

# Using Q Methodology in the Literature Review Process: A Mixed Research Approach

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## Abstract

Because of the mixed research-based nature of literature reviews, it is surprising, then, that insufficient information has been provided as to how reviewers can incorporate mixed research approaches into their literature reviews. Thus, in this article, we provide a mixed methods research approach—Q methodology—for analyzing information extracted from literature reviews. Specifically, after describing the history and characteristic of Q methodology, we show how this approach can be mapped onto the literature review process—a process that we call a Q Methodology Research Synthesis (QMRS). In particular, we outline the steps involved in a QMRS. We contend that our framework represents a first step in an attempt to help literature reviewers analyze and interpret information extracted from literature reviews in an optimally rigorous way.

**Keywords:** Q methodology, Q Methodology Research Synthesis, Literature review, Literature review process, Mixed methods research, Mixed research

## 1. Introduction

Conducting the literature review represents the most difficult component of the research process—regardless of the type of empirical research study represented (i.e., qualitative research study, quantitative research study, or mixed research study). Indeed, when conducting the literature review, researchers (i.e., literature reviewers) face numerous challenges. First, as noted by Onwuegbuzie and Frels (2016), when the goal of the literature review is to inform primary research, then the literature reviewer should conduct a series of literature reviews, as needed, throughout the conduct of the primary research. Specifically, the review of the literature can inform any or all of the 12 components of a primary research report: problem statement, literature review, theoretical/conceptual framework, research question(s), hypotheses, participants, instruments, procedures, analyses, interpretation of the findings, directions for future research, and implications for the field (Onwuegbuzie & Frels, 2016). Simply put, the literature review process does not end at the onset of the primary study. That is, the literature review typically should take place throughout the research process—that is, before, during, and after the primary research study (Onwuegbuzie & Frels, 2016). Therefore, with very few exceptions (e.g., grounded theory research; Glaser & Strauss, 1967), wherein some researchers argue against conducting an initial literature review before data collection (for an excellent discussion, see McGhee, Marland, & Atkinson, 2007), the literature review can be the most intense and time-consuming component of the research process, especially when the extant literature for the underlying topic is extensive.

A second challenge of the literature review process stems from the fact that it is not a linear process (Onwuegbuzie, Collins, Leech, Dellinger, & Jiao, 2010). Although the literature review typically precedes the primary research study in most instances, it is very common for researchers to oscillate between the primary research study and the extant information. This non-linearity adds complexity to the literature review process.

A third challenge is that literature reviews are not value neutral (Dellinger, 2005; Onwuegbuzie & Frels, 2012). Indeed, in *every* case, literature reviewers make a series of decisions such as what sources are used to inform the literature review, what literature is included and excluded, what literature is supported or criticized, and so on. Consequently, any given literature review can be framed in numerous ways that reflect the value system of the literature reviewer.

A fourth challenge is that a literature review involves much more than a *review of literature*, unlike its name (i.e., “literature review” or “review of the literature”) falsely suggests (Onwuegbuzie, Leech, & Collins, 2011). Indeed, as noted by Onwuegbuzie and Frels (2016), in addition to reviewing printed and digital published and unpublished literature, reviewers should consider extracting knowledge to inform their literature reviews via such means as formally or informally interviewing (e.g., via face-to-face, email, Skype) experts in the topic area and reviewing visual data (e.g., drawings, photographs, videos) or collecting data that represent digital text (e.g., via Web 2.0 platforms such as Facebook and Twitter). Reviewing information from these additional modes also increases the complexity of the literature review process.

A fifth challenge of the literature review stems from the use of the literature review as a methodology (Onwuegbuzie & Frels, 2016) because of its potential to have a “coherent foundation for inquiry with tightly interconnected logics of justification, positioning, procedures, and rationales” (Greene, 2006, p. 94). Indeed, supporting this contention is the fact that, optimally, the literature review process involves the collection, analysis, and interpretation of both qualitative and quantitative data (i.e., information)—regardless of whether the source of information represents a quantitative, qualitative, or mixed research study (Onwuegbuzie et al., 2010; Sandelowski, Voils, & Barroso, 2006). For instance, at the very least, the following elements of each empirical source that informs literature reviews—whether representing quantitative, qualitative, or mixed research studies—contain quantitative information:

- Sample size(s) pertaining to *every* quantitative, qualitative, and mixed research study selected for the literature review analysis and synthesis
- Findings (e.g., descriptive statistics, score reliability, *p* values, effect sizes, confidence interval, meta-analysis information) pertaining to each quantitative research study and mixed research study presented in the literature review section of the cited work
- Findings (e.g., descriptive statistics, score reliability, *p* values, effect sizes, confidence intervals, meta-analysis information) presented in the results section of each quantitative research study and mixed research study selected for the literature review.

Also, the following elements of the research study contain qualitative information:

- Information about the sample characteristics pertaining to *every* quantitative, qualitative, and mixed research study selected for the literature review analysis and synthesis
- Findings (e.g., codes, themes, meta-themes, metaphors, quotations, narrative) pertaining to each qualitative research study presented in the literature review section of the work cited
- Findings (e.g., themes, meta-themes, metaphors, quotations, narrative) presented in the results section of each qualitative research study or mixed research study selected for the literature review.
- Information from the discussion/conclusion section of *every* quantitative, qualitative, and mixed research study selected for the literature review.

Because of the array of quantitative and qualitative data that are potentially inherent in each work, *every* literature review lends itself simultaneously to the analysis of quantitative and qualitative information. Consequently, *every* literature review optimally involves using mixed research techniques (Onwuegbuzie et al., 2010; Onwuegbuzie & Frels, 2016). Simply put, analyzing and synthesizing both quantitative and qualitative information within the same literature review automatically renders the literature review process as a mixed research study (Onwuegbuzie et al., 2010). Indeed, with respect to the analysis of information, optimally, the reviewer should be competent in conducting quantitative-based (e.g., meta-analysis; Glass, 1976), qualitative-based (e.g., meta-synthesis; Sandelowski & Barroso, 2003), *and* mixed research-based (e.g., meta-summary; Sandelowski & Barroso, 2003) analyses.

