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A Model Incorporating the Rationale and Purpose for Conducting Mixed-Methods Research in Special Education and Beyond

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This article provides a typology of reasons for conducting mixed-methods research in special education. The mixed-methods research process is described along with the role of the rationale and purpose of study. The reasons given in the literature for utilizing mixed-methods research are explicated, and the limitations of these reason frameworks are identified. We build on these frameworks by providing a comprehensive list of reasons for conducting mixed-methods research. The reasons provided in our model are operationalized in the context of special education and, thus, complement the goals of special education researchers. Finally, we present a four-dimensional Rationale and Purpose (RAP) model demonstrating how investigations can be designed according to the rationale for using mixed methods, purpose of mixing, stage of study where mixing occurs, and emphasis of approach derived from the research question(s).

Keywords: Mixed Methods, Special Education, Purpose of Study, Rationale of Study

In recent years, numerous calls have been made for researchers to combine qualitative and quantitative approaches within the same study (Chatterji, 2005; Johnson & Onwuegbuzie, 2004; Raudenbush, 2005)—most commonly known as mixed-methods research. In addition, the publication of the *Handbook of Mixed Methods in Social and Behavioral Research* (Tashakkori & Teddlie, 2003a), to date the most comprehensive textbook in this area, has provided researchers with some theoretical and practical tools for conducting mixed-methods research.

Frameworks for conducting mixed-methods research have been developed for many disciplines in the health or social and behavioral science fields, including education (Johnson & Onwuegbuzie, 2004; Onwuegbuzie & Johnson, 2004; Rocco et al., 2003); psychology (Waszak & Sines, 2003); nursing (Dzurec & Abraham, 1993;

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Morse, 1991; Sandelowski, 2001; Twinn, 2003); sociology (Hunter & Brewer, 2003; Onwuegbuzie, in press); health sciences (Forthofer, 2003; Morgan, 1998); management and organizational research (Currall & Towler, 2003); library and information science research (Onwuegbuzie, Jiao, & Bostick, 2004); counseling (Leech & Onwuegbuzie, 2005a); counseling psychology (Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005; Haverkamp, Morrow, & Ponterotto, 2005); school psychology (Mihalas, Powell, Onwuegbuzie, Suldo, & Daley, 2005); law (Kromrey, Onwuegbuzie, & Hogarty 2006); primary care (Creswell, Fetters, & Ivankova, 2004); family research (Blake, 1989); and program evaluation (Greene, Caracelli, & Graham, 1989; Rallis & Rossman, 2003). However, mixed-methods research has not been adopted to a similar degree by researchers in special education (Collins, Sutton, & Onwuegbuzie, 2006). For example, Collins, Sutton, and Onwuegbuzie (2006) found that only 10.8% of articles published in the *Journal of Special Education,* from 2000 through 2005, combined qualitative and quantitative techniques within a single study.

One reason for the limited utilization of mixed-methods investigations in special education might stem from the practical roadblocks to combining qualitative and quantitative research approaches. These roadblocks include the labor intensity needed for conducting mixed-methods research. Specifically, compared to mono-method studies (i.e., quantitative or qualitative research), mixed-methods inquiries tend to require more time, resources, and effort to organize and implement (Onwuegbuzie & Johnson, 2004; Teddlie & Tashakkori, 2003). Further, they require expertise in designing and implementing both the qualitative and quantitative phases (Teddlie & Tashakkori, 2003). In particular, a researcher with more of a qualitative orientation likely would find it more difficult to design the quantitative component of a mixed-methods study than would a researcher with a more quantitative orientation, and vice versa. Another reason stems from conflicts among researchers within a mixed-methods team regarding the most appropriate methodology to use.

These and other reasons suggest that logistics might be responsible for the limited number of mixed-methods studies in special education. However, these barriers have not prevented several other fields (e.g., nursing, sociology) from seeing a rapid increase in the number of mixed-methods investigations. Consequently, it appears that these barriers, at best, provide only a partial explanation. A more likely reason for the limited utilization of mixed-methods studies by special education researchers is that the rationale and purpose for doing so have not been made sufficiently explicit.

Indeed, in a recent high-profile special issue of *Exceptional Children,* in a series of articles discussing research quality indicators and guidelines for evidence of effective practices in special education, only two sentences in one article (i.e., Odom et al., 2005) acknowledged the role that mixed methods can play in research in education. Specifically, Odom et al. (2005) stated that (a) "Educational researchers have acknowledged the value of mixing methodologies to provide a complementary set of information that would more effectively (than a single method) inform practice" (p. 141); and (b) "The research methodologies that would generate this information are more likely qualitative, correlational, and mixed methods, as well as RCT [randomized controlled trials] and large-scale, single-case designs" (p. 146).

As exemplars of scientifically based research, these methodologies are endorsed in

legislation such as the No Child Left Behind Act of 2001, as well as in the What Works Clearinghouse (WWC)[1] standards. However, the exclusive use of mono-method research—quantitative research in general and experimental designs utilizing randomized trials in particular—has been criticized by researchers from different educational disciplines as being problematic (e.g., St. Pierre, 2002). Moreover, the weaknesses of relying solely on experimental research are emerging (Chatterji, 2005; Johnson & Onwuegbuzie, 2004; Raudenbush, 2005). In particular, while the strength of experimental research is its ability to identify cause-and-effect relationships, this type of research design does not lend itself to answering *why* and *how* questions.

A model for explicating the rationale and purpose for conducting mixed-methods research, and, therefore, making it explicit, will facilitate the design and implementation of methodologically strong studies in special education. It is hoped that the framework outlined in this article will help to motivate more special education researchers to utilize mixed-methods techniques.

Purpose

The purpose of this article is to provide a typology of reasons for conducting mixed-methods research in special education research. First, we describe the mixed-methods research process. Second, we discuss the role that the rationale and purpose of study have in the mixed-methods research process. Third, we discuss reasons (e.g., Greene et al., 1989) given (i.e., reason frameworks) for utilizing mixed-methods research. In so doing, we point out the limitations inherent in these reason frameworks. Further, we introduce a typology of reasons for undertaking mixed-methods investigations. The reasons are operationalized in the context of special education, and thus complement the goals of special education researchers. Finally, we present a four-dimensional Rationale and Purpose (RAP) model demonstrating how investigations may be designed according to the rationale for using mixed methods, purpose of mixing, stage of study where mixing occurs, and emphasis of approach derived from the research question(s).

Mixed-Methods Research Process

One of the most current definitions of mixed-methods research is provided by Johnson, Onwuegbuzie, and Turner (2005):

> Mixed research is formally defined here as *the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language in a single study or set of related studies*. This type of research should be used when the contingencies suggest that it is likely to provide superior answers to a research question or set of research questions. (p. 19) [emphasis in original]

Research formulation stage. Building on the works of Onwuegbuzie and Teddlie (2003), Kromrey et al. (2006), and Onwuegbuzie and Leech (2005), we conceptualize mixed-methods research as comprising the following 13 distinct steps: (1) determining the goal of the study, (2) formulating the research objective(s), (3) determining

1. The What Works Clearinghouse was commissioned by the Institute of Education Sciences to collect and evaluate data on the "strength and nature of scientific evidence on the effectiveness of education programs, products, and practices (labeled interventions) claimed to enhance important student outcomes" (WWC, 2001). As a result, the WWC developed a set of standards for selecting empirical investigations that provide research-based evidence on effective educational interventions (Valentine & Cooper, 2003).

the research/mixing rationale(s), (4) determining the research/mixing purpose(s), (5) determining the research question(s), (6) selecting the sampling design, (7) selecting the mixed-methods research design, (8) collecting the data, (9) analyzing the data, (10) validating/legitimating the data and data interpretations, (11) interpreting the data, (12) writing the final report, and (13) reformulating the research question(s).

