Integrative Analysis Strategies for Mixed Data Sources

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Abstract

The approach taken to integration of diverse data sources and analytical approaches in mixed methods studies is a crucial feature of those studies. Models of integration in analysis range from discussing separately generated results from different components or phases of a study together as part of the conclusion, through synthesis of data from these different components, to combination of data sources or conversion of data types to build a blended set of results. While different models of integration are appropriate for different research settings and purposes, an overcautious approach to integration can generate invalid or weakened conclusions through a failure to consider all available information together. Strategies for making the most of opportunities to integrate process and variable data in analysis to build strong and useful conclusions are identified and illustrated through reference to a variety of mixed methods studies, including several with a focus on transition to school.

Sitting somewhere in between the complex methodological challenges presented by major investigative or evaluative projects and the inventive excitement of new methods and new technologies are the kind of 'everyday' research and evaluation studies that will occupy many of those engaged in behavioral and educational research. For example, in her doctoral research, Catherine Kaplun is investigating the experience of transition to school for 118 families from a disadvantaged area by looking at the interplay of parental, child and school attitudes and expectations during the transition process. These families had been part of a randomized-control trial examining the benefits of sustained home visiting by community-based, early-childhood nurses during the first two years of the child's life. As the children in the trial have now reached school age, the second question Kaplun is examining is whether benefits of early family intervention (which were most evident for anxious and/or culturally diverse mothers) have been sustained over the intervening three years, to impact on successful adjustment to school. Data for this mixed-method study include statistical data on developmental history; group assignment; pre- and post-transition interviews with parents and children; rating scales, and responses to an open-ended question from teachers; performance assessments; and children's prior-to-school and post-school-start drawings.

Those engaged in larger projects, too, can find themselves unexpectedly grappling with issues raised by having varied data sources. The questions on which they focus in their studies and the need for evidence that satisfies a variety of stakeholders drives them increasingly toward employing an integrated approach to their analysis. Such was the experience of Weiss, Kreider, Mayer, Hencke, and Vaughan (2005) when several of their qualitative sources, including teacher interviews, parent interviews, and case study observations, consistently pointed to the relevance of parents' work life for the adjustment of their children in early school years. This became an issue they could not avoid and, in working through it in the context of welfare reform leading to the entry of many low income

mothers into the workforce, these researchers wanted to be able to impact on policy as well as educational debates. They therefore decided to combine their qualitative case study data with statistical data in an iterative process such that mixing and integration of the data sets occurred throughout further analysis.

Integration in Mixed Methods Studies

All behavioral data analysis requires a combination of empiricism and interpretation, and it can be argued that both 'quantitative' and 'qualitative' approaches, components, data, and/or strategies for analysis are necessary to adequately understand human behavior, whether individual, group or societal. This is particularly the case where process is to be understood as well as outcome (Chatterji, 2004; Maxwell, 2004). While combination of *multiple methods* has a long history in evaluation and sociological research (Brewer & Hunter, 2006; Rallis & Rossman, 2003), *mixing methods*, particularly integration during data analysis, has a lesser history.

Many mixed methods researchers report difficulty, however, in "bringing together the analysis and interpretation of the quantitative and the qualitative data and [in] writing a narrative that linked the analyses and interpretations" (Bryman, 2007, p. 10). This is reflected in publication of separate results for different components of a study, a problem that is aggravated by journal publishing limitations (O'Cathain, Murphy, & Nicholl, 2007). Combination during data gathering and analysis, prior to drawing conclusions, recognizes the not-easily classified diversity of approaches one can take to investigating a problem, the benefits of having different but mutually informing data types, and the scope for new ways of exploring an experience or issue that become possible when data are combined or converted from one form to another.

My approach to integration recognizes "the reality that there can be many different 'mixes' or combinations of methods" (Yin, 2006, p. 41) and rejects a clear differentiation between 'qualitative' and 'quantitative' methods or approaches to research (Bergman, 2008). Thus, to define integration in mixed methods research:

> Integration can be said to occur to the extent that different data elements and various strategies for analysis of those elements are combined throughout a study in such a way as to become interdependent in reaching a common theoretical or research goal, thereby producing findings that are greater than the sum of the parts. (Bazeley, 2010a, p.432)

Integrative mixed methods analysis strategies will be considered here in five groups:

- Those that integrate results from analyses of separate data components;
- Those where one form of data informs the design or analysis of another;
- Those that integrate multiple data components or sources during the process of analysis;
- Those where the data invite integration of more than one strategy for analysis; and
- Those where methods are 'inherently mixed'.

