton (1988) likened to a comparison between loving intimacy and a one-night stand. The corruption may be out of ignorance, or because those using multiple strategies for investigation take shortcuts in order to cope with the greater time commitment required (Bryman, 1988). The term "Blitzkrieg ethnography" (Rist, quoted in Bryman, 1988), for example, has been applied to work conducted in a number of multisite-multimethod studies claiming an ethnographic component, where there has not been proper immersion in the site.

"Ethnography is a methodological approach with specific procedures, techniques, and methods of analysis" (Fetterman, 1984, p.23), and for the method to be valid one needs to adopt its values as well as its techniques. Conflicts of this type might be alternatively interpreted as disciplinary purists being precious about the traditional approaches to research of their discipline, or at least, the labelling of those approaches. The balance needs to be struck, then, between adherence to a total package of techniques, perspectives and values associated with a traditional method, and the ability to draw useful strategies from those traditions—recognising the ways in which they have been modified and the implications of doing so (e.g. Smith & Robbins, 1982).

Mixed methods often combine nomothetic and idiographic approaches in an attempt to serve the dual purposes of generalisation and in-depth understanding—to gain an overview of social regularities from a larger sample while understanding the other through detailed study of a smaller sample. Full integration of these approaches is difficult, hence the predominance of component studies. Case-oriented quantification (Kuckartz, 1995) has been proposed as a way of bringing these together by providing understanding of the individual while also supporting typification. Kuckartz' software program, winMAX, was specifically written to support such a goal. Similarly, Ragin's (1987; 1995) method of qualitative comparative analysis (QCA), also translated into software, is an attempt to develop typologies and related understandings while retaining the richness of the qualitative case.

In my own work I have set up a model for analysis of a database in which qualitative coding is converted into quantitative variables that can be fed into a predictive regression model. In another instance, I have used correspondence analysis to assist in revealing dimensions derived from coding of descriptive data. In each case, the qualitative database is necessary to provide understanding of the meaning of the concepts and variables used, and of how the statistically derived models work out for "real people", but the statistical analysis provides also access to patterns, trends and underlying dimensions in the data not readily evident in the detail of the qualitative analyses. Such methods as these, in which the same data are treated both hermeneutically and statistically, along with those proposed by Kuckartz and Ragin, provide integrated (holistic) techniques for viewing data both nomothetically and ideographically.

In the final analysis, methodology must be judged by how well it informs research purposes, more than how well it matches a set of conventions (Howe & Eisenhardt, 1990). What counts for good research will not necessarily match what counts as orthodox methodology. The standards Howe and Eisenhardt (1990) suggest should be applied include:

- Do the methods chosen provide data which can answer the question?
- Are the background assumptions coherent?
- Are the methods applied well enough that the results are credible?

Sampling

Typically one expects quantitative research to rely on a large, randomly drawn sample, while qualitative studies are associated with smaller, purposive (non-random) samples. But there are no statistics for generalising from small purposive samples and it is not possible to do fine hermeneutic analysis on data from large random sample. Cases for detailed study can be identified from within larger samples (e.g. Nickel, Berger, Schmidt & Plies, 1995), while computerisation can facilitate testing, across a larger selection of texts, of the generality of ideas developed through fine-grained interpretive analysis of a subset of those texts (Bazeley, 2002).

With computerisation of qualitative analysis and the increasing use of qualitative analysis software by those trained only in quantitative approaches to research, there is a tendency for those researchers to attempt to include much larger volumes of unstructured data than have traditionally been used in qualitative approaches. Stratified random sampling or quota sampling replaces purposive sampling so as to meet expectations for generalisation of results as understood in statistical terms—and the inappropriate application of rules of one method distorts, and potentially invalidates, the assumptions of another.

When qualitative programs can provide statistical summaries, there is a temptation to over interpret numbers (frequency or cross-tabulated data) generated through coding texts from a small, purposively drawn sample. Where the total *N* is less than 20, it is inappropriate to report percentages, and few inferential statistical procedures can be applied to such small samples. The chi-square statistic cannot be validly used to test a relationship between variables where there are small expected frequencies (nor where categories are not mutually exclusive), and samples in the range of 10 to 20 cases per variable are required for multivariate analyses. At the same time, there is nothing to be gained from substituting vague terms (more, most) for actual numbers, where those numbers are available.