Due to the mixed research-based nature of literature reviews, it is surprising, then, that although several authors have attempted to make the literature review process more warranted and transparent by providing a step-by-step guide to conducting literature reviews (i.e., Bettany-Saltikov, 2012; Combs, Bustamante, & Onwuegbuzie, 2010a, 2010b; Cronin, Ryan, & Coughlan, 2008; Dellinger & Leech, 2007; Fink, 2009; Garrard, 2009; Hart, 2005; Jesson, Matheson, & Lacey, 2011; Leech, Dellinger, Brannagan, & Tanaka, 2010; Machi & McEvoy, 2009; Onwuegbuzie et al., 2010; Onwuegbuzie & Frels, 2012, 2014; Onwuegbuzie, Leech, & Collins, 2012; Ridley, 2012), these authors have provided insufficient information as to how reviewers can incorporate mixed research approaches into their literature reviews. We have identified only seven frameworks, to date, that apply the principles of mixed research: (a) Whitemore and Knafl (2005), called *integrative review*; (b) Gaber (2000), called *meta-needs assessment*; (c) Harden and Thomas (2010), called *mixed methods synthesis*; (d) Sandelowski et al. (2006), called *mixed research synthesis*; (e) Pluye, Gagnon, Griffiths, and Johnson-Lafleur (2009), called *mixed studies review*; (f) Pawson, Greenhalgh, Harvey, and Walshe (2005), called *realist review*; and, most recently; (g) Onwuegbuzie et al. (2010), also called a mixed research synthesis. However, many more works of this type are needed. Thus, the purpose of this article is to provide a mixed methods research approach—specifically, Q methodology—for analyzing information extracted from literature reviews, which yields a process that we call a Q Methodology Research Synthesis (QMRS).

## 2. Theoretical Framework

Q methodology, which was developed in the mid 1930s by William Stephenson after he received a Ph.D. in both Physics and Psychology, involves examining correlations among participants across a set (i.e., sample) of variables that culminates in a reduction of the participants' many viewpoints to a few *factors*, which are assumed to represent shared feelings, beliefs, opinions, perspectives, or preferences (Newman & Ramlo, 2010) via any of the four sources of qualitative data identified by Leech and Onwuegbuzie (2008), namely: *talk* (i.e., data that are extracted directly from the voices of the participants using data collection techniques such as individual interviews and focus groups), *observations* (i.e., collection of data by systematically watching or perceiving one or more events, interactions, nonverbal communication in order to address or to inform one or more research questions), *images* (i.e., still [e.g., drawings, photographs] or moving [e.g., videos] visual data that are observed or perceived), and *documents* (i.e., collection of text that exists either in printed or digital form).

Because Q methodology involves the use of factor analysis, historically, it has been deemed as representing a quantitative research approach. However, because the study of subjectivity has been associated more with the qualitative research tradition, and because Q methodology typically involves the use of relatively small samples, recently, Q methodology has been reframed as representing a mixed methodology (Ernest, 2011; Newman & Ramlo, 2010), that involves “a successful combination of the two differing styles of research” (Ray & Montgomery, 2006, p. 3). Simply put, the qualitative component of Q methodology provides a forum for participants to express their subjective opinions and the quantitative component of Q methodology involves the use of factor analytic data reduction and induction to yield

insights regarding the formation of perceptions, opinions, and the like, as well as to generate testable hypotheses (Valenta & Wigger, 1997). Moreover, Q methodology “provides a way to investigate empirically how an individual, separately or as part of a group, thinks about a topic or issue of interest” (Durning, 2007, p. 1678) while, at the same time, retaining the individual’s point of view (McKeown & Thomas, 1988; Newman & Ramlo, 2010). As noted by Valenta and Wigger (1997), Q-methodology research emphasizes the qualitative *how* and *why* people think the way that they do; the methodology does not count *how many* people think a certain way. The goal of Q-methodology is, first and foremost, to uncover different patterns of thought (not their numerical distribution among the larger population) (p. 502).

### 3. Mapping Q Methodology onto the Literature Review Process: QMRS

An important part of the search process stage of the literature review process is for the reviewer to identify the experts of the underlying topic. Once these experts have been identified, they could be contacted by the reviewer and asked to participate in a Q methodology study. The first step of the Q (methodology) study would involve the development of a set of, say, 40 items (i.e., statements)—called the *concourse*—that evolve from a thorough analysis of the literature review information on the topic of interest. For example, this analysis could represent one or more of the 17 qualitative data analysis approaches identified by Onwuegbuzie et al. (2012) for analyzing and interpreting literature. Table 1 presents these 17 approaches. Typically, the number of concourse items ranges from 30 to 60 items.

Table 1. Possible qualitative analyses for research syntheses

Type of Analysis	Short Description of Analysis
Constant comparison analysis	Systematically reducing source(s) to codes inductively, then developing themes from the codes. These themes may become headings and subheadings in the literature review section.
Classical content analysis	Systematically reducing source(s) to codes deductively or inductively, then counting the number of codes.
Word count	Counting the total number of (key)words used or the number of times a particular word is used either during a within-study or between-study literature analysis.
Keywords-in-context	Identifying keywords and utilizing the surrounding words to understand the underlying meaning of the keyword in a source or across sources.
Domain analysis	Utilizing the relationships between symbols and referents to identify domains in a source(s).
Taxonomic analysis	Creating a classification system that categorizes the domains in a pictorial representation (e.g., flowchart) to help the literature reviewer understand the relationships among the domains.