This process is illustrated in Figure 1. At first glance, one might think that the steps of the mixed-methods research process are similar to the steps of both the quantitative and qualitative research process. However, as illustrated in the remainder of this section, although many of the steps appearing in Figure 1 also are pertinent to monomethod studies, the elements of each of these steps are significantly different when conducting mixed-methods research.

Formulation stage. Figure 1 shows that the first five steps (all represented by rectangles) are linear. That is, the study's goal (i.e., involving identifying the overall, long-term aim of the study) leads to the research objective(s), which, in turn, leads to a determination of the research/mixing rationale, which, in turn, leads to the research/mixing purpose, which is followed by the determination of the research question(s). These first five steps represent the research formulation stage. Determination of the research/mixing rationale comprises the *rationale* for the study (i.e., why the study is needed) and the rationale for mixing quantitative and qualitative approaches. Similarly, determination of the research/mixing purpose comprises the *purpose* of the study (i.e., what will be undertaken in the study) and the purpose of mixing quantitative and qualitative approaches. Thus, Steps 3 and 4 are the steps of the research formulation stage that best distinguish the mixed-methods research process from either the quantitative or the qualitative research process. In mixed-methods studies, researchers also have to concern themselves with both the rationale and purpose for mixing quantitative and qualitative approaches. Indeed, it is the importance of conceptualizing the rationale and purpose for combining quantitative and qualitative approaches in mixed-methods studies that gave rise to the present article.

Planning stage. Step 6 and Step 7, namely, selecting the sampling design and selecting the mixed-methods design, represent the planning stages of the mixed-methods research process. These two steps are interactive because the choice of sampling design affects the selection of the mixed-methods research design, and vice versa. As is the case for the research formulation stage, Step 6 and Step 7 are markedly different in mixed-methods research than in mono-method studies because in mixed-methods investigations, the researcher must decide on the relationship between the quantitative and qualitative components. For example, with respect to the mixed-methods sampling design, as conceptualized by Onwuegbuzie and Collins (2004, in press), the researcher must decide whether the samples for the quantitative and qualitative components are to be identical (i.e., exactly the same sample members participate in both the qualitative and quantitative phases of the study); parallel (i.e., the samples for the qualitative and quantitative components of the research are different but are drawn from the same population of interest); nested (i.e., sample members selected for one phase of the study represent a subset of participants chosen for the other facet of the investigation); or multilevel (i.e., using two or more sets of samples that are extracted from different levels of the study such as students and their teachers). Also, the mixed-methods researcher needs to decide whether qualitative and quantitative data are to be

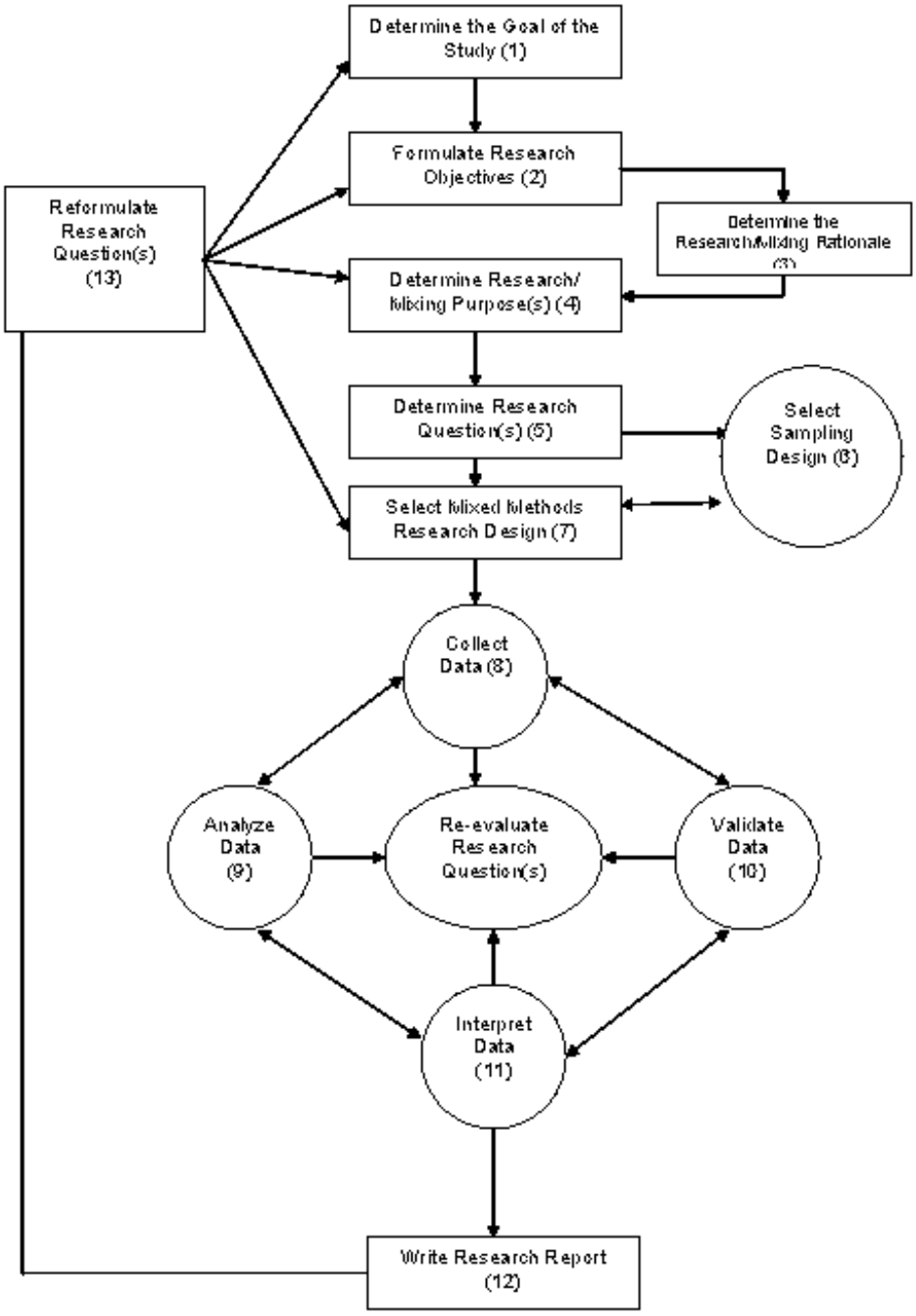


Figure 1. Steps in the mixed-methods research process.

collected from the samples concurrently or sequentially. Similarly, with respect to the research design, mixed-methods researchers must decide whether the qualitative and quantitative designs are to be implemented concurrently or sequentially, whether they are combined partially or fully, and whether they receive equal or unequal status (Leech & Onwuegbuzie, 2005b).

Implementation stage. The next four steps—data collection, data analysis, data validation, and data interpretation (all represented by circular shapes in Figure 1)—are interactive and cyclical steps in the mixed-methods research process. In all four steps, the mixed-methods researcher must remain cognizant of the planned and/or emergent relationship between the quantitative and qualitative data. Specifically, once data from at least one phase have been collected, the data are either analyzed or validated. If data analysis is the next step in the process, the results that emerge from these analyses are validated/legitimated.[2] Once validated/legitimated, the data are then interpreted, or more data are collected if the mixed-methods research design is sequential in nature. Alternatively, findings from the first data analysis cycle might be used to design the data collection method for the subsequent phase(s). These new data then are either analyzed or validated.

In any case, once all data have been collected, analyzed, and validated, interpretation takes place. Typically, the goal in the interpretation stage is to make meta-inferences, which involves combining quantitative and qualitative inferences into a coherent whole (Tashakkori & Teddlie, 2003b). Such meta-inferences are not pertinent in mono-method studies. Writing the research report, as is the case in quantitative and qualitative research, is the last step in the research process of a single study. However, in this step, the mixed-methods researcher must decide how to present the reports stemming from both the quantitative and qualitative components. The report writing step leads to a reformulation of the research questions for subsequent phases or studies.