The researcher's view of the generic and specific properties of a single case provides a basis for sampling decisions. The opportunity for detailed study while maintaining balance and variety may be more important than satisfying selection criteria based on a sampling of attributes (Stake, 1994). Symbolic interactionists argue that every case is a sample of its broader population, that similarities across a population are greater than differences between populations, and therefore that it is appropriate to treat each case as being, in general terms, representative of their population. These approaches are unacceptable, however, to statisticians.

It is with integrated methods that apply both hermeneutic and statistical analyses to the same data that difficulties are most likely to arise, however, generating a need to "trade off" between the intensiveness of detailed hermeneutic analysis and the extensiveness of statistical inference to larger populations (Prein & Kuckartz, 1995). Sampling issues must be resolved with respect to the purpose of the research, and in particular how the results are to be generalised to a population beyond the sample. It matters, for example, whether it is descriptive information or understanding of a process that is to be learned and generalised from the sample.

Analysis

Without computerisation, the researcher's capacity to integrate different data types in an analysis is limited. Typically, statistical data have been analysed using a computer, "in-depth" text data have been analysed without. Recent developments in computer software for qualitative data analysis (QDA) have brought about a revolution in textual analysis. Even more recent developments in QDA software—specifically the ability to export coding information in tabular form—herald a revolution for integrated mixed methods analysis. It is in the conversion of qualitative data to quantitative code for statistical analysis (often referred to as the quantitizing of qualitative data) that most issues arise.

The use of codes

Coding or categorising of data is undertaken to facilitate understanding and retrieval of information in almost any approach to analysis. Whether they are called variables, themes, concepts, categories or values, responses are "coded". And codes are the means by which data are transferred from one format into another, or between QDA and statistical software. The kinds of things codes can stand for are similar in the different softwares, but the way they are generated and the way they are used are often quite different, making for potential complication of interpretation when they are read in a different context.

While categories developed through a qualitative analysis may be defined *a priori*, QDA software allows for generation of new codes as analysis is progressing, for rearrangement of codes without loss of data, and for some software, for coding on from existing codes into new categories. Researchers using a statistical program, in contrast, need to define their variables before coding, and changing them involves recategorising already coded data. These differences may become an issue if a researcher is determined to have a common coding system across data types in order to force comparability of conclusions from the different data sources.

Both statistical and QDA programs use codes for demographic and project related information as well as to capture topic themes and concepts. Representational/descriptive categories (e.g. does research), instrumental/interpretive categories (e.g. being stimulated by or passionate about research) and analytic concepts (identification as a researcher, addiction to research) are each able to be represented

by codes or scores in the various softwares. But it is at this point that the similarity ends. A code in a statistical data set has to totally represent the category or concept it stands for. Unlike a qualitative data set, there is no recourse to the original source to check what was meant by it or to review different interpretations of it.

Because codes are the only medium for communicating information in a quantitative data set, they are necessarily precise in what they are conveying, they are single-dimensional (Sivesind, 1999) and directional. With qualitative data the text supporting a code is always available for review, and dimensions within it (which may not have been initially apparent to the coder) may become obvious through that review, or may be revealed through pattern or comparative analyses. Thus qualitative coding has singularity rather than single dimensionality, in that in all text about a particular issue or idea or experience may be assigned the same code, regardless of the way it is expressed. Often, as well, such coding is multi-directional, as for example when all text about competence is coded together, simply because it is about that concept and regardless of whether it is about high or low levels of competence. (It is possible that analysis will reveal different dimensions for—or types of—competence, other than its quantity.)

When a qualitative theme code is quantitized, its meaning becomes fixed and single-dimensional. Where directionality was not embodied in the qualitative coding, then statistical analysis involving these variables must be carefully interpreted. The exported variable may simply have been a record of whether an issue was raised or a feeling discussed, without indication of *how* it was dealt with or perceived. If direction is needed for interpretation in the statistical analysis, it will be necessary to code on the qualitative data to provide that directionality before exporting the coding information. This is perhaps the most critical issue in interpretation of quantitized data.

The counting of codes

The way in which (qualitative) texts are segmented within QDA software, whether data are being exported for each coded segment or whole documents, the way overlapping codes are dealt with, and the method of scaling all have implications for the generation, processing and interpretation of numeric data from coding of qualitative text.