Integrating Results From Analyses of Separate Data Components

Weiss et al. (2005) designed their study of families and children's educational development to use mixed data sources in the belief that mixing methods added value: "This approach can, among other things, enhance validity through data triangulation, delineate overlapping but distinct aspects of a phenomenon, elaborate one set of findings with data from another, expand potential findings, and uncover paradoxes and contradictions between results based on different methods" (p.50).

The most common form of mixed methods studies similarly involves the use of different data components, comprising separate sources with different types of data or

different types of data from within the same source, to complement or extend what might be learned from one or other of those data types independently. These different data are often selected on the understanding that they have complementary strengths and non-overlapping weaknesses, and thus in the expectation that combining them will generate stronger outcomes, that is, outcomes that are better supported by evidence, or more generalizable, or both (Johnson & Onweugbuzie, 2004). This strategy for mixing methods might be thoroughly planned, but often, also, it arises in situations (such as evaluation studies) where the investigator is seeking to gather whatever information might be available from whatever source, as long as it addresses the topic. Data might be obtained, for example, through survey instruments that combine closed and open questions, or when questionnaires or other quantitative sources are combined with interview, visual, documentary, web-based, or observational data, or any combination of these.

The actual strategy for bringing the different data components together varies depending on the purpose of the study, and on the timing and sequencing of the methods used. Data from each component is usually analyzed separately first, using 'regular' text analysis, statistical or alternative methods (Creswell & Plano Clark, 2007). At the simplest level, illustrative quotes from the open ended or interview data are used to complement or supplement (i.e., sprinkled through or tacked onto) reports of statistically-analyzed responses. Using quoted comments to illustrate can assist in communicating statistical results (Mark, Feller, & Button, 1997), but this type of integration strategy is quite limited.

Integration using different but complementary sources best occurs at the stage where results are being composed, well before the final conclusions are made (Bazeley & Kemp, 2011). Reporting then reflects the input of both methods throughout, and in these circumstances is best arranged by the issue or aspect of the topic being discussed, rather than the source of the data.

Arksey (2003) and Barlow, Wright and Wright (2003) each used interviews with a variety of stakeholders to complement outcome data from surveys when they evaluated (different) projects designed to assist people with a disability or a disabling chronic condition into employment. Small-scale evaluation studies such as these, where sample size is limited, especially benefit from the use of complementary data sources. While Barlow et al.'s article demonstrated a common problem of reporting the statistical results first, followed by a simple thematic analysis of qualitative data (with its status as 'mixed methods' being open to challenge), Arksey used her complementary sources more effectively by integrating them, along with occasional references to other literature, throughout her report to show both *how often* and *how* different aspects of the program being evaluated helped both people with a disability and/or their carers.

The practice of employing mixed data sources in evaluation studies is increasingly being applied also in experimental research and randomized control trials. As the course of an intervention or experiment is traced and experience of those involved is assessed, understanding of *how* the intervention might be contributing to the outcomes can be integrated with knowledge of *what* that outcome is. Thus, in both evaluation studies and experimental trials, analysis of these multiple data sources extends understanding of the processes leading to effectiveness (or otherwise) of an intervention and potentially contributes to explaining causal pathways.

The Miller Early Childhood Sustained Home-visiting project (MECSH) being conducted in a low-income, south-west Sydney housing estate, the trial for which Kaplun's study of transition to school is a follow-up, is one such project. In this randomized control trial to test the efficacy of an early-childhood, nurse-based, sustained home-visiting program for families at risk, families and children are being regularly assessed using standardized quantitative instruments (Kemp, Harris, McMahon, Matthew, Graham, et al., 2008). In

addition, records are being kept of the activities and interventions the nurses engage in each time they visit, and observational data of mother-child interactions are recorded. Analysis of the particular competencies that are needed by the nurses for this kind of intervention (Kemp, Anderson, Travaglia, & Harris, 2005) and of the processes involved in generating the measurable outcomes (to come) extend the value of the study well beyond simply being able to report how well it worked and for whom, to why and how it worked. For example, mothers in the intervention group, unlike those in the control group, had learned to develop strategies for working toward their goals. When mothers were asked about their hopes and dreams for their children, those in the control group were likely simply to indicate that they wanted their child to be happy, or perhaps to be a sports star (as a 'miraculous' way of escaping poverty), but when those in the intervention group talked about their child being successful or happy, they also talked about their having a good education or job—"not like me"—in order to experience success.