Componential analysis	Using matrices and/or tables to discover the differences among the subcomponents of domains.
Theme analysis	Involves a search for relationships among domains, as well as a search for how these relationships are linked to the overall cultural context.
Discourse analysis	Selecting representative or unique segments of language use, such as several lines of an interview transcript involving a researcher, and then examining the selected lines in detail for rhetorical organization, variability, accountability, and positioning. This analysis is particularly useful when reviewing literature review sections of empirical articles, literature review articles, theoretical/conceptual articles, and methodological articles.
Secondary data analysis	Analyzing pre-existing sources or artifacts.
Membership categorization analysis	Examining how authors/researchers communicate research terms, concepts, findings, and categories in their works.
Semiotics	Using talk and text as systems of signs under the assumption that no meaning can be attached to a single term. This form of analysis shows how signs are interrelated for the purpose of creating and excluding specific meanings.
Manifest content analysis	Describing observed (i.e., manifest) aspects of communication via objective, systematic, and empirical means.
Qualitative comparative analysis	Systematically analyzing similarities and differences across sources, typically being used as a theory-building approach, allowing the reviewer to make connections among previously built categories, as well as to test and to develop the categories further. This analysis is particularly useful for assessing causality in findings across sources.
Narrative analysis	Considering the potential of stories to give meaning to research findings, and treating data as stories, enabling reviewers to reduce data to a summary.
Text mining	Analyzing naturally occurring text within multiple sources in order to discover and capture semantic information.
Micro-interlocutor analysis	Analyzing information stemming from one or more focus groups of researchers, scholars, or practitioners about which participant(s) responds to each question, the order that each participant responds, the characteristics of the response, the nonverbal communication used, and the like.

*Note.* Adapted from “Qualitative analysis techniques for the review of the literature,” by A. J. Onwuegbuzie, N. L. Leech, K. M. T. Collins, 2012, *The Qualitative Report*, 17(Art . 56), p. 12. Copyright 2012 by Anthony J. Onwuegbuzie, Nancy L. Leech, Kathleen M. T. Collins and Nova Southeastern University.

Now, let us assume that the reviewer developed 40 statements, which would represent what is called the Q sample. The goal of the Q sample is to provide a microcosm of the larger phenomenon of interest—that is, to provide statements that are representative of diverse opinions around a topic of interest. Then, the reviewer randomly assigns each of the 40 statements a number from 1 to 40. The Q participants (i.e., the selected experts) then are asked to sort (i.e., subjectively) each statement in comparison to the other statements along a continuum anchored by conceptually opposite ratings such as “most agree” to “most disagree,” “most like me” to “most unlike me,” or “most like my view” to “least like my view.” During this process of sorting, the reviewer places these 40 statements into a distribution that approximates the normal distribution that is represented by a grid (e.g., sorting the statements along a 9-point quasi-normal distribution from -4 to +4; cf. Figure 1). The Q participants then sort these 40 statements either face-to-face (if convenient for them) or via an online sorting format that involves the use of the free FlashQ program ([www.hackert.biz/flashq](http://www.hackert.biz/flashq)).

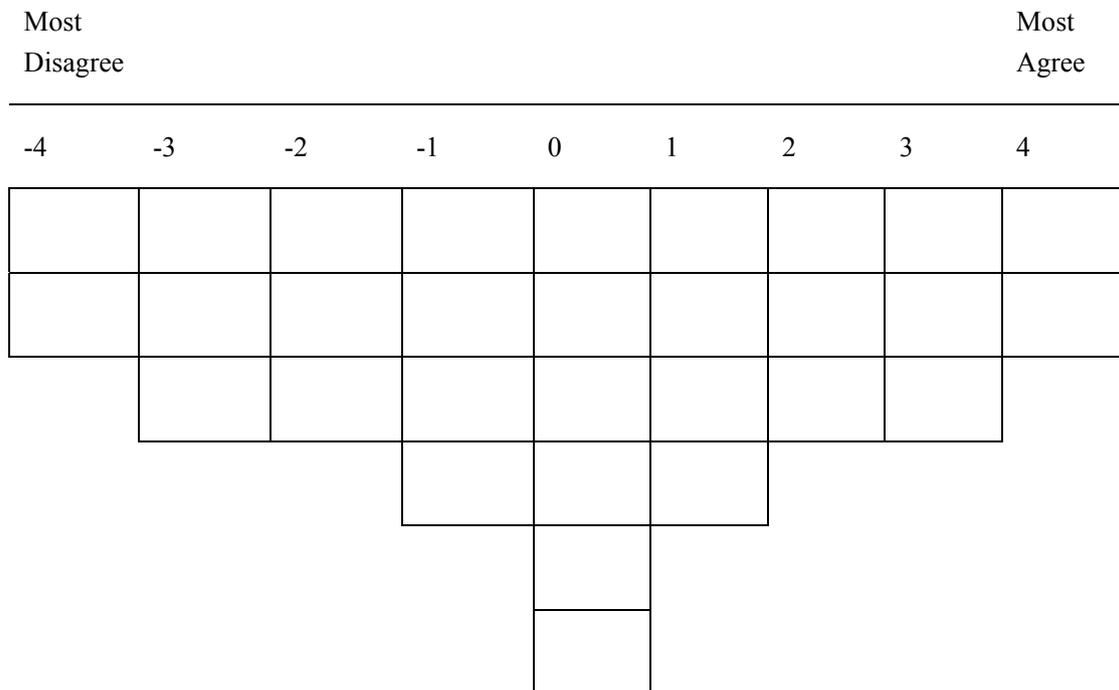


Figure 1. Example of a Q sort grid allowing participants to sort 30 statements into nine categories that range from “Most Disagree” to “Most Agree” that yield a quasi-normal forced distribution

At this stage of the Q methodology process, qualitative techniques (e.g., face-to-face/virtual interviews, face-to-face/virtual focus groups) can be used to understand the participants’ rationales for sorting the statements in order to facilitate the quality of inferences that the reviewer can derive from the Q methodology study. Once the statements are sorted by the participants, the reviewer then subjects the Q sorts to an exploratory-based factor analysis that involves factor extraction and factor rotation, which lead to the identification (i.e.,

*flagging*) of the experts who are represented by each factor, and which yield factor analyses and descriptions for each factor that only involve the experts who are flagged on that factor.

The reviewer can create one or more of the following four types of tables associated with Q methodology: (a) factor scores, (b) rank-ordered list of Q items (i.e., statements) alongside *z* scores to create a representative sort for each emergent factor, (c) the list of statements that distinguish each factor from other factors, and (d) the list of consensus statements that depict agreement among all the factors (Newman & Ramlo, 2010). Conveniently, the reviewer can use software programs that have been developed specifically to facilitate the Q sort analysis (e.g., PQ Method; Schmolck, 2002). These software programs allow the integration of quantitative and qualitative data (Newman & Ramlo, 2010). Thus, Q methodology involves conducting a mixed analysis (i.e., a mixing or combining of quantitative and qualitative analyses; Onwuegbuzie & Combs, 2010) to interpret the quantitative data generated by the factor analysis informed by qualitative data of the interrelationships among the statements, involving the search for themes (i.e., factors), with the goal of systematically identifying categories, connecting them, and searching for disconfirming evidence (Ernest, 2011).