Depending on the program being used, the researcher may have a choice of exporting dichotomous (0/1) codes indicating presence or absence of a concept, counts giving the frequency of mention, or a measure indicating the relative volume of text coded a particular way in a document. Counts (other than 0/1) are influenced by the way data are segmented as a basis for counting, and frequency counts are affected by the overall length of the source documents. Counts and proportions are also problematic from the point of view that they assume a level of (ratio) scaling that ignores the meaning of missing data (scored as 0) in a qualitative data set and the potential disjuncture between 0 and 1 in a continuous scale derived from such data.

In practical terms, QDA software packages differ in whether information relating to each coded segment is the basis for exported data or whether data for each document or case as a whole is being exported. This has implications for data handling (e.g. the need to aggregate data in order to obtain patterns for respondents), as well as for the recognition of intersections in coding. Researchers using exported coding information therefore need to test out and become familiar with the transfer syntax used by their selected software.

Issues for statistical analysis

Inferential statistics are based on an assumption of random or representative selection of cases, and error rates in derived estimates of population characteristics are proportional to sample size. Sample selection and sample sizes therefore limit the kind of statistical procedures that might legitimately be used and the capacity to generalise to a larger population.

Each statistical technique carries particular assumptions which must be met for appropriate use of that technique. For data derived from qualitative coding, most measures (including scaled measures) will be nominal or ordinal rather than interval, distributions may be unknown and normality cannot be

assumed. For descriptive reporting, medians are likely to be more appropriate than means. Lack of independence in observations for some types of data can create a problem of multicollinearity (Roberts, 2000). Similarly, chi-square analysis carries an assumption that categories on the same axis are mutually exclusive. While classic multivariate techniques based on the general linear model are strict in their assumptions, exploratory multivariate techniques such as cluster and correspondence analysis can generally be applied to quantitized data where conditions of normality and randomness are not necessary met—although even these techniques are not appropriate if all variables are not equally relevant to all cases (Prein & Kuckartz, 1995).

Different approaches to data analysis treat variations and exceptions differently. Statisticians will often simply dismiss "outliers" from their analysis, and rely on probability estimates to deal with variation across the sample. Variation is "error" where the goal is to describe the typical. In a qualitative approach the researcher uses variation to illuminate developing theories and modifies theory to take account of exceptions (Barbour, 1998; Miles & Huberman, 1994).

A pragmatist's approach to analysis

When evidence from different sources is conflicting, one has to determine how to weight the different components—or, preferably, seek reasons for the discrepancy. Ultimately, mixed methods analysis (like almost any other!) is a process of piecing together bits of a puzzle to find answers to questions (Jick, 1979). Numbers should be used where they help to answer questions, verbal comments should never be ignored. "From data in the form of numbers, one makes inferences in the same way as with data in the form of words, not by virtue of probabilistic algorithms. Statistics are not privileged. Inference is not mechanised. With this way of viewing knowledge, 'mixed' methods may even be a misnomer, as both surveys and participant observation yield equivalent data. Inferences are based on the inquirer's coordinating multiple lines of evidence to gain an overall understanding of the phenomenon ... Yet, because the inquirer is the instrument, all information flows through a single perspective" (Smith, 1997, p.77). In my experience, and as hinted earlier, "rules" are often broken: the wise mixed methods researcher knows what assumptions underlie the methods of analysis being used, understands the implications of not fully meeting those assumptions, and takes that into account in drawing and presenting conclusions.

Pragmatics

Quite apart from arguments about paradigms, methods and analysis, there are a number of quite practical issues that impact on mixed methods research. Most obviously, use of multiple methods increases the amount of time required to complete a study and the cost of conducting the study, particularly if a component design is being used.

The more critical practical problem relates to the level of researcher skills and knowledge available. Good mixed methods research requires a good working knowledge of the multiple methods being used, their assumptions, analysis procedures and tools, and an ability to understand and interpret results derived from those different methods. While they might be able to adapt to and learn new methods, researchers brought up in the traditions of a particular discipline often do not have knowledge of other methodologies, particularly the tacit knowledge that comes from years of immersion in the literature and research associated with those methodologies. But years of disciplinary training can also create a methodological prejudice (Patton 1988; Reichardt & Cook 1979) which can result in a tendency to choose methods that are within one's expertise rather than because they are the best way of answering the questions set (Bryman, 1988; Jick, 1979).