Dealing With Divergent Findings

Inconsistent results that arise when different data sources are used can point to either (or both) methodological or substantive issues in the data (Mathison, 1988). These are issues that will need to be resolved by further analysis of the existing data, through adding additional data, or by setting up a new study to explore new puzzles or test new hypotheses.

When Weiss et al. (2005) investigated family involvement in school, they found divergent evidence coming from mothers and teachers. Parents reported a range of ways they connected with the school through survey responses, and working mothers talked about their involvement in their child's schooling that occurred either despite working or even because they were working, yet surveyed teachers and principals cited mothers' work schedules as more problematic than anything else in limiting family involvement in the school. Because

the numbers and the text told different stories about an issue that would not go away, they set about 'dredging up' any available evidence to further investigate it. They used their qualitative case study data, in combination with open-ended survey data, to discover and then demonstrate how parents were more involved than teachers gave them credit for, in ways that were not unanticipated by teachers. By combining data from the different people and sources, they were able to refine and extend what they had learned from their original analyses by clarifying the conditions that best facilitated or inhibited involvement in school, including the unexpected and inventive ways in which working parents saw their work as facilitating their children's education through the mother's "managing time and space". Parents spoke of their child's use of a computer in the workplace; of how they gained educational information from clients; and of negotiating more flexible times for parent-teacher interviews. Categories used in early analyses to code open-ended survey responses had obscured the workplace as a possible site for parental involvement in their child's education. The open-ended and case study data therefore expanded on and complemented the findings from the statistical data, and helped to explain some of the anomalies they had found. Later iterations of statistical data collection were redesigned to include questions that addressed this emergent issue of the impact of mothers' work and working on involvement in their children's education and learning.

Using one form of data to inform the design or analysis of another

When one approach to data gathering and analysis is used as a tool in the development of another, analyses of the different components are typically sequenced and separate, with integration occurring through the results of the first method being used to inform the design of the second (Greene, Caracelli & Graham, 1989). This development strategy is most often found when the *design* of a quantitative instrument is based on analysis

of qualitative interview or focus group data, but also when a survey or quantitative study is used to identify either a sample or particular issues to be investigated qualitatively. Many of those using this technique limit its value adding capacity by ignoring their qualitative data once they have developed a quantitative instrument.

Guiding the *analysis* of a set of data using the methods or results of an earlier or alternative approach, was also identified as an integrative strategy by Caracelli and Greene (1993). Dockett and Perry (2004) used an 8-category typology of perceptions about starting school that was developed and confirmed in their earlier questionnaire-based studies to code further children's interviews as well as data from an open-ended survey question of parents and teachers about having a child start school.

In a rather innovative approach, Jang, McDougall, Pollon, Herbert, and Russell (2008) used qualitative themes to reorganize the items contributing to factors in their survey of successful schools. They found that while the new factors were not so internally consistent as the original statistically derived ones, they were better able to capture the dynamics of the interplay between community factors and school success.

Integrating Multiple Data Components *During* Analysis

When opportunities to exploit multiple data components are not taken up during analysis, this can work to the detriment of the study's conclusions. Often, focus group data used to generate survey questions are ignored once the statistical data are in, data from different components or sources are separately presented, or are combined post initial analyses. "Creative and at times even playful meshing" is needed "to encourage serendipity and openness to new ideas" (Brewer & Hunter, 2006, p.69). Integrating data *during* analysis occurs when a particular analysis strategy relies on more than one source or form of data.