Q methodology involves both quantitizing (e.g., converting statements to a quasi-normal distribution that subsequently is factor analyzed; Miles & Huberman, 1994; Onwuegbuzie & Teddlie, 2003; Sandelowski, Voils, & Knafl, 2009; Tashakkori & Teddlie, 1998) and qualitizing (e.g., forming narrative profiles (Tashakkori & Teddlie, 1998)) for each emergent factor) within the same analysis. Interestingly, Q methodology can be transformed to a mixed analysis to an even greater degree by conducting follow-up quantitative analyses (e.g., correlating the experts' views with other variables of interest (e.g., demographic variables)) and qualitative analyses (e.g., conducting and analyzing follow-up interviews/focus groups to confirm or to disconfirm inferences that emerge from the factor analysis). Thus, Q methodology represents an extremely powerful methodology for conducting a comprehensive and rigorous literature review via the use of experts.

#### **4. Heuristic Example of a QMRS**

As an illustration, we discuss our ongoing study of how *mixed methods research*, or what we call *mixed research* (cf. Johnson, Onwuegbuzie, & Turner, 2007), is defined in the literature. In what follows, we outline a seven-step process that consist of the four steps that have been undertaken and the three planned future steps that will comprise our Q methodology.

#### **5. Completed Q Methodology Steps**

*Step 1.* Our first step was to conduct a comprehensive review of the literature (e.g., articles, book chapters, books, dissertations and theses, monographs, encyclopedias, government documents, trade catalogues, legal and public records information) to identify the various ways that authors are defining *mixed methods research*. This search led us not only to locate an array of definitions but also to identify the authors whose definitions were being cited the most.

*Step 2.* The second step was to interview several of these well-cited authors to find out what their latest definitions of mixed methods research was. This notion of interviewing prolific

authors-researchers related to the underlying topic (i.e., *experts*) has been conceptualized by Onwuegbuzie and Frels (2016) as being one of the five broad ways of expanding a literature review search and ensuring that a comprehensive literature review takes place. As part of a mixed research study to document the challenges faced by instructors and students in mixed research courses (cf. Frels, Onwuegbuzie, Leech, & Collins, 2012), 11 leading mixed methodologists (i.e., *experts*) were asked about their preferred mixed methods research definition. Interestingly, a significant proportion of these mixed methodologists revealed that they utilize some or all of the definition developed by Johnson et al. (2007).

Johnson et al. (2007) asked 31 leading mixed methodologists to share their definitions of mixed methods research. A total of 19 of these mixed methodologists provided updated definitions. Using constant comparison analysis (Glaser & Strauss, 1967) to analyze these 19 definitions, Johnson et al. (2007) extracted themes, which subsequently they used to conceptualize an inclusive definition (i.e., *consensus*) of mixed research.

Because Johnson et al.'s (2007) article has been the most read and most cited article in the area of mixed research since it was published in 2007, with more than 2,000 citations at the time of writing this article, we decided to subject their definition, as well as those definitions provided by the 19 participants in their study, to a Q methodology. These definitions provided the *concourse*, or initial set of statements.

*Step 3.* Unitizing the aforementioned definitions appearing in Johnson et al.'s (2007) article yielded 30 statements that ensured comprehensiveness and representativeness with regard to the *concourse*. These 30 statements formed the Q sample. The content-related validity of the Q sample was maximized by leaving the statements in each mixed methodologist's own words, edited only slightly for grammar and readability.

*Step 4.* Each of these 30 statements was numbered randomly and printed on a separate index card to form a set of statements. This procedure was repeated multiple times in order to obtain several sets of statements such that each set was identical. Next, we identified the sample of *N* members whom we will ask to participate in the Q Sort phase of our study. Currently, we are seeking Institutional Review Board (IRB) approval to conduct the Q Sort phase. This participant sample is referred to as *person samples* or *P-sets*. The sample size will be sufficiently large "to establish the existence of a factor for purposes of comparing one factor with another" (Brown, 1980, p. 192)—specifically, that produce at least two or three Q sorts that are statistically significant via a factor analysis (Watts & Stenner, 2005).

## 6. Future Q Methodology Steps

*Step 5.* Once we receive IRB approval, our next step is to conduct the Q Sort phase. This phase will involve the participants expressing their subjectivity by modeling their viewpoints via the Q Sort. Specifically, these participants will be asked to rank order the Q sample stimuli (i.e., the mixed methods research definitions) according to what is called a *condition of interaction*, which will involve them sorting the Q statements (i.e., 30 statements) into nine categories that range from "Most Disagree" to "Most Agree"—which represent what is called a *forced-rank continuum* (see Figure 1)—in this case, from -4 (i.e., statements with which the

participants most disagree) to 4 (i.e., statements with which the participants most agree), with a neutral viewpoint being represented by 0. The Q sorts either will occur face-to-face or online via the free FlashQ program ([www.hackert.biz/flashq](http://www.hackert.biz/flashq)). This ranking of each of the 30 statement by the participants within a fixed distribution will result in them rating the relative *value* of each statement with respect to their personal viewpoints. The participants who conduct the Q sort under both conditions (i.e., face-to-face and online) also will be asked to type their rationales for their statement choices. For the majority of participants who are expected to conduct their Q sorts online, once completed, the FlashQ webhosting site will automatically email us their arrangements, alongside their rationale(s) for statement choices and demographic information.