Rationale and Purpose of Mixed Methods: Previous Representations

Elaborate frameworks have been developed for most of the stages of the mixed-methods research process, including the goal (i.e., Newman, Ridenour, Newman, & DeMarco, 2003)[3]; research objective (e.g., Johnson & Christensen, 2004); research question (i.e., Onwuegbuzie & Leech, 2005); sampling design (i.e., Onwuegbuzie & Collins, 2004, in press); research design (e.g., Creswell, Plano Clark, Guttman, & Hanson, 2003; Johnson & Onwuegbuzie, 2004; Leech & Onwuegbuzie, 2005b; Maxwell & Loomis, 2003; Morgan, 1998; Morse, 1991; Onwuegbuzie & Johnson, 2004a; Patton, 1990; Tashakkori & Teddlie, 1998, 2003b); data collection (i.e.,

2. In mixed-methods research, the words *validated* and *legitimated* are used interchangeably. Indeed, both terms refer to the trustworthiness, credibility, dependability, legitimation, validity, plausibility, applicability, consistency, neutrality, reliability, objectivity, confirmability, and/or transferability of quantitative and/or qualitative data and interpretations stemming from them. Both terms are included here because although the term *validity* is routinely used in quantitative research, it is disliked by many qualitative researchers. The term *legitimation* is less emotive and provocative for qualitative researchers. For an in-depth discussion of the use of the terms *validity* and *legitimation* in mixed-methods research, see Onwuegbuzie and Johnson (in press).

3. Newman et al. (2003) used the word *purposes* instead of *goals* to label their nine categories. Unfortunately, the word *purpose* has many uses. Traditionally, this word has been used to denote the direction or focus for the study (see, for example, Creswell, 2005). Conversely, Newman et al. conceptualize their typology of research purposes as representing "an iterative flow of ideas" (p. 184) that maps the researcher's thinking process. The terms *direction* and *focus* do not have the same meaning as *ideas*. Thus, we believe that Newman et al.'s use of the term *research purpose* conflicts with its traditional usage. In fact, the word *ideas* represents a higher level of abstraction than do the terms *direction* and *focus*. Hence we have relabeled Newman et al.'s *research purpose* as *research goal*.

Johnson & Turner, 2003); data analysis (i.e., Onwuegbuzie & Teddlie, 2003); data legitimation (i.e., Onwuegbuzie & Johnson, in press); data interpretation (i.e., Erzberger & Kelle, 2003; Miller, 2003; Teddlie & Tashakkori, 2003); and report writing (Onwuegbuzie & Johnson, 2004). Unfortunately, a comprehensive framework does not exist for either the rationale or the purpose. However, over the years, several articles have discussed the rationale and purpose of mixed-methods studies; they will be summarized in the following section.

Table 1 provides a brief overview of the literature in this area. As illustrated, several typologies of rationales and purposes for conducting mixed-methods research have been constructed—since Campbell and Fiske paved the way in 1979. Unfortunately, these typologies are either too abstract (e.g., Dzurec & Abraham, 1993), too general (e.g., Morse, 1991), or too narrow in scope (e.g., the five purposes of Greene et al., 1989, pertain only to the data analysis step of the mixed-methods research process). Therefore, we decided to create a more comprehensive typology.

Typology of Rationales and Purposes for Conducting Mixed-Methods Research in Special Education

Our original intent was to determine a typology of reasons for conducting mixed-methods research from articles published in special education journals. However, because a limited number of mixed-methods studies have been conducted by special education researchers (Collins, et al., 2006), we quickly came to the conclusion that this body of literature would not yield a comprehensive typology. Thus, we decided to use the following two sources from which to develop our typology: (a) the 494 articles published journal articles identified by Collins, Onwuegbuzie, and Jiao (2005) that used the phrase "mixed method(s)" published between 2000 and 2005 across 14 major electronic databases (e.g., PsycINFO, CINAHL, ERIC) representing the fields of psychology, sociology, social services, education, business, and nursing and allied health; and (b) theoretical/methodological/conceptual articles and books on mixed methods, including those presented in the previous section (e.g., Greene et al., 1989), that had been published between 1973 (e.g., Sieber, 1973) and the time when the present article was written.

With respect to our second list of articles, we obtained methodological articles in the area of mixed methods either from the literature databases or by attending methodological paper presentations at state (e.g., Georgia Educational Research Association, Florida Educational Research Association); regional (e.g., Mid-South Educational Research Association, Southwest Educational Research Association, Eastern Educational Research Association, Midwestern Educational Research Association); national (e.g., American Educational Research Association, American Psychological Association); and international (e.g., European Educational Research Association, Australian Association for Research in Education) conferences over the last decade.

In addition to searching the literature database and collecting methodological articles from professional meetings, we used the "snowballing" approach to obtaining methodological manuscripts. Specifically, (a) the reference list of every methodological paper was extracted via the snowballing strategy, and (b) was examined to determine if it contained relevant articles that we had overlooked. This technique led to the identification of several additional articles. The method also helped us to validate our choice of articles.

Table 1
Summary of Articles Published (1959-2005) That Propose Various Rationales and Purposes for Utilizing Mixed Methods

Article's Author(s)	Rationale and Purpose of Mixed Methods
Campbell and Fiske (1959)	Coined the term *multiple operationalism*, in which more than one method is used as part of a validation process that ensures that the variance explained is the result of the underlying phenomenon or trait and not of the method (e.g., qualitative or quantitative)
Webb, Campbell, Schwartz, & Sechrest (1966)	Coined the phrase *triangulation* as representing the use of multiple measures that "are hypothesized to share in the theoretically relevant components but have different patterns of irrelevant components" (p. 3)
Denzin (1978)	Distinguished "within-methods" triangulation, which refers to the use of either multiple quantitative or multiple quantitative approaches, from "between-methods" triangulation, which involves the use of both quantitative and qualitative approaches
Jick (1979)	Noted advantages of triangulation as a process that leads the researcher to: • obtaining thicker, richer data; • being more confident of the interpretation of results; • synthesizing or integrating multiple theories; • developing creative ways of collecting data; • uncovering contradictions; and • using triangulation as a test for competing theories
Morse (1991)	Defined simultaneous triangulation as the concurrent use of qualitative and quantitative methods with limited interaction between the two sources of data during the data collection stage, although the findings complement one another at the data interpretation stage Specified that sequential triangulation be utilized when the results of one approach are necessary for planning the next method
Rossman & Wilson (1985)	Noted that researchers combining quantitative and qualitative research leads to: • convergence of findings; • elaboration of analysis to provide richer data; and • initiation of new modes of thinking by attending to paradoxes that emerge from the two data sources
Reichardt & Cook (1979)	Recommended that program evaluators utilize both quantitative and qualitative approaches (e.g., comprehensive program evaluations should be process- as well as outcome-oriented)
Mark & Shotland (1987)	Provided the following three purposes for mixed-methods research: • triangulation (i.e., convergence);

Table 1 continued

Mark & Shotland (1987) (continued)	• bracketing (i.e., seeking a range of estimates; namely, confidence intervals, on the correct answer); and • complementarity (i.e., using different methods to evaluate different phenomena to evaluate the plausibility of identified threats to validity, or to enhance the interpretability of a single phenomenon)
Dzurec & Abraham (1993)	Identified a link between qualitative and quantitative research in the pursuit of: • mastery over self and the world; • understanding through re-composition; • complexity reduction to enhance understanding; • innovation; meaningfulness; and truthfulness
Sechrest & Sidana (1995)	Recommended that methodological pluralism be used to: • provide a basis for estimating possible error in the underlying measures; • provide verification; • facilitate the monitoring of data collected; and • probe a dataset in order to extract meaning
Madey (1982)	Posited that combining quantitative and qualitative research helps to: • develop a conceptual framework; • validate quantitative findings by referring to information extracted from the qualitative phase of the study; and • construct indices from qualitative data that can be used to analyze quantitative data
Kidder & Fine (1987)	Argued that combining qualitative and quantitative approaches can increase researchers' understanding of a given phenomenon by exploring convergences in findings yielded from alternate paradigms
Greene, Caracelli, & Graham (1989)	Identified, through inductive analysis, a typology of five purposes or rationales of mixed-methods studies: • triangulation (i.e., seeking convergence and corroboration of results from different methods studying the same phenomenon); • complementarity (i.e., seeking elaboration, enhancement, illustration, clarification of the results from one method with results from the other method); • development (i.e., using the results from one method to help inform the other method); • expansion (i.e., seeking to expand the breadth and range of inquiry by using different methods for different inquiry components); and • initiation (i.e., discovering paradoxes and contradictions that lead to a re-framing of the research question)
Onwuegbuzie (2003b); Onwuegbuzie & Leech (2005)	Contended that mixed-methods studies allow researchers to combine "empirical" precision with "descriptive" precision