Comparative analysis is one way to combine data during analysis that can be achieved relatively simply using a hand-drawn table or using computer software. Thus, for example, in an ethnographic study to look at the impact of staffing on quality of care, analyzed by hand, columns would be drawn to record information about each criterion assessing quality of care, with rows for each facility ordered, say, by the number of available staff, and cells containing a summary statement about each criterion of care, to allow an assessment of the overall impact of variation in staff numbers on care (*cf*. Miles & Huberman, 1994). The use of a spreadsheet to record a matrix with a row for each institution being considered would facilitate consideration of a range of staffing variables. With additional columns created to record each staffing variable for each care facility, rows could be sorted by each in turn, and thus patterns across the care criteria could be assessed for each value of the staffing variable currently being considered.

The advent of computer software for working with qualitative data (such as NVivo, MAXQDA or QDA Miner) has meant that coding for qualitative content no longer needs to be to predetermined categories. Qualitative data can be linked, on an individual case basis, with demographic or other source attributes, also categorical responses or scaled variables. Thus comparative analyses of coded (qualitative) data in relation to quantitative variables are not only less time consuming to conduct, but they can be extended and refined to include a wider range of within-case and cross-case analyses (Bazeley, 2006; 2010a). Results from the comparative, matrix-building process provide both numeric data (*how many* from each category talk about this?) as well as access to the text supporting each cell in the table of the matrix (*how* do they compare in what they say?). Results can also be displayed visually.

In their Australian Starting School Project, Dockett and Perry (2004) compared both frequency and content of open-ended responses across their large sample of teachers, parents, and children for their eight categories of concern about starting school. They found that both

teachers and parents prioritized adjustment concerns ahead of disposition (attitudes and emotions), while children focused more on disposition and having to follow rules (explicit expectations). While parents' and teachers' concerns about adjustment were similar in focus to children's concerns about rules, they differed in expression. Teachers' wanted children to be able to operate as part of a group and follow directions. Parents were concerned about their children fitting in and not standing out. Children expressed similar concerns to these, but in terms of rules that had to be known and followed, with consequences if you didn't comply.

In Kaplun's study following up children from families who received home visiting, as well as for changes from pre- to post-transition for each of the intervention and control groups, experiences and issues discussed by individual children and their parents and items drawn by the children are being considered in relation to measures of their intelligence and school performance, scores on the strengths and difficulties questionnaire, and responses to various survey questions.

Exploring Deviant or Extreme Cases

These kinds of techniques often point to anomalous cases—those that don't 'fit' the overall patterns in the comparative analysis. These are explored further, to better understand the dynamics of the situation. Extreme cases might also be deliberately selected (e.g., those that are statistical outliers, or have high residuals from regression analysis) for further exploration (Caracelli & Greene, 1993; Fry, Chantavanich, & Chantavanich, 1981). Alternative data sources are considered from the point of view of seeking confirming or disconfirming evidence, with the likely outcome of modifying the original conclusions or study design to account for the additional insights gained.

Integration of more than one strategy for analysis

In an integrated dual analytic approach, data might be analyzed in one form, and then manipulated into a different form to allow an alternative approach, with both approaches making necessary contributions to the resulting interpretation of the data. Sometimes this involves 'qualitizing' numeric data; more often it involves 'quantitizing' qualitative coding for inclusion in a statistical database.

Qualitizing Numeric Data

At its simplest level, qualitizing data might comprise profiling a sample, or members of it, using word categories based on demographic information, perhaps supplemented by average scores or other measures. Groups from within a population can be identified and profiled using cluster or factor analyses (Teddlie & Tashakkori, 2009). Data with a temporal or longitudinal component, including cohort studies, large scale prospective panel surveys, and retrospective surveys have narrative potential (Elliott, 2005). Event histories involving detailed descriptions of sequences and patterns profiling individuals or groups can be built from statistical analysis of these sources (Blossfeld, Golsh, & Rohwer, 2007).

Weiss et al. (2005) report using factor analysis as a data reduction strategy to combine a number of variables into a measure of school involvement that was able to be used for statistical analyses for data from the mothers in their study. They then qualitized this measure for descriptive purposes by dividing the measures obtained into quartiles reflecting low, modest, moderate, and high levels of involvement. This also facilitated its combination with qualitative data.