*Step 6.* Once all arrangements from the Q sorts have been obtained, the analysis phase will begin. This analysis phase will involve intercorrelating the NQ (i.e. N x 30) sorts as variables and factor-analyzing the N x N correlation matrix, which “allows those of similar views to be grouped into factors” (Newman & Ramlo, 2010, p. 508). In other words, the factor analysis will identify patterns of viewpoints that emerge within and across the participants (McKeown & Thomas, 1988). PQMethod 2.11 (Schmolck, 2002), a free computer software program, will be used to conduct this analysis. Specifically, a principal component analysis will be used to conduct the analysis wherein the total variance of each statement will be used to assess the shared variation among the statements. Additionally, a varimax (i.e., an orthogonal) rotation will be employed. Correlations will be considered statistically significant at the 1% level if they are above  $\pm 2.58$  times the standard error, and statistically significant at the 5% level if they are above  $\pm 1.96$  times the standard error.

The factors (i.e., patterns) that will emerge are called subjective operants (McKeown & Thomas, 1988), and the participant’s association with these subjective operants will be characterized by the magnitude of the “pattern coefficients” and “structure coefficients.” Factor scores then will be computed for each factor, which will yield a parsimonious set of “composite Q sorts” called *factor arrays* (McKeown & Thomas, 1988, p. 6) that capture, via qualitative and quantitative analyses, the different viewpoints that are contained within the larger concourse (Ernest, 2011; McKeown & Thomas, 1988; Newman & Ramlo, 2010). Each factor array will represent a generalization of a subjective viewpoint regarding the definition of mixed methods research. The factor scores provide a quantitative way “to assess the significance of different statement locations within different factor arrays” (McKeown & Thomas, 1988, p. 6).

Prior to merging the Q sorts in order to generate the model factor array, factor weights will be calculated using the generated structure/pattern coefficients, on the basis that some sorts are closer statistically to one factor than another and, therefore, will receive a higher score. As recommended by McKeown and Thomas (1988), these scores initially will be calculated as z scores and subsequently converted to whole numbers (+4 to -4) to aid in the comparison of the factor array comparisons. As such, it is the weighted statements that will be used to interpret the factors.

As part of the analysis, we will arrive at a list of statements that distinguish each factor from

other factors. In additions, we will create a table of consensus statements that depict agreement among all the factors (Newman & Ramlo, 2010). In Q methodology, consensus statements are “statements that are similar across the various factors based upon statistical analyses” (Ramlo, 2011, p. 33). Our consensus table will reveal where consensus exists among pairs of factors (i.e., viewpoints).

*Step 7.* In addition to conducting the Q sorts, each participant will be asked to take part in an interview (i.e., post-sort interview) so that they could explain their sorting arrangement choices, especially the highest and lowest rankings in their Q sorts. These interviews will occur face-to-face or virtually (e.g., Skype, GoToMeeting) such that both verbal and nonverbal data can be collected (cf. Denham & Onwuegbuzie, 2013; Onwuegbuzie & Byers, 2014). Further, a second post-sort interview will be conducted on key informants, who are represented by participants whose structure/pattern coefficients are the highest and, thus, will be considered as being most representative of each extracted factor. The purpose of this second interview will be twofold: (a) to member check their responses (Manning, 1997) and (b) to obtain a richer understanding of their statement arrangement choices (Brown, 1980; McKeown & Thomas, 1988). These post-sort interviews will allow for the participants’ voices to be heard (i.e., via quotations) regarding their sorting choices, thereby providing greater richness to the analysis.

Interpretive phenomenological analysis (IPA) will be used to analyze responses from the post-sort interviews (Smith, 1996a, 1996b). This analysis particularly is suited to Q methodology because it is rooted in the theoretical lens of phenomenology and interactionism. Along the phenomenological axis, IPA focuses on idiographic (i.e., understanding of unique, subjective phenomenon) analysis of meanings, experiences, and subjectivity (Onwuegbuzie & Denham, 2014). Specifically, in this phase of our Q methodology, we will use IPA as a double-hermeneutic process in which we are attempting to make sense of the P-set participants as they attempt to make sense of what mixed methods research means to them, with our sense-making process being augmented by detailed and systematic examination of each key informant. Our analysis, which we plan to be iterative, fluid, engaged, and multi-directional (Smith, 1996a, 1996b), will involve immersive and intense reading and re-reading of all interview transcripts; initial noting on the exploratory level of processes, opinions, values, and principles; free textual analysis of exploratory noting (i.e., how is mixed methods research defined by the participant?) through descriptive, linguistic, and conceptual comments; deconstruction (e.g., de-contextualizing); developing emergent themes; identifying connections among themes; abstraction; subsumption; polarization; contextualization; numeration; and function (Onwuegbuzie & Denham, 2014). Further, we plan to use the following prompts suggested by Larkin, Watts, and Clifton (2006): (a) IPA’s phenomenological component: mapping out each participant’s concerns from her/his current positioning in the field of mixed methods research, (i.e., *How does this person understand the mixed methods research field*); (b) IPA’s interpretative component: contextualizing the claims made by each participant (i.e., *What does this mixed methods research mean for this person?*), and (c) the overall outcome will be an integrated insight into mixed methods research from the participants’ perspectives.

We believe that the findings from our Q methodology will provide a much-needed understanding of mixed methodologists' subjective perspectives on mixed methods research. In turn, this understanding will help to inform this and future literature reviews that we conduct on mixed methods research.

## 7. Conclusions

In this article, we contended that there is scant guidance on how to analyze sources that inform a literature review. Thus, we have provided a framework for analyzing and interpreting sources that stem from documents and conversations/interviews with key researchers, scholars, and/or practitioners—namely, using the QMRS.

As can be seen from our heuristic example, the power of Q methodology is not that it provides findings that can be generalized to the population from which the participants were selected (i.e., make external statistical generalizations). Rather, the power of Q methodology stems from its ability to lead to analytic findings, wherein the literature reviewer is “striving to generalize a particular set of [case study] results to some broader theory”; Yin, 2009, p. 43) and that are “applied to wider theory on the basis of how selected cases ‘fit’ with general constructs”; Curtis, Gesler, Smith, & Washburn, 2000, p. 1002)—or what Thomas and Baas (1992/1993) refer to as “substantive inference ‘about’ a phenomenon” (p. 22). It is the participants' viewpoints that can be generalized according to the types of persons who share similar points of view on the topic, under the assumption that the statements that comprise the Q sample are representative of the universe of viewpoints on the topic (Brown, 1980; McKeown & Thomas, 1988). Alternatively stated, although the findings from a Q methodology of information extracted from literature reviews generalize only to those who participate in the study, because the Q sample reflects a representative sample of statements that are drawn from the concourse, which, in turn, evolves from the comprehensive literature review, the factor themes potentially can be generalized to the extant body of research on the underlying topic. As such, QMRS represents a useful tool that helps both beginning researchers and experienced researchers map the mixed analysis process onto the literature review process, thereby yielding a more rigorous review of the literature.