These three techniques for extracting methodological papers (i.e., database searching, attending conferences, snowballing) led to what we determined to be a comprehensive, albeit not exhaustive, set of theoretical/methodological/conceptual works. A perusal of other theoretical/methodological/conceptual articles in the area of mixed methods indicates no more, and often much less structure in the technique used to select articles than described earlier.

Next, a content analysis was undertaken on the collected articles. In using this procedure, our goal was to (a) develop a typology of reasons (i.e., rationale) used by mixed-methods researchers to combine quantitative and qualitative research; (b) identify the specific purposes used; and (c) develop a model that incorporates a comprehensive set of rationales and purposes for conducting mixed-methods studies specific to special education research and, more generally, to other fields.

Four themes emerged from the analysis of the empirical and theoretical/methodological/conceptual articles in the area of mixed methods: participant enrichment, instrument fidelity, treatment integrity, and significance enhancement. These themes and their descriptors are presented in Table 2. Each of these themes represents a rationale for conducting mixed methods research. Table 3 presents the specific purposes for conducting mixed-methods research. Each of these purposes is grouped under one of the four rationales.

Participant Enrichment

Participant enrichment represents the mixing of quantitative and qualitative techniques for the rationale of optimizing the sample. One way to optimize a sample is by increasing the number of participants. In the field of special education, it is not unusual for researchers to study populations who exhibit a heterogeneous set of characteristics that differentially impact individuals' instructional responsiveness (e.g., individuals with learning disabilities). This research focus may be expanded to probe the potential impact of a person's disability on family dynamics and to assess the mediating effects of community-based support systems. In such cases, the researcher could conduct a qualitative and/or quantitative pilot study to determine the best ways to identify members of these various populations. For example, the researcher could use snowballing techniques to identify additional participants by asking existing participants to nominate potential population members. The researcher could then formally or

Table 2

Rationale for Conducting Mixed-Methods Research: Categories and Their Formulated Meanings

Categories	Formulated Meaning
Participant Enrichment	Recruit participants; engaging in activities such as Institutional Review Board debriefings; ensure that each participant selected is appropriate for inclusion
Instrument Fidelity	Assess the appropriateness and/or utility of existing instrument(s); create new instrument(s) and assess appropriateness and/or utility
Treatment Integrity	Assess fidelity of intervention
Significance Enhancement	Facilitate thickness and richness of data; augment interpretation of findings

informally interview the identified participants to obtain qualitative information that establishes their suitability and willingness to participate in the study. Alternatively, documents such as case records that could be examined to obtain quantitative information (e.g., test scores, referral rates, prevalence rates) could be used to identify potential participants.

In special education research, it is also not unusual to study populations that represent a unique subset of the general population in terms of characteristics such that it is difficult to recruit them (e.g., students with multiple disabilities and/or low-incidence disabilities). Again, interviews could be used to assess both suitability and willingness to participate in the study.

The participant enrichment theme also refers to interviews used to inform participants who have already agreed to participate in the study, or those who have not yet agreed about the impact the study in general and the intervention in particular may impose on them, as well as to identify any concerns they might have and to answer any questions. We call such interviews "prebriefings." Alternatively, interviews could be conducted during the study to determine the participant's suitability to continue in the study, to determine whether any adjustments to the protocol are needed, or the like. Similarly, interviews could be conducted after the study has been completed for a variety of reasons, such as to obtain the participants' feedback on the results, to identify deviant cases, or to debrief. However, participant enrichment techniques only lead to a mixed-methods study if either (a) both quantitative and qualitative techniques are used at one or more phases of the study (e.g., pre-study phase, post-study phase), or (b) an approach (e.g., qualitative) is used to enrich the sample that is different from the approach used in the main study (e.g., quantitative).

Instrument Fidelity

The goal in every study, regardless of research paradigm, is to obtain data that have one or more of the following characteristics: trustworthiness, credibility, dependability, legitimation, validity, plausibility, applicability, consistency, neutrality, reliability, objectivity, confirmability, and/or transferability (Onwuegbuzie & Johnson, in press). Thus, the instrument fidelity theme or rationale refers to steps taken by the researcher to maximize the appropriateness and/or utility of the instruments used in the study, whether quantitative or qualitative. For example, a researcher might conduct a pilot study either to assess the appropriateness and/or utility of existing instruments with a view to making modifications, where needed, or creating and improving a new instrument. Alternatively, in studies that utilize an evolving design, the researcher could assess instrument fidelity on an ongoing basis and make modifications, where needed, at one or more phases of the inquiry. Finally, the investigator could assess the validity of information (i.e., qualitative or quantitative) yielded by the instrument(s) as a means of putting the findings in a more appropriate context.

Issue of Validity

Onwuegbuzie, Daniel, and Collins (in press) have provided a conceptual framework that builds on Messick's (1989, 1995) theory of validity. Specifically, Onwuegbuzie et al. (2004) combined the traditional notion of validity with Messick's (1989, 1995) conceptualization of validity to yield a reconceptualization of validity as presented in Figure 2. Although treated as a unitary concept, Figure 2 shows that content-, criterion-, and

Table 3
Mixed-Methods Research Purpose: Categories and Descriptors

Categories	Descriptors
Participant Enrichment	• recruit study participants • obtain information about the feasibility and the burden the intervention may impose on participants • identify obstacles to recruitment and consent of participants • improve recruitment and consent of participants • obtain participants' feedback to results (e.g., debrief) • conduct participant follow-up to ensure compliance with an intervention • identify representative sample members • identify outlying (i.e., deviant) cases • avoid "elite bias" (talking only to high-status individuals) • determine optimal sampling design • provide data to inform participant recruitment • identify characteristics of individuals who do not want to participate in the study and reasons for non-participation • identify characteristics of participants who drop out of the study and determine reasons for attrition • identify characteristics of participants who enter the study after the study has begun and determine reasons • determine reasons for differential attrition among intervention groups • determine whether participants are comparable across intervention conditions • determine characteristics of intervention providers • determine whether intervention providers are comparable across conditions • conduct member check
Instrument Fidelity	• assess adequacy of observational protocols in varied settings • validate individual scores on outcomes measures • identify the adequacy of measures used • explain within- and between-participant variations in outcomes on instruments • assist with conceptual and instrument development • determine the optimal conditions for administering instrument for specific population • develop items for an instrument • provide some basis for identifying possible sources of error in the underlying measures
Treatment Integrity	• refine interventions for subsequent phases • identify treatment fidelity problems • note discrepancies between the planned intervention and its actual approach • identify barriers and facilitators that may be used in the intervention • evaluate the fidelity of implementing the intervention and how it worked

Table 3 continued

Treatment Integrity (continued)	• gain more detail about the intervention • provide stakeholders with information to improve program delivery • determine the readiness of a program to undergo a summative evaluation • conduct an impact analysis • identify environmental variables as a component of the intervention • conduct a needs assessment to inform program design • determine stakeholders' attitudes towards program • identify the information needs of stakeholders • identify the context of the program/phenomenon/site • examine the underlying theory of a program/phenomenon to identify key variables (e.g., causal, moderating, mediating, confounding) and their interrelationships • determine the level of implementation of a program/intervention • clarify the socio-political processes that affect program delivery, management, and outcomes • determine how to allocate resources for program delivery and maintenance • undertake condition-seeking methods • provide data to inform implementation of intervention