Quantitizing Qualitative Data

Survey researchers have always quantitized qualitative data, without thinking about it as a mixed method. Respondents may themselves transform their thoughts or experiences to a numeric code as they fill in a scale to answer a question; an interviewer might immediately convert what is said to a numeric code during data collection; or, open-ended responses are converted to numeric code as part of the analysis process (Louis, 1982).

Simple counts of codes, instances, themes or patterns in the data are used to complement findings from qualitative data. Thus, for a sample of post-transition interviews, Kaplun was able to use frequencies to demonstrate that parents talked often about both the academic and the physical (sport and play) activities that their children engaged in at school, while cultural/artistic activities were mentioned only rarely.

The presence or absence of a code in qualitative data can be recorded mathematically as a dichotomous (0,1) variable, as a continuous variable representing the number of times it appears in the interview, or as the volume of text coded (Sandelowski, Voils & Knafl, 2009; Bazeley, 2010a). This information is then recorded in or transferred to a spreadsheet or database for statistical processing. Bryans (2004) found it useful, for example, when analyzing comparable simulated home visits to clients by 15 health visitors, to deal with 'considerable' variations in the length of discussion of various issues by weighting the coded excerpts on a scale of 1-to-3 (representing variation from single statements to lengthy exchanges), making it possible for her "to identify dominant and recurring issues within the simulated visits" (p. 627). Bazeley (2010b) used cross-tabulated counts generated using qualitative software as one of several tools that helped develop and refine an inductively-derived concept of research performance.

Quantitizing qualitative data is not an end in itself, but "a means of making available techniques which add power and sensitivity to individual judgment when one attempts to

detect and describe patterning in a set of observations" (Weinstein & Tamur, 1978, p. 140). It can serve a number of purposes:

- It can facilitate merging and comparison of different data sources (Happ, DeVito Dabbs, Tate, Hricik, & Erlen, 2006);

- Assuming adequate sample size, qualitative or mixed sources of data can be employed in exploratory, predictive or confirmatory statistical analyses (Bazeley 2010a).

Data extracted from a qualitative database for statistical analysis can be arranged as a case-by-variable table. Assuming an adequate sample size, this can be analysed using bivariate and multivariate statistical procedures (including hypothesis-testing, predictive, explanatory or exploratory techniques). Alternatively, matrix data can be derived by cross-tabulating two sets of codes that co-occur within the same context (such as a set of issues by a set of responses), a set of codes with variable data (e.g., issues sorted by phase of development), or by creating a (reflected) similarity matrix in which a set of codes is cross-tabulated with the same set of codes when they co-occur in the same context. Exploratory multivariate analyses such as cluster analysis, correspondence analysis or multidimensional scaling can be used with data of these types. These nonparametric and exploratory multivariate techniques make fewer assumptions about the data (e.g., linearity, normality) than do regression-based techniques of analysis. Use of a computer for these types of analyses (including for generating and exporting the qualitative codes) is generally essential.

Integration using methods that are 'inherently mixed'

The term 'inherently mixed' was coined by Teddlie & Tashakkori (2009, p. 273) to describe studies in which the same data source provided both qualitative and quantitative information designed to answer interlinked questions.

Inherently mixed approaches include those where results are obtained from qualitative comparative analysis (Rihoux & Ragin, 2009), when using a repertory grid technique (Fransella, Bell, & Bannister, 2003), social network analysis (Scott, 2000), the social application of geographic information systems (Cope & Elwood, 2009), or from a range of other strategies for working visually (Dickinson, 2010).

Qualitative Comparative Analysis (QCA)

Weiss et al. (2005) found they had just 21 case studies in which mothers were working, resulting in limited opportunity for standard statistical analysis being possible through conversion of qualitative to quantitative coding. Because of sample attrition over the six year span of study involvement for the sample of families she is concerned with, Kaplun also will have limited opportunity to use regression or other probability based techniques that assume large samples and normal distributions. Qualitative comparative analysis provides an approach to causal analysis (or exploring relationships between variables) that is appropriate for use with a small- to medium-*N* sample (Rihoux & Ragin, 2009). In this approach, up to seven variables can be considered concurrently, in relation to the presence or absence of an outcome variable. A truth table is built from (usually although not necessarily dichotomized) qualitative and/or quantitative data, to show all possible configurations of those variables. This is then analyzed algebraically (rather than statistically) to generate one or more statements that identify various conjunctions of sufficient conditions for the outcome to have occurred.