## References

- Bettany-Saltikov, J. (2012). *How to do a systematic literature review in nursing: A step-by-step guide*. New York, NY: Open University Press.
- Brown, S. (1980). *Political subjectivity: Applications of Q methodology in political science*. New Haven, CT: Yale University Press.
- Combs, J. P., Bustamante, R. M., & Onwuegbuzie, A. J. (2010a). An interactive model for facilitating development of literature reviews. *International Journal of Multiple Research Approaches*, 4, 159-182. <http://dx.doi.org/10.5172/mra.2010.4.2.159>
- Combs, J. P., Bustamante, R. M., & Onwuegbuzie, A. J. (2010b). A mixed methods approach to conducting literature reviews for stress and coping researchers: An interactive literature review process framework. In G. S. Gates, W. H. Gmelch, & M. Wolverton (Series Eds.); K.

- M. T. Collins, A. J. Onwuegbuzie, & Q. G. Jiao (Vol. Eds.), *Toward a broader understanding of stress and coping: Mixed methods approaches* (pp. 213-241). *The Research on Stress and Coping in Education Series* (Vol. 5). Charlotte, NC: Information Age.
- Cronin, P., Ryan, F., & Coughlan, M. (2008). Undertaking a literature review: A step-by-step approach. *British Journal of Nursing, 17*, 38-43.
- Curtis, S., Gesler, W., Smith, G., & Washburn, S. (2000). Approaches to sampling and case selection in qualitative research: Examples in the geography of health. *Social Science and Medicine, 50*, 1001-1014. <http://dx.doi.org/10.1016/j.jas.2007.02.013>
- Dellinger, A. (2005). Validity and the review of the literature. *Research in the Schools, 12*(2), 41-54.
- Dellinger, A., & Leech, N. L. (2007). A validity framework: A unified approach to evaluating validity of empirical research. *Journal of Mixed Methods Research, 1*, 309-332. <http://dx.doi.org/10.1177/1558689807306147>
- Denham, M. A., & Onwuegbuzie, A. J. (2013). Beyond words: Using nonverbal communication data in research to enhance thick description and interpretation. *International Journal of Qualitative Methods, 12*, 670-696.
- Durning, D. (2007). "Q methodology." *Encyclopedia of Public Administration and Public Policy (2nd ed.)*, 1(1), 1678-1681. <http://dx.doi.org/10.1201/NOE1420052756.ch343>
- Ernest, J. M. (2011). Using Q methodology as a mixed methods approach to study beliefs about early childhood education. *International Journal of Multiple Research Approaches, 5*, 223-237. <http://dx.doi.org/10.5172/mra.2011.5.2.223>
- Fink, A. (2009). *Conducting research literature reviews: From the Internet to paper*. Thousand Oaks, CA: Sage.
- Frels, R. K., Onwuegbuzie, A. J., Leech, N., & Collins, K. M. T. (2012). Challenges to teaching mixed research courses. *The Journal of Effective Teaching, 12*, 23-44.
- Gaber, J. (2000). Meta-needs assessment. *Evaluation and Program Planning, 23*, 139-147. [http://dx.doi.org/10.1016/S0149-7189\(00\)00012-4](http://dx.doi.org/10.1016/S0149-7189(00)00012-4)
- Garrard, J. (2009). *Health sciences literature review made easy: The matrix method*. Sudbury, MA: Jones and Bartlett.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine.
- Glass, G. (1976). Primary, secondary, and meta-analysis of research. *Educational Researcher, 5*(10), 3-8.
- Greene, J. C. (2006). Toward a methodology of mixed methods social inquiry. *Research in the Schools, 13*(1), 93-98.

- Harden, A., & Thomas, J. (2010). Mixed methods and systematic reviews: Examples and emerging issues. In A. Tashakkori & C. Teddlie (Eds.), *Sage handbook of mixed methods in social and behavioral research* (2nd ed., pp. 749-774). Thousand Oaks, CA: Sage.
- Hart, C. (2005). *Doing a literature review: Releasing the social science research imagination*. London, England: Sage.
- Jesson, J. K., Matheson, L., & Lacey, F. M. (2011). *Doing your literature review: Traditional and systematic techniques*. London, England: Sage.
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research, 1*, 112-133. <http://dx.doi.org/10.1525/sp.1960.8.2.03a00030>
- Larkin, M., Watts, S., & Clifton, E. (2006). Giving voice and making sense in interpretative phenomenological analysis. *Qualitative Research in Psychology, 3*, 102-120. <http://dx.doi.org/10.1191/1478088706qp062oa>
- Leech, N. L., Dellinger, A. B., Brannagan, K. B., & Tanaka, H. (2010). Evaluating mixed research studies: A mixed methods approach. *Journal of Mixed Methods Research, 4*, 17-31. <http://dx.doi.org/10.1177/1558689809345262>
- Leech, N. L., & Onwuegbuzie, A. J. (2008). Qualitative data analysis: A compendium of techniques and a framework for selection for school psychology research and beyond. *School Psychology Quarterly, 23*, 587-604. <http://dx.doi.org/10.1037/1045-3830.23.4.587>
- Machi, L. A., & McEvoy, B. T. (2009). *The literature review: Six steps to success*. Thousand Oaks, CA: Corwin Press.
- Manning, K. (1997). Authenticity in constructivist inquiry: Methodological considerations without prescription. *Qualitative Inquiry, 3*, 93-115. <http://dx.doi.org/10.1177/107780049700300105>
- McGhee, G., Marland, G. R., & Atkinson, J. M. (2007). Grounded theory research: Literature reviewing and reflexivity. *Journal of Advanced Nursing, 60*, 334-342. <http://dx.doi.org/10.1111/j.1365-2648.2007.04436.x>
- McKeown, B., & Thomas, D. (1988). *Q methodology*. Newbury Park, CA: Sage.
- Miles, M., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.
- Newman, I., & Ramlo, S. (2010). Using Q methodology and Q factor analysis in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Sage Handbook of mixed methods in social and behavioral research* (2nd ed., pp. 505-530). Thousand Oaks, CA: Sage.
- Onwuegbuzie, A. J., & Byers, V. T. (2014). An exemplar for combining the collection, analysis, and interpretations of verbal and nonverbal data in qualitative research. *International Journal of Education, 4*(1), 183-246. <http://dx.doi.org/10.5296/ije.v6i1.4399>