Significance Enhancement	• expand the interpretation of the quantitative results
	• expand the interpretation of the qualitative results
	• clarify why outcomes did or did not occur
	• enhance findings that are significant (i.e., statistically, practically, clinically, or economically significant)
	• follow up on results
	• compare results from the quantitative data with the qualitative findings (i.e., triangulation)
	• seek elaboration, illustration, enhancement, and clarification of the findings from one method with the results from the other method (i.e., complementarity)
	• use the findings from one method to help inform the other method (i.e., development)
	• discover paradoxes and contradictions that lead to a re-framing of the research question (i.e., initiation)
	• add "real-life" examples to results
	• present individual stories that provide compelling ways to communicate findings
	• expand breadth and range of inquiry by using multiple methods for different inquiry components (i.e., expansion)
	  • facilitate generalizability of qualitative data
	  • explore different levels of the same phenomenon
	  • shed new light on findings
	  • legitimate results
	  • develop theory
	  • modify theory
	  • test theory

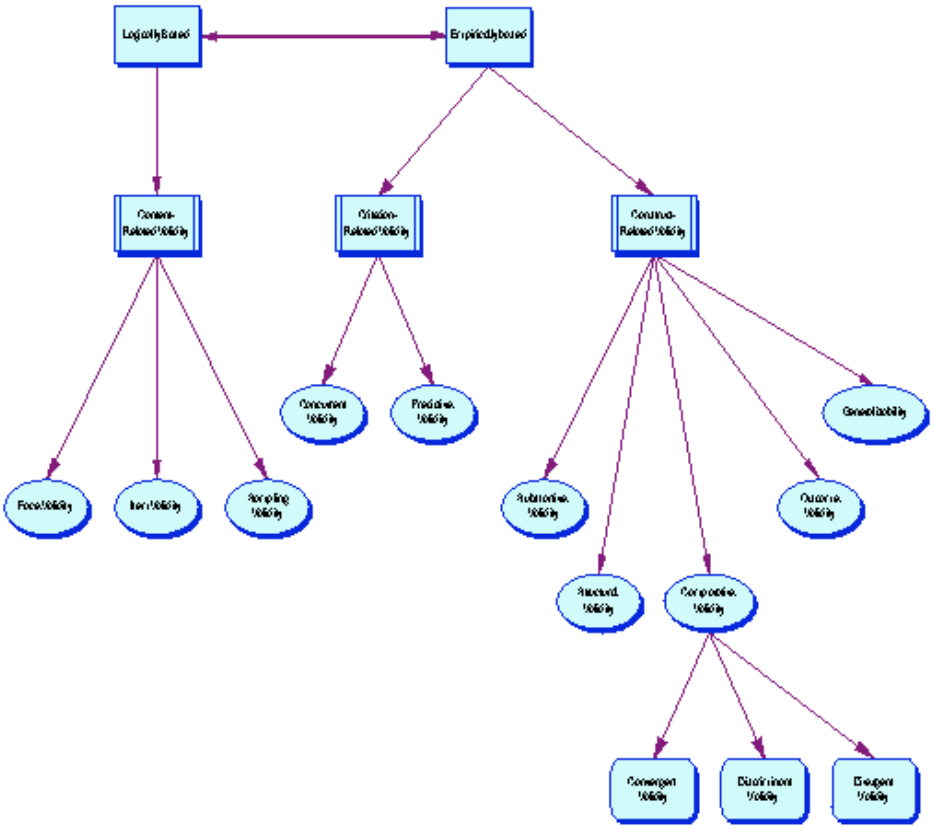


Figure 2. Conceptual framework for assessing instrument fidelity.

construct-related validity may be subdivided into areas of evidence. (The descriptions of each of these validity types are presented in Table 4.) Although more of these validity types are more relevant for quantitative instruments, some of them (e.g., content-related validity of interview schedule) also are pertinent for qualitative instruments. Thus, the conceptual framework presented in Figure 2 serves as a schema for researchers to assess instrument fidelity.

Instrument fidelity also applies to cases where the instrument is the researcher himself/herself. This might involve the researcher using quantitative and/or qualitative techniques to maximize her/his ability to collect relevant data that indicate fidelity. As is the case for participant enhancement, use of instrument fidelity techniques only lead to a mixed-methods study if either (a) both quantitative and qualitative techniques are used at one or more phases of the study (e.g., pre-study phase, post-study phase), or (b) an approach (e.g., qualitative) is used to assess or obtain instrument fidelity that is different from the approach used in the main study (e.g., quantitative).

Treatment Integrity

Treatment integrity represents the mixing of quantitative and qualitative techniques for the rationale of assessing the fidelity of interventions, treatments, or programs. This

Table 4
Areas of Validity Evidence

Validity Type	Description
Criterion-Related:	
Concurrent Validity	Assesses the extent to which scores on an instrument are related to scores on another, already established instrument administered approximately simultaneously or to a measurement of some other criterion that is available at the same point in time as the scores on the instrument of interest
Predictive Validity	Assesses the extent to which scores on an instrument are related to scores on another, already established instrument administered in the future or to a measurement of some other criterion that is available at a future point in time as the scores on the instrument of interest
Content-Related:	
Face Validity	Assesses the extent to which the items appear relevant, important, and interesting to the respondent
Item Validity	Assesses the extent to which the specific items represent measurement in the intended content area
Sampling Validity	Assesses the extent to which the full set of items sample the total content area
Construct-Related:	
Substantive Validity	Assesses evidence regarding the theoretical and empirical analysis of the knowledge, skills, and processes hypothesized to underlie respondents' scores
Structural Validity	Assesses how well the scoring structure of the instrument corresponds to the construct domain
Convergent Validity	Assesses the extent to which scores yielded from the instrument of interest are highly correlated with scores from other instruments that measure the same construct
Discriminant Validity	Assesses the extent to which scores generated from the instrument of interest are slightly but not significantly related to scores from instruments that measure concepts theoretically and empirically related to but not the same as the construct of interest
Divergent Validity	Assesses the extent to which scores yielded from the instrument of interest are not correlated with measures of constructs antithetical to the construct of interest
Outcome Validity	Assesses the meaning of scores and the intended and unintended consequences of using the instrument
Generalizability	Assesses the extent to which meaning and use associated with a set of scores can be generalized to other populations

rationale is particularly pertinent for research in special education in which an intervention is administered either randomly or non-randomly to some or all participants—as is the case for studies wherein the quantitative component either is experimental or quasi-experimental. In order for an intervention to possess integrity, it must be implemented as intended (Gresham, MacMillan, Beebe-Frankenberger, & Bocian, 2000; Onwuegbuzie, 2003a). For example, a program consisting of multifaceted interventions (comprehension, fluency, writing) designed to facilitate student skill acquisition in reading must be implemented in a way that is consistent with the underlying theory and principles guiding the study's design and reflect the contextual processes that affect program delivery, such as organizational structure and culture of participating schools.

Treatment integrity may be assessed both quantitatively and qualitatively. With respect to quantitative assessment of treatment integrity, a fidelity score can be obtained by calculating the percentage of the intervention component that was implemented fully or estimating the average (e.g., mean) degree to which the treatment or program was implemented (Gersten, Fuchs, Coyne, Greenwood, & Innocenti, 2005). Qualitative assessment of treatment integrity could involve the use of tools such as interviews, focus groups, and observations. Clearly, the use of both quantitative and qualitative techniques for assessing treatment integrity would yield the greatest insights into treatment integrity, and most likely lead to identification of *implementation bias*—a phrase coined by Onwuegbuzie (2003a) to refer to the discrepancy between the planned intervention and the way it is implemented in the study. Implementation bias threatens the internal validity (i.e., "approximate validity with which we infer that a relationship between two variables is causal"; Cook & Campbell, 1979, p. 37) of quantitative findings and internal credibility (i.e., "truth value, applicability, consistency, neutrality, dependability, and/or credibility of interpretations and conclusions within the underlying setting or group"; Onwuegbuzie & Leech, in press, p. 4) of qualitative findings.