Repertory Grid and Other Scale Development Techniques

Based on the personal construct theory of George Kelly, application of the repertory grid technique involves asking participants to make multiple comparisons between sets of three elements, identifying ways in which two are alike but different from the third. The

dimensional constructs generated by the participant are then used to rate each element (Fransella et al., 2003). Constructs so elicited reflect the way in which the participant construes the topic of interest, while the ratings can be analyzed statistically (using cluster or factor analysis) to identify a broader dimensional structure.

The idea of generating items from participants that are then rated by those participants as a basis for exploratory, visual, and/or statistical analyses lies at the basis of a number of methods, often developed initially for particular purposes but capable of being employed in wider mixed methods settings. These include, for example, concept evaluation as described by Kane and Trochim (2007), 'interactive qualitative analysis' (Northcutt & McCoy, 2004), and use of Q-methodology (Newman & Ramlo, 2010). Visual displays (e.g., reflecting the results of multidimensional scaling) often play a significant role in interpreting results from these various techniques.

Social Network Analysis

Social network analysis focuses on the ties between units (usually but not necessarily people) in a defined population. Analysis typically involves generating a visual display of the linkages, along with mathematical measures reflecting network or member characteristics such as centrality, density, connectivity, cliques, isolates and bridging members (Hanneman & Riddle, 2005; Scott, 2000). The visual display, potentially supplemented by qualitative data gathered when linkages were being recorded, aids considerably in interpreting the mathematical indices generated by the analysis. Social network analysis and a range of derivative techniques are being used, for example, to ascertain the level and type of social capital present within networks through exploring their bonding and brokerage linkages (Prell, 2009; Prell & Skvoretz, 2008).

Geographic Information Systems (GIS)

Qualitative, quantitative, and visual data reflecting the social and/or physical environment can be combined with locational information using GIS software (Cope & Elwood, 2009; Knigge & Cope, 2006). Different types or sources of information or changes over time are compared on a series of maps or are overlaid on the same map, contributing to analyses of those social relations that are related to environment, distance or travel.

Arguing that size, concentration and accessibility of services all need to be taken into account by policy makers when allocating resources in a country like Australia, Hugo (2001) created the Accessibility/Remoteness Index of Australia (ARIA) The ARIA is based on a measure of personal distance (population density for each square kilometer), combined with road distances from all populated areas to urban centers of 10-, 20- and 100-thousand people, and a capital city. The GIS databases which provide the foundation for the measures include transport networks, populated localities and population centers, and services; GIS databases showing ARIA values are also used to demonstrate remoteness in relation to particular services, as needed by policymakers (or those applying for Federal funding to develop services).

Iterative and Longitudinal Inquiries

Weiss et al. (2005, p.56) describe the "interactive, back-and-forth exchanges and turn-taking" of their quantitative and qualitative methodologies as they pursued their inquiry. In the context of educational evaluation, Chatterji (2004) argues that to make causal inferences about the value of a program, it is necessary for outcome data to be set within the longitudinal historical, social, and policy context of the program. Particular methods employed for data collection and analyses will vary, depending on the stage of implementation of the program.

Greene (2007) has suggested that the dialectical nature of mixing traditions was a powerful tool for the initiation of new ways of thinking. Iterative movement back and forth between types of data and methods of analysis are often a feature of larger or longitudinal projects, during which time, as each draws on and in turn informs another, the boundaries between methods become increasingly clouded.

Conclusion

Through their experience, Weiss et al. "learned that mixed-methods approaches could only be rough guides and that intentional designs might have to give way to real-world problems of data availability and deadlines. Accordingly [they] developed a sense of [their] mixed-methods work as a dynamic hands-on process, guided only very generally by mixed-methods analytic models" (2005, p. 61). This release from predetermined design constraints fostered added creativity and flexibility in their analysis, and yielded valuable contributions for developing policies that could "support the articulation between work and school systems" (p. 62).