The level of understanding of the audience, similarly, can be a problem. The mixed methods researcher needs to convey methods which may be unfamiliar to readers from one side or the other (Creswell, 1994). Stakeholders, granting bodies, thesis examiners, journal editors and readers all may struggle with particular (but different!) elements of a presentation; each has their own biases and methodological preferences and tends to understand terms used from the perspective of their own framework, even where an alternative framework is spelt out.

Writing up

Writing mixed methods is rather like writing qualitative analysis in that it is unlikely to follow a traditional format. In determining how best to present the ideas and evidence generated through the completed study, the issue becomes one of the degree to which quantitative and qualitative components can or should be integrated. While this may be influenced by the degree to which they were integrated throughout the study, it is not necessarily determined by that. All too often, the results and conclusions from one type of data or analysis are presented and then the results and conclusions for the other before an attempt is made to draw them together in a general conclusion (if at all). If the different approaches were designed to contribute together to a common understanding then, even where they were used side-by-side or in sequence, separation of the different components in reporting and interpreting those results is likely to lead to a report which is disjointed and potentially repetitive. Better to progressively unveil relevant evidence on a path to a common conclusion, than to organise on the basis of method used.

Is validity enhanced?

Mixed methods are used to enrich understanding of an experience or issue through confirmation of conclusions, extension of knowledge or by initiating new ways of thinking about the subject of the research. Mixed methods are inherently neither more nor less valid than specific approaches to research. As with any research, validity stems more from the appropriateness, thoroughness and effectiveness with which those methods are applied and the care given to thoughtful weighing of the evidence than from the application of a particular set of rules or adherence to an established tradition.

Critical issues for mixed methods research include:

- clarity of purpose, basis and substantive focus, giving direction to the study and a logical basis for explanation;
- awareness of the limitations of traditional methods as they are modified in a mixed methods environment;
- appropriate use and interpretation of quantitized coding from qualitative data;
- varied methods of treatment of “error” or “deviance”, and
- appropriate generalisation, given choice of sample and methods.

References

Barbour, R. S. (1998). Mixing qualitative methods: Quality assurance or qualitative quagmire? *Qualitative Health Research, 8*(3), 352-361.

Bazeley, P. (2002). Computerized data analysis for mixed methods research. in A. Tashakorri, & C. Teddlie (Eds.), *Handbook of mixed methods for the social and behavioral sciences*. Thousand Oaks, CA: Sage, 385-422.

Bryman, A. (1988). *Quantity and Quality in Social Research*. London & NY: Routledge.

Caracelli, V. J., & Greene, J. C. (1997). Crafting mixed-method evaluation designs. In J. C. Greene, & V. J. Caracelli (Eds), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms* (pp. 19-32). San Francisco: Jossey-Bass.

Chen, H. (1997). Applying mixed methods under the framework of theory-driven evaluations. In J. C. Greene, & V. J. Caracelli (Eds), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms* (pp. 61-72). San Francisco: Jossey-Bass.

Creswell, J. W. (1994). *Research design: Qualitative & quantitative approaches*. Thousand Oaks, CA: Sage.

Denzin, N. K. (1970). *The research act*. Chicago: Aldine.

Denzin, N. K. (1978). *The research act* (2nd ed.). New York: McGraw-Hill.

Denzin, N. K. (1989). *The research act* (3rd ed.). Englewood Cliffs, NJ: Prentice Hall.

Fetterman, D. M. (1984). Ethnography in educational research: The dynamics of diffusion. In D. M. Fetterman (Ed), *Ethnography in educational evaluation* (pp. 21-35). Newbury Park, CA: Sage.

Fielding, N. G., & Fielding, J. L. (1986). *Linking data: The articulation of qualitative and quantitative methods in social research*. Beverly Hills, CA: Sage .

Flick, U. (1992). Triangulation revisited: Strategy of validation or alternative? *Journal for the Theory of Social Behaviour, 22*, 175-197.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*(3), 255-274.

Greene, J. C., & Caracelli, V. J. (1997). Defining and describing the paradigm issues in mixed-method evaluation. In J. C. Greene, & V. J. Caracelli (Eds), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms* (pp. 5-18). San Francisco: Jossey-Bass.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. N. K. Denzin, & Y. S. Lincoln (Editors), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage.

Howe, K. R., & Eisenhardt, M. (1990). Standards for qualitative (and quantitative) research: A prolegomenon. *Educational Researcher, 19*(4), 2-9.

Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly, 24*, 602-611.

Kaplowitz, M. D. (2000). Statistical analysis of sensitive topics in group and individual interviews. *Quality and Quantity, 34*, 419-431.

Krantz, D. L. (1995). Sustaining versus resolving the quantitative-qualitative debate. *Evaluation and Program Planning, 18*, 89-96.

Kuckartz, U. (1995). Case-oriented quantification. In U. Kelle (Ed), *Computer-aided qualitative data analysis: Theory, methods and practice* (pp. 158-176). Thousand Oaks, CA: Sage.

Kuhn, T. S. (1963). The essential tension: tradition and innovation in scientific research. In C. W. Taylor, & F. Barron (Eds), *Scientific creativity: it's recognition and development* (pp. 341-154). N.Y.: Wiley.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic enquiry*. Beverly Hills, CA: Sage.

Mark, M. M., Feller, I., & Button, S. B. (1997). Integrating qualitative methods in a predominantly quantitative evaluation: A case study and some reflections. In J. C. Greene, & V. J. Caracelli (Eds), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms* (pp. 47-60). San Francisco: Jossey-Bass.

Mathison, S. (1988). Why triangulate? *Educational Researcher, 17*(2), 13-17.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*.

Thousand Oaks, CA: Sage.
Morgan, D. L. (Ed.) (1993). *Successful focus groups.* Newbury Park, CA: Sage
Morgan, D. L. (1998). Practical strategies for combining qualitative and quantitative methods: Applications to health research. *Qualitative Health Research, 8*(3), 362-376.
Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research, 40*, 120-123.
Nickel, B., Berger, M., Schmidt, P., & Plies, K. (1995). Qualitative sampling in a multi-method survey. *Quality and Quantity, 29*, 223-240.
Patton, M. Q. (1988). Paradigms and pragmatism. in D. M. Fetterman (ed.), *Qualitative approaches to evaluation in education: the silent scientific revolution* (pp. 116-137). N.Y.: Praeger.
Patton, M. Q. (1989). *Utilisation-focused evaluation* (2nd ed.). Newbury Park, CA: Sage.
Prein, G., & Kuckartz, U. (1995). Computers and triangulation. Introduction: Between quality and quantity. In U. Kelle (Ed), *Computer-aided qualitative data analysis: Theory, methods and practice* (pp. 152-157). Thousand Oaks, CA: Sage.
Ragin, C. C. (1987). *The comparative method: Moving beyond qualitative and quantitative strategies.* Berkeley: University of California Press.
Ragin, C. C. (1995). Using qualitative comparative analysis to study configurations. In U. Kelle (Ed), *Computer-aided qualitative data analysis: Theory, methods and practice* (pp. 177-189). Thousand Oaks, CA: Sage.
Reichardt, C. S., & Cook, T. D. (1979). Beyond qualitative *versus*quantitative methods . In T. D. Cook, & C. S. Reichardt (Eds), *Qualitative and quantitative methods in evaluation research* . Beverly Hills, CA: Sage.
Riggin, L. J. (1997). Advances in mixed-method evaluation: A synthesis and comment. In J. C. Greene, & V. J. Caracelli (Eds), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms* (pp. 87-94). San Francisco: Jossey-Bass.
Roberts, C. W. (2000). A conceptual framework for quantitative text analysis. *Quality and Quantity, 34*, 259-274.
Rossman, G. B., & Wilson, B. L. (1985). Numbers and words: Combining quantitative and qualitative methods in a single large-scale evaluation study. *Evaluation Review, 9*(5), 627-643.
Sivesind, K. H. (1999). Structured, qualitative comparison: between singularity and single-dimensionality. *Quality and Quantity, 33*, 361-380.
Smith, A. G., & Robbins, A. E. (1982). Structured ethnography: The study of parental involvement. *American Behavioural Scientist, 26*(1), 45-61.
Smith, M. L. (1997). Mixing and matching: Methods and models. In J. C. Greene, & V. J. Caracelli (Eds), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms* (pp. 73-86). San Francisco: Jossey-Bass.
Stake, R. E. (1994). Case studies. in N. K. Denzin, & Y. S. Lincoln (Eds), *Handbook of qualitative research* (First ed., pp. 236-247). Thousand Oaks, CA: Sage.
Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.