Onwuegbuzie, A. J., Collins, K. M. T., Leech, N. L., Dellinger, A. B., & Jiao, Q. G. (2010). A meta-framework for conducting mixed research syntheses for stress and coping researchers and beyond. In G. S. Gates, W. H. Gmelch, & M. Wolverton (Series Eds.); K. M. T. Collins, A. J. Onwuegbuzie, & Q. G. Jiao (Eds.), *Toward a broader understanding of stress and coping: Mixed methods approaches* (pp. 169-211). *The Research on Stress and Coping in Education Series* (Vol. 5). Charlotte, NC: Information Age Publishing.

Onwuegbuzie, A. J., & Combs, J. P. (2010). Emergent data analysis techniques in mixed methods research: A synthesis. In A. Tashakkori & C. Teddlie (Eds.), *Sage Handbook of mixed methods in social and behavioral research* (2nd ed., pp. 397-430). Thousand Oaks, CA: Sage.

Onwuegbuzie, A. J., & Denham, M. A. (2014). Qualitative data analysis techniques. In L. Meyer (Ed.), *Oxford Bibliographies in education*. Oxford, England: Oxford University Press. Retrieved from <http://www.oxfordbibliographies.com/view/document/obo-9780199756810/obo-9780199756810-0078.xml>

Onwuegbuzie, A. J., & Frels, R. K. (2012). Writing a literature review. In C. Wagner, B. Kawulich, & M. Garner (Eds.), *Doing social research: A global context* (pp. 29-51). Maidenhead, England: McGraw-Hill.

Onwuegbuzie, A. J., & Frels, R. K. (2014). A framework for using discourse analysis for the review of the literature in counseling research. *Counseling Outcome Research and Evaluation*, 5, 52-63. <http://dx.doi.org/10.1177/2150137813515905>

Onwuegbuzie, A. J., & Frels, R. K. (2016). *Seven steps to a comprehensive literature review: A multimodal and cultural approach*. London, England: Sage.

Onwuegbuzie, A. J., Leech, N. L., & Collins, K. M. T. (2011). Innovative qualitative data collection techniques for conducting literature reviews. In M. Williams & W. P. Vogt (Eds.), *The Sage handbook of innovation in social research methods* (pp. 182-204). Thousand Oaks, CA: Sage.

Onwuegbuzie, A. J., Leech, N. L., & Collins, K. M. T. (2012). Qualitative analysis techniques for the review of the literature. *The Qualitative Report*, 17(Art. 56), 1-28. Retrieved from <http://www.nova.edu/ssss/QR/QR17/onwuegbuzie.pdf>

Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 351-383). Thousand Oaks, CA: Sage.

Pawson, R., Greenhalgh, T., Harvey, G., & Walshe, K. (2005). Realist review - A new method of systematic review designed for complex policy interventions. *Journal of Health Services Research & Policy*, 10(Suppl. 1), 21-34. <http://dx.doi.org/10.1258/1355819054308530>

Pluye, P., Gagnon, M. P., Griffiths, F., & Johnson-Lafleur, J. (2009). A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative, and mixed methods primary studies in mixed studies reviews. *International Journal of*

*Nursing Studies*, 46, 529-546. <http://dx.doi.org/10.1016/j.ijnurstu.2009.01.009>

Ramlo, S. (2011). Facilitating a faculty learning community: Determining consensus using Q methodology. *Mid-Western Educational Researcher*, 24(1), 30-38.

Ray, C. M., & Montgomery, D. M. (2006). Views in higher education toward methods and approaches for character development of college students. *Journal of College & Character*, VII(5), 1-15.

Ridley, D. (2012). *The literature review: A step-by-step guide for students* (2nd ed.). Thousand Oaks, CA: Sage.

Sandelowski, M., & Barroso, J. (2003). Creating metasummaries of qualitative findings. *Nursing Research*, 52, 226-233. <http://dx.doi.org/10.1097/00006199-200307000-00004>

Sandelowski, M., Voils, C. I., & Barroso, J. (2006). Defining and designing mixed research synthesis studies. *Research in the Schools*, 13(1), 29-40. <http://dx.doi.org/10.1016/j.bbi.2008.05.010>

Sandelowski, M., Voils, C. I., & Knafl, G. (2009). On quantizing. *Journal of Mixed Methods Research*, 3, 208-222. <http://dx.doi.org/10.1177/1558689809334210>

Schmolck, P. (2002). *PQMethod manual mirror*. Unpublished manuscript. Retrieved from <http://www.rz.unibw-muenchen.de/~p41bsmk/qmethod>

Smith, J. A. (1996a). Beyond the divide between cognition and discourse: using interpretative phenomenological analysis in health psychology. *Psychology & Health*, 11, 261-271. <http://dx.doi.org/10.1080/08870449608400256>

Smith, J. A. (1996b). Evaluating the contribution of interpretative phenomenological analysis. *Health Psychology Review*, 5, 9-27. <http://dx.doi.org/10.1080/17437199.2010.510659>

Tashakkori, A., & Teddlie, C. (1998). Mixed methodology: Combining qualitative and quantitative approaches. *Applied Social Research Methods Series* (Vol. 46). Thousand Oaks, CA: Sage.

Thomas, D. B., & Baas, L. R. (1992/1993). The issue of generalization in Q methodology: "Reliable schematics" revisited. *Operant Subjectivity*, 16(1/2), 18-36.