It is evident from the examples given that many of the methods outlined are not independent of others, and that any one study is likely to embrace within it a range of these approaches. By the same token, nor are the categories I have used to classify strategies mutually exclusive. Mixed methods data analysis is inherently messy and still largely experimental. In reading the mixed methods literature one is continually stimulated by innovative new ways of combining methods to work with data. Flexibility and pragmatism about design, openness to data and a touch of inventiveness in approach to analysis are invaluable assets for the mixed methods researcher. My primary concern is that researchers fully exploit the integrative potential of their data, as they seek to answer the questions they have posed.

References

Arksey, H. (2003). People into employment: supporting people with disabilities and careers into work. *Health and Social Care in the Community, 11*(3), 283-292.

Barlow, J. H., Wright, C. C., & Wright, S. (2003). Development of job-seeking ability in people with arthritis: evaluation of a pilot program. *International Journal of Rehabilitation Research, 26*(4), 329-333.

Bazeley, P. (2006). The contribution of computer software to integrating qualitative and quantitative data and analyses. *Research in the Schools, 13*(1), 63-73.

Bazeley, P. (2010a). Computer assisted integration of mixed methods data sources and analyses. In C. Teddlie & A. Tashakkori (Eds.), *Handbook of mixed methods research for the social and behavioral sciences* (2nd ed.) (pp. 431-467). Thousand Oaks, CA: Sage.

Bazeley, P. (2010b). Conceptualising research performance. *Studies in Higher Education, 35*(8), 889-903.

Bazeley, P. & Kemp, L. (2011). Mosaics, triangles and DNA: metaphors for integrated analysis in mixed methods research. *Journal of Mixed Methods Research* (DOI: 10.1177/1558689811419514).

Bergman, M. M. (2008). The straw men of the qualitative-quantitative divide and their influence on mixed methods research. In M. M. Bergman (Ed.), *Advances in mixed methods research* (pp. 11-21). London: Sage.

Blossfeld, H.-P., Glosch, K., & Rohwer, G. (2007). *Event history analysis with Stata*. Mahwah, NJ: Lawrence Erlbaum Associates.

Brewer, J., & Hunter, A. (2006). *Foundations of multimethod research: synthesizing styles.* (2nd ed.). Thousand Oaks, CA: Sage.

Bryans, A. N. (2004). Examining health visiting expertise: combining simulation, interview and observation. *Journal of Advanced Nursing, 47*(6), 623-630.

Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research, 1*(1), 8-22.

Caracelli, V. J., & Greene, J. C. (1993). Data analysis strategies for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 15*(2), 195-207.

Chatterji, M. (2004). Evidence on "What Works": an argument for extended-term mixed-method (ETMM) evaluation designs. *Educational Researcher, 33*(9), 3-13.

Cope, M., & Elwood, S. (2009). *Qualitative GIS: a mixed methods approach.* Thousand Oaks, CA: Sage.

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.

Dickinson, W. B. (2010). Visual displays for mixed methods findings. In C. Teddlie & A. Tashakkori (Eds.), *Handbook of mixed methods in social and behavioral research* (2nd ed.) (pp. 469-504). Thousand Oaks, CA: Sage.

Dockett, S., & Perry, B. (2004). Starting school: perspectives of Australian children, parents and educators. *Journal of Early Childhood Research, 2*, 171-189.

Elliott, J. (2005). *Using narrative in social research: qualitative and quantitative approaches*. London: Sage.

Fransella, F., Bell, R., & Bannister, D. (2003). *A manual for repertory grid technique* (2nd ed.). Chichester, UK: Wiley.

Fry, G., Chantavanich, S., & Chantavanich, A. (1981). Merging quantitative and qualitative research techniques: Toward a new research paradigm. *Anthropology and Education Quarterly, 12*(2), 145-158.

Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass (Wiley).

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.

Hanneman, R. A. & Riddle, M. (2005). *Introduction to social network methods.* Riverside, CA: University of California, Riverside (published in digital form at http://faculty.ucr.edu/~hanneman/)

Happ, M. B., DeVito Dabbs, A., Tate, J., Hricik, A., & Erlen, J. (2006). Exemplars of mixed methods data combination and analysis. *Nursing Research, 55*(2, Supplement 1), S43-S49.