Whatever technique(s) is used to assess treatment integrity, it is essential to determine whether the level or degree of implementation is consistent across different conditions and intervention providers. The more information that is gleaned about the intervention at various stages of the study, the better the special education researcher will be able to put the findings in their appropriate context. As before, use of treatment integrity techniques only lead to a mixed-methods study if either (a) both quantitative and qualitative strategies are used at one or more phases of the study (e.g., pre-study phase, post-study phase), or (b) an approach (e.g., quantitative) is used to assess treatment integrity that is different from the approach used in the main study (e.g., qualitative).

As noted by Boudah and Lenz (2001), interventions may be classified as being either direct or indirect. According to these authors,

> direct intervention occurs when a problem (dependent variable) is identified and researchers or participants intervene in some way to address or solve the problem (independent variable). Measurement of the dependent variable then occurs to evaluate the effects of the independent variable. Direct intervention is associated with experimental and quasi-experimental research, connoting conditions and controls, hypothesis testing, and quantifiable outcomes. (p. 149)

In contrast, Boudah and Lenz note that

> Indirect intervention occurs when researchers study a phenomenon or problem and do not deliberately deploy an experimental variable or treatment within the setting. Indirect observation can be *intentional* or *unintentional* and can occur in qualitative as well as experimental research. Indirect interventions that are intentional occur in qualitative inquiry (as well as quantitative research that is descriptive) when researchers, as said, study a phenomenon without overt experimental intervention into a setting. When researchers later report the findings and conclusions, however, *stakeholders* may be motivated to subsequently intervene into structures and organizations associated with the situation to promote change (Peshkin, 1993). Thus, the researcher intentionally intervenes into the setting, but indirectly. . . . Unintentional intervention is a more subtle form of intervention. . . It is found in research efforts where intervention and change occur *as a result* of the research process. It occurs in the setting during the course of the study, rather than afterward. [emphasis in original] (p. 150)

In slight contrast to Boudah and Lenz (2001), we subdivide interventions into *explicit interventions* and *implicit interventions*. We define explicit interventions the same way as Boudah and Lenz define direct intervention. However, we define implicit intervention as the setting or context that prevails that is not deliberately manipulated by the researchers when studying a phenomenon.

Although the treatment integrity rationale for conducting a mixed-methods investigation is most applicable to studies in which the quantitative phase represents either experimental or quasi-experimental research designs, it is often applicable to other quantitative research designs (e.g., correlational, descriptive), as well as qualitative designs (e.g., case study, phenomenological, ethnographic). For example, if researchers were interested in conducting a correlational study to examine the relationship between time on task and performance among students with attention deficit/hyperactivity disorder (ADHD), they should not only collect quantitative data pertaining to these independent and dependent variables, it would be wise also to collect qualitative data about the setting (i.e., implicit intervention) in which these constructs are being measured. Such setting information might include collecting interview data pertaining to teachers' levels of confidence and teachers' levels of stress when implementing instruction. Indeed, any relationship found between time on task and performance in a setting might be significantly different from that in another setting. Consequently, collecting qualitative information in correlational (and descriptive) studies would represent utilizing condition-seeking methods that provide the researchers with data about (implicit) treatment integrity. Similarly, in qualitative studies, quantitative data may be used to glean information about (implicit) treatment integrity. For instance, in conducting a qualitative investigation of the experiences of students with ADHD, quantitative information such as number of discipline referrals would provide (implicit) treatment integrity data.

Significance Enhancement

Significance enhancement represents mixing quantitative and qualitative techniques for the rationale of enhancing researchers' interpretations of data. A

researcher can use qualitative data to enhance statistical analyses, quantitative data to enhance qualitative analyses, or both. Even though researchers working with quantitative data traditionally use statistical analyses and those working with qualitative data are more apt to utilize qualitative data analyses, quantitative and qualitative data analysis techniques may be used side-by-side to enhance the interpretation of *significant* findings in special education research (Onwuegbuzie & Leech, 2004).

Use of qualitative data in statistical analyses. The two most common ways for qualitative data analyses to provide more insight on significant findings emerging from statistical analyses are concurrently and sequentially, yielding concurrent mixed analyses and sequential mixed analyses (Onwuegbuzie & Leech, 2004; Onwuegbuzie & Teddlie, 2003). In concurrent mixed analyses, quantitative and qualitative data are collected at approximately the same point in time, and the data analysis typically does not occur until *all* the data (i.e., both quantitative and qualitative data) have been collected. Questionnaires that extract both quantitative and qualitative data may be subjected to concurrent mixed analyses.

For example, let us suppose that researchers were interested in examining the relationship between levels of anxiety and academic performance among elementary school students identified as having a learning disability. These investigators could administer a Likert-format scale measuring self-concept that has been found consistently to possess adequate psychometric properties. Then, they could correlate scores from the anxiety measure with a set of achievement scores. A correlation that was both statistically and practically significant would suggest an important relationship between these two variables; however, because of the correlational design used, causal statements would not be justified. Including one or more open-ended items asking students to describe the role that anxiety plays in their perceptions of instructional effectiveness could enhance the meaningfulness of this relationship. That is, the extent to which respondents indicate that anxiety negatively impacts their levels of performance would provide the researchers with more justification to make causal statements. Thus, the inclusion of qualitative data analyses would enable students not only to answer questions of who, where, how many, how much, and what is the relationship between specific variables, they also would be able to address *why* and *how* questions.

Concurrent mixed analyses also can be used in the quantitative phase of studies by *qualitizing* data, a common term used by mixed-methods researchers to denote a process by which quantitative data are converted into data that may be analyzed qualitatively (Tashakkori & Teddlie, 1998). One way of qualitizing data is to use narrative profile formation (i.e., modal profiles, average profiles, holistic profiles, comparative profiles, normative profiles), wherein narrative descriptions are constructed from statistical data.

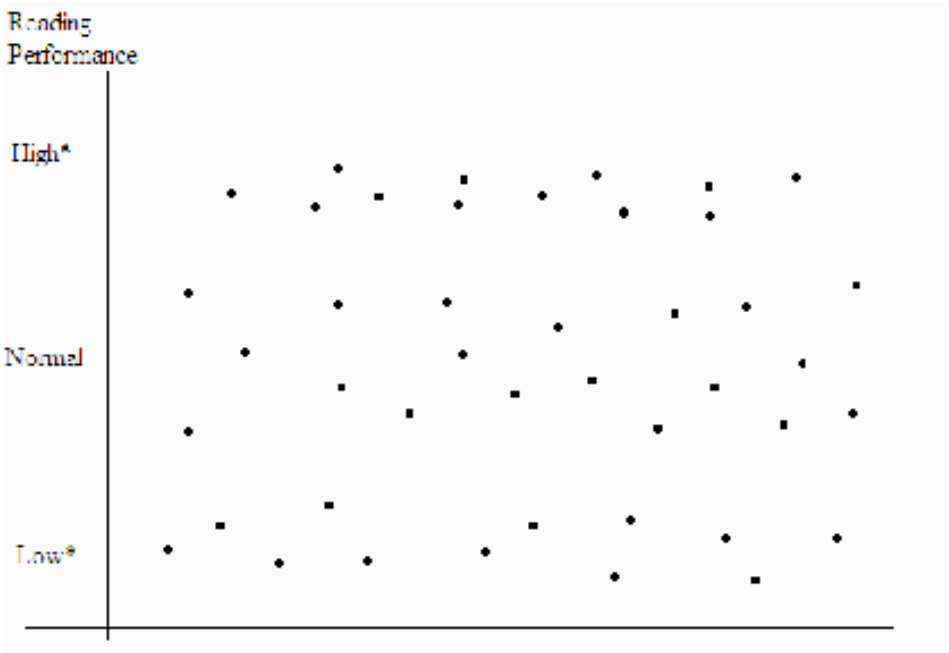
In sequential mixed analyses, "multiple approaches to data collection, analysis, and inference are employed in a sequence of phases" (Tashakkori & Teddlie, 1998, pp. 149–150). Here, the data analysis always begins before all the data are collected. When the qualitative data analysis phase follows the quantitative data analysis phase, it is called a sequential quantitative-qualitative analysis. According to Onwuegbuzie and Teddlie (2003), this form of analysis involves "forming groups of peoples/settings on the initial basis of [quantitative] data and then comparing the groups on

[qualitative] data (subsequently collected or available)" (Tashakkori & Teddlie, 1998, p. 135). Sequential quantitative-qualitative analysis techniques that can enhance statistical results include those identified by Onwuegbuzie and Teddlie (2003): (a) qualitative contrasting case analysis, (b) qualitative residual analysis, (c) qualitative follow-up interaction analysis, and (d) qualitative internal replication analysis.