Valenta, A. L., & Wigger, U. (1997). Q-methodology: Definition and application in health care informatics. *Journal of the American Medical Informatics Association*, 4, 501-510. <http://dx.doi.org/10.1136/jamia.1997.0040501>

Watts, S., & Stenner, P. (2005). Doing Q methodology: Theory, method and interpretation. *Qualitative Research in Psychology*, 2, 67-91. <http://dx.doi.org/10.1191/1478088705qp022oa>

Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, 52, 546-553. <http://dx.doi.org/10.1111/j.1365-2648.2005.03621.x>

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

## Appendix

Q Sample of 30 Statements Extracted from a Literature Review of How Mixed Methods Research is Defined.

*Burke Johnson and Anthony Onwuegbuzie:*

1. Mixed methods research is the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study or set of related studies.
2. Mixed methods research is the research paradigm that partners with the philosophy of pragmatism in one of its forms (left, right, middle).
3. Mixed methods research follows the logic of mixed methods research (including the logic of the fundamental principle and any other useful logics imported from qualitative or quantitative research that are helpful for producing defensible and usable research findings).
4. Mixed methods research relies on qualitative and quantitative viewpoints, data collection, analysis, and inference techniques combined according to the logic of mixed methods research to address one's research question(s).
5. Mixed methods research is cognizant, appreciative, and inclusive of local and broader sociopolitical realities, resources, and needs.
6. The mixed methods research paradigm offers an important approach for *generating* important research questions *and* providing warranted answers to those questions.
7. Mixed methods research should be used when the nexus of contingencies in a situation, in relation to one's research question(s), suggests that mixed methods research is likely to provide superior research findings and outcomes.

*Udo Kelle:*

8. Mixed methods means the combination of different qualitative and quantitative methods of data collection and data analysis in one empirical research project.
9. This combination can serve for two different purposes: it can help to discover and to handle threats for validity arising from the use of qualitative or quantitative research by applying methods from the alternative methodological tradition and can thus ensure good scientific practice by enhancing the validity of methods and research findings. Or it can be used to gain a fuller picture and deeper understanding of the investigated phenomenon by relating complementary findings to each other which result from the use of methods from the different methodological traditions of qualitative and quantitative research.

*Donna Mertens:*

10. Mixed methods research, when undertaken from a transformative stance, is the use of qualitative and quantitative methods that allow for the collection of data about historical and contextual factors, with special emphasis on issues of power that can influence the achievement of social justice and avoidance of oppression.

*Steven Miller:*

11. Mixed methods is a form of evolving methodological inquiry, primarily directed to the human sciences, which attempts to combine in some logical order the differing techniques and procedures of quantitative, qualitative and historical approaches.

12. Mixed methods must devote itself to resolving an epistemological set of issues, ontological, called the “epistemological link,” which represents the rules and rationales that “permit” researchers to proceed mixed methodologically.

13. Mixed methods must devote itself to resolving an ontological set of issues, adhering to some form of “minimal realist” ontology, wherein either social reality is “One” but can be accessed by different methods separately or working in conjunction, or social reality is multiple in nature and can ONLY be accessed through mixed methods.

14. Present day attempts to couch mixed methods within some broad notion of pragmatism are not satisfactory.

*Janice Morse:*

15. A mixed method design is a plan for a scientifically rigorous research process comprised of a qualitative or quantitative *core component* that directs the theoretical drive, with qualitative or quantitative *supplementary component(s)*. These components of the research fit together to enhance description, understanding and can either be conducted simultaneously or sequentially.

*Isadore Newman:*

16. Mixed methods research as a set of procedures that should be used when integrating qualitative and quantitative procedures reflects the research question(s) better than each can independently.

17. The combining of quantitative and qualitative methods should better inform the researcher and the effectiveness of mixed methods should be evaluated based upon how the approach enables the investigator to answer the research question(s) embedded in the purpose(s) (why the study is being conducted or is needed; the justification) of the study.

*Michael Q. Patton:*

18. Mixed methods represents inquiring into a question using different data sources and design elements in such a way as to bring different perspectives to bear in the inquiry and therefore support triangulation of the findings.

19. Using different methods to examine different questions in the same overall study is not mixed methods.

*Hallie Preskill:*

20. Mixed methods research refers to the use of data collection methods that collect both quantitative and qualitative data.

21. Mixed methods research acknowledges that all methods have inherent biases and weaknesses; and that using a mixed methods approach increases the likelihood that the sum of the data collected will be richer, more meaningful, and ultimately more useful in answering the research questions.

*Margarete Sandelowski:*

22. I think of mixed methods in terms of either a single primary research study or as a program of research.

23. Mixed methods research is more the use of different methodological approaches together in a single study or single program of research.

24. Mixed methods research can be defined at the technique level as the combination of, e.g., purposeful and probability sampling, open-ended and closed-ended data collection techniques, and narrative and multivariable analyses—i.e., in which anything can be

used together (linked or assimilated into each other)

25. Mixed methods research can be defined at a larger theoretical/paradigmatic level as using divergent approaches to inquiry together.

26. Mixed methods research does not constitute *any* combination of two or more things, because any research involves the use of two or more of something and the use of experiment and survey is two things, but they are informed by one mind (typically positivist/objectivist/realist).

*Lyn Shulha:*

27. Methods can be “mixed” in a variety of ways. Sometimes, one method serves another in validating and explicating findings that emerge from a dominant approach. On other occasions, different methods are used for different parts of the issues being investigated, and

in an independent way. In more complex cases, the methods and perspectives are deliberately mixed from the beginning of the process.

28. The resulting interaction of problem, method, and results produce a more comprehensive, internally consistent, and ultimately, more valid general approach.

29. What sets the most complex forms of collaborative mixed method research apart from other forms of inquiry is that findings depend as much on the researchers' capacities to learn through joint effort and to construct joint meaning as on their expertise in conventional data collection and analysis techniques.

*Abbas Tashakkori and Charles Teddlie:*

30. Mixed methods research is a type of research design in which QUAL and QUAN approaches are used in type of questions, research methods, data collection and analysis procedures, or in inferences.

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