Hugo, G. (2001). *Using GIS based accessibility indicators in non-metropolitan Australia*. Annual conference, Australian Association for Social Research, 18-19th May, Wollongong, NSW.

Jang, E. E., McDougall, D. E., Pollon, D., Herbert, M., & Russell, P. (2008). Integrative mixed methods data analytic strategies in research on school success in challenging circumstances. *Journal of Mixed Methods Research, 2*(3), 221-247.

Johnson, R. B., & Onweugbuzie, A., J. (2004). Mixed methods research: a research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Kane, M., & Trochim, W. M. K. (2007). *Concept mapping for planning and evaluation*. Thousand Oaks, CA: Sage.

Kaplun, C. (in progress). School transition for families and children in an area of social disadvantage. PhD thesis, Charles Sturt University, Albury NSW, Australia.

Kemp, L., Anderson, T., Travaglia, J., & Harris, E. (2005). Sustained nurse home visiting in early childhood: exploring Australian nursing competencies. *Public Health Nursing,* 22(3)**,** 254-259.

Kemp, L., Harris, E., McMahon, C., Matthew, S., Vimpani, G., Anderson, T., & Schmied, V. (2008). Miller Early Childhood Sustained Home-visiting (MECSH) trial: design, method and sample description. *BMC Public Health, 8*, 424.

Knigge, L., & Cope, M. (2006). Grounded visualization: integrating the analysis of qualitative and quantitative data through grounded theory and visualization. *Environment and Planning A, 38*, 2021-2037.

Louis, K. S. (1982). Multisite/multimethod studies. *American Behavioral Scientist, 26*(1), 6-22.

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.

Maxwell, J. A. (2004). Causal explanation, qualitative research, and scientific inquiry in education. *Educational Researcher, 33*(2), 3-11.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: an expanded sourcebook*. Thousand Oaks, CA: Sage.

Newman, I., & Ramlo, S. E. (2010). Use of two multivariate techniques, Q methodology and Q factor analysis, to facilitate interpretation of mixed methods research. In C. Teddlie & A. Tashakkori (Eds.), *Handbook of mixed methods in social and behavioral research* (2nd ed.) (pp. 505-530). Thousand Oaks, CA: Sage.

Northcutt, N., & McCoy, D. (2004). *Interactive qualitative analysis: a systems method for qualitative research*. Thousand Oaks, CA: Sage.

O'Cathain, A., Murphy, E., & Nicholl, J. (2007). Integration and publications as indicators of "yield" from mixed methods studies. *Journal of Mixed Methods Research, 1*(2), 147-163.

Prell, C. (2009). Linking social capital to small-worlds: A look at local and network-level processes and structure. *Methodological Innovations Online, 4*, 8-17.

Prell, C., & Skvoretz, J. (2008). Looking at social capital through triad structures. *Connections, 28*(2), 1-13.

Rallis, S. F., & Rossman, G. B. (2003). Mixed methods in evaluation contexts: a pragmatic framework. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 491-512). Thousand Oaks, CA: Sage.

Rihoux, B., & Ragin, C. (Eds.). (2009). *Configurational comparative methods*. Los Angeles: Sage.

Sandelowski, M., Voils, C. I., & Knafl, G. (2009). On quantitizing. *Journal of Mixed Methods Research, 3*(3), 208-222.

Scott, J. (2000). *Social network analysis: a handbook*. London: Sage.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research*. Thousand Oaks, CA: Sage.

Weinstein, E. A., & Tamur, J. M. (1978). Meanings, purposes, and structural resources in social interaction. In J. G. Manis & B. N. Meltzer (Eds.), *Symbolic interaction* (3rd ed., pp. 138-140). Boston: Allyn & Bacon.

Weiss, H. B., Kreider, H., Mayer, E., Hencke, R., & Vaughan, M. A. (2005). Working it out: the chronicle of a mixed-methods analysis. In T. S. Weisner (Ed.), *Discovering successful pathways in children's development: mixed methods in the study of childhood and family life* (pp. 47-64). Chicago: Univeristy of Chicago Press.

Yin, R. K. (2006). Mixed methods research: Are the methods genuinely integrated or merely parallel? *Research in the Schools, 13*(1), 41-47.