Qualitative contrasting analysis involves first using descriptive statistical techniques (e.g., total, mean, *z*-score) on some construct (e.g., achievement), and then identifying a proportion (e.g., 25%) or a specific number of those who obtained the highest and lowest scores on the quantitative measure. Second, new qualitative data (e.g., observations, interviews, focus groups) are collected on the highest- and lowest-scoring groups, followed by a qualitative analysis (e.g., method of constant comparison) of the newly collected data, in order to determine why the two groups differed on the numerical measure.

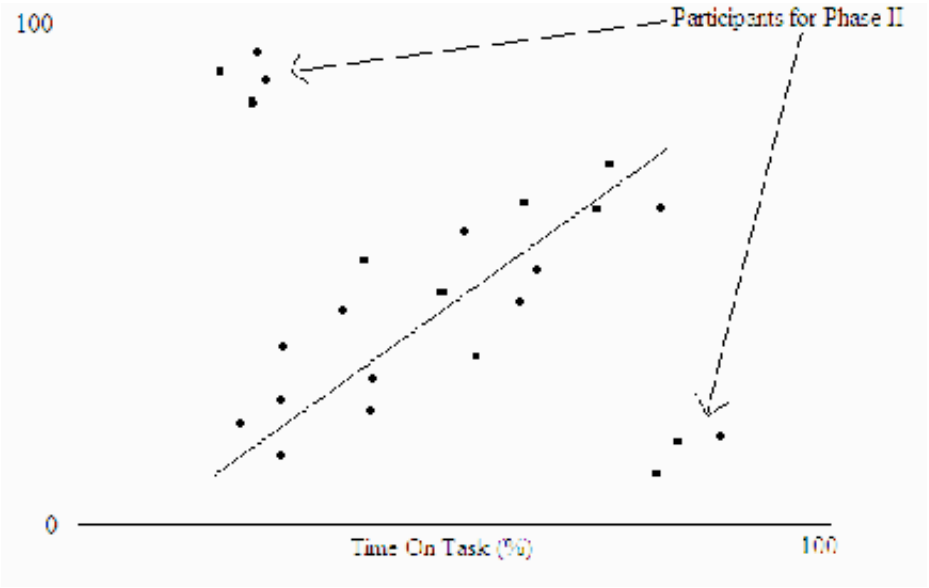
An example of qualitative contrasting analysis is presented in Figure 3. In this example, the reading comprehension scores of fifth-grade students are displayed. Specifically, in Phase I, the scores are separated into low, medium, and high groups based on pre-existing normative data. As illustrated, in Phase II, qualitative data are collected (e.g., via interviews, observations, focus groups) on selected members of the low and high groups, which are then compared.

Qualitative residual analysis involves conducting an analysis (e.g., multiple regression), followed by a residual analysis on the selected model in order to identify any outliers (i.e., participants who do not fit the model). In the second phase, new



*Use these two groups for Phase II. Phase II includes interviews, observations, focus groups, etc.

Figure 3. Example of qualitative contrasting case analysis.



Note. Phase II includes interviews, observations, focus groups, etc.

Figure 4. Example of qualitative residual analysis.

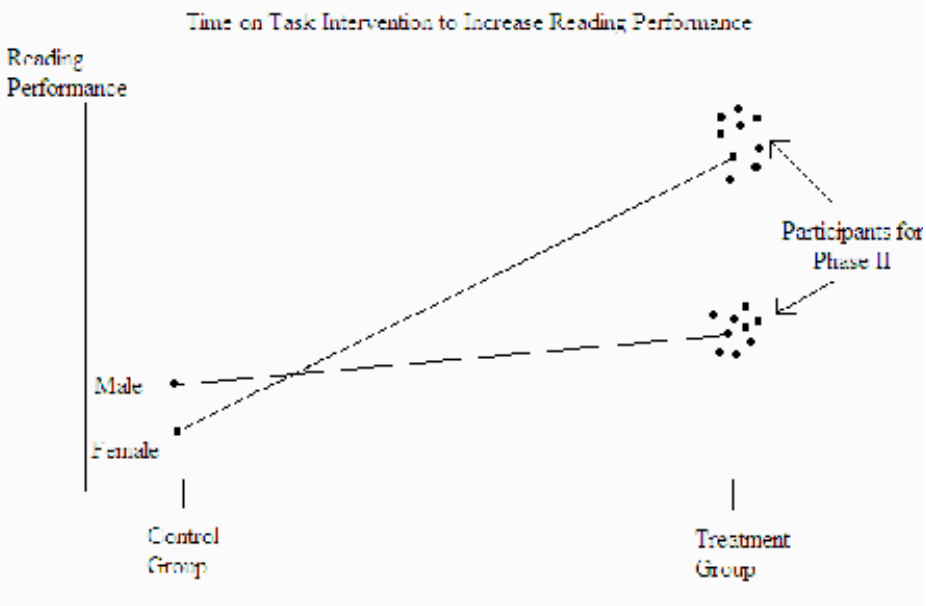
qualitative data are collected on participants who represent the outlying cases, followed by a qualitative analysis of the newly collected data with the goal of determining why these participants did not fit the chosen model.

An example of qualitative residual analysis is presented in Figure 4. This example shows the line of best fit pertaining to a regression analysis used to examine the relationship between time on task and reading comprehension of fifth-grade students. Specifically, in Phase I, for each study participant, the difference between the observed and predicted value (i.e., residual) is computed. As illustrated, in Phase II, qualitative data are collected (e.g., via interviews, observations, focus groups) on selected members of the cases who generate the largest residuals.

Qualitative follow-up interaction analysis involves using qualitative data analysis techniques to further investigate statistically significant interactions that emerge from inferential analyses.

An example of qualitative follow-up interaction analysis is presented in Figure 5. This example displays a two-factor (i.e., treatment group and gender) analysis of variance (ANOVA) used to examine the effect of the intervention (i.e., time of task), gender, and the treatment x gender interaction on reading comprehension among fifth-grade students. Specifically, in Phase I, the treatment-by-gender interaction is tested, and is clearly statistically significant. In Phase II, qualitative data (e.g., via interviews, observations, focus groups) are collected on selected male and female members of the experimental group, which are then compared.

Finally, *qualitative internal replication analysis* involves undertaking an inferential analysis, followed by an internal replicationanalysis on the selected model (e.g., jackknife analysis, cross-validation analysis) in order to determine internal replication



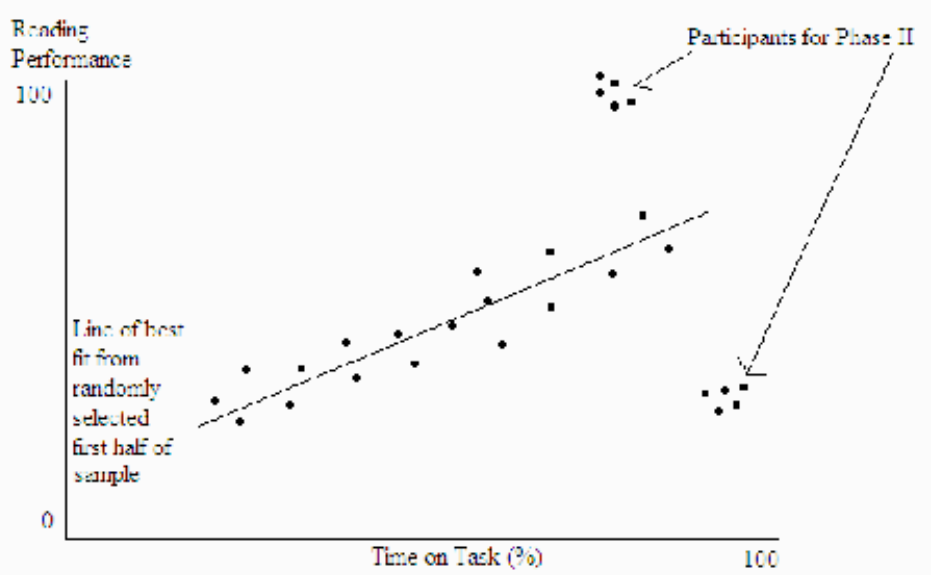
Note. Phase II includes interviews, observations, focus groups, etc.

Figure 5. Example of qualitative follow-up interaction analysis.

outliers (i.e., cases who unduly affect the internal replication analysis). In the second phase, new qualitative data are collected on participants who have been identified as outliers, followed by a qualitative analysis of the newly collected data in order to determine why they did not fit the chosen model.

An example of qualitative internal replication analysis is presented in Figure 6. In this example, the sample of fifth graders is split randomly into two subsamples. Data from the first sample are subjected to a regression analysis to examine the relationship between time on task and reading comprehension. The line of best fit (i.e., regression parameters) is then used to see how well the second sample fit the model derived from the first sample. Specifically, in Phase I, for each study participant in the second subsample, the difference between the observed and the predicted value is computed, with the largest differences indicating students in the second subsample who least fit the model. As illustrated, in Phase II, qualitative data are collected (e.g., via interviews, observations, focus groups) on selected members of those cases who least fit the model.

Use of statistics in qualitative analyses. In a similar manner, statistical analyses may be used to enhance qualitative data analyses via concurrent mixed analyses and sequential mixed analyses. With respect to concurrent mixed analyses, the most common way of combining qualitative analysis with a quantitative analysis is by *quantitizing* data, another common term used by mixed-methods researchers to denote transforming qualitative data to a numerical form (Tashakkori & Teddlie, 1998). That is, when researchers quantitize data, "qualitative themes are numerically represented, in scores, scales, or clusters, in order more fully to describe and/or interpret a target phenomenon" (Sandelowski, 2001, p. 231). Quantitizing often involves reporting



Note. Each • is a coordinate that represents a combination of independent (i. e., time on task) and dependent (i.e., reading performance) measures pertaining to a participant from the randomly selected second half of sample.
Phase II includes interviews, observations, focus groups, etc.

Figure 6. Example of qualitative internal replication analysis: Qualitative follow-up of cross-validation.

effect sizes associated with qualitative results (Onwuegbuzie, 2003b; Sandelowski & Barroso, 2003), which can range from manifest effect sizes (i.e., counting qualitative data in order to determine the prevalence rates of observations, words, or themes) to latent effect sizes (i.e., quantifying nonobservable content, for example, by factor-analyzing emergent themes; cf. Onwuegbuzie, 2003b).

In sequential qualitative-quantitative analysis, an initial qualitative data analysis leads to identification of groups of individuals who are similar in some way to each other. These groups are then compared to each other using either existing quantitative data, or quantitative data that are collected after the initial qualitative data analysis (Onwuegbuzie & Teddlie, 2003).

Onwuegbuzie and Teddlie (2003) have conceptualized the following types of sequential qualitative-quantitative analyses: (a) quantitative extreme case analysis and (b) quantitative negative case analysis. Quantitative extreme case analysis involves first conducting a qualitative data analysis, followed by a legitimation analysis (i.e., validity checks), in order to determine the extreme cases. In the second phase, new quantitative data are collected on all cases, followed by a quantitative analysis (e.g., *t*-test) of the newly collected quantitative data, wherein the extreme and nonextreme cases are compared, in order to determine why the former cases were so extreme. In studies involving an intervention or a treatment, in the second or subsequent phase(s), the researcher may investigate statistical artifacts such as regression toward the mean (Campbell & Kenny, 1999).

Quantitative negative case analysis involves undertaking a qualitative data analysis, followed by a legitimation analysis, in an attempt to identify negative cases (i.e., participants who do not fit the interpretation or initial theory). In the second phase, new quantitative data are collected on all cases, followed by a quantitative analysis (e.g., t-test) of the newly collected data, in which the negative and nonnegative cases are compared, in order to determine why the former did not fit the model in the first phase.

Model Incorporating the Rationale and Purpose for Conducting Mixed-Methods Research in Special Education

In the previous section, we presented a typology consisting of four broad rationales and 65 purposes.[4] As illustrated in the examples, each of the rationale types and most of these purposes are applicable at the following three phases of the investigation: before the study, during the study, or after the study.[5] With respect to the rationale types, participant enrichment can lead to mixing of approaches at any of the three phases of a study (i.e., before, during, after). For example, a quantitative study may be transformed to a mixed-methods study via the participant enrichment rationale if the researcher uses qualitative techniques to identify obstacles to the recruitment and consent of participants or to prebrief them (i.e., before), to replace participants who dropped out of the study (i.e., during), or to debrief participants (i.e., after). Further, a qualitative study may be transformed to a mixed-methods study via the integrity fidelity rationale if the researcher uses quantitative techniques to assess the interrater reliability of observers before the study, during the study, or after the study.

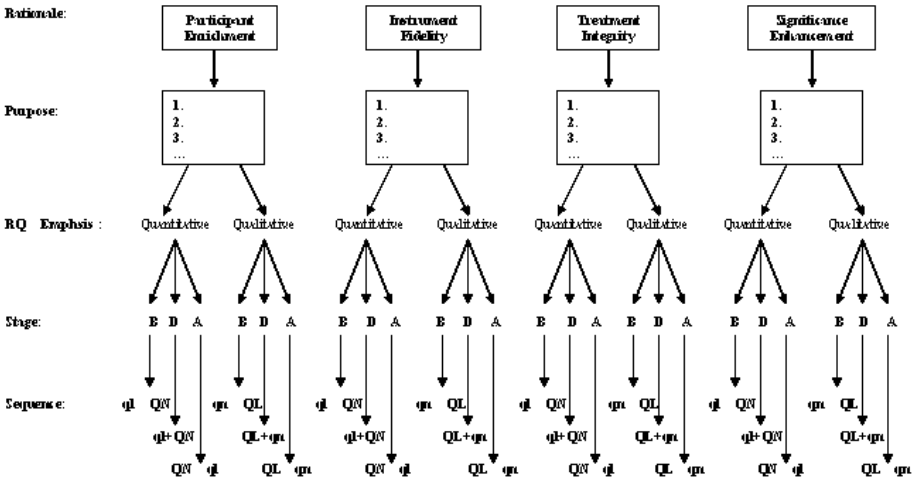
A quantitative study may be transformed to a mixed-methods study via the treatment integrity rationale if the researcher uses qualitative techniques to refine interventions during a pilot study (i.e., before), to gain more information about the intervention (i.e., during), or to determine the level of implementation of an intervention (i.e., after). A qualitative study may be transformed to a mixed-methods study via the significance enhancement rationale if the researcher uses quantitative techniques to use quantitative findings from a pilot study to inform the qualitative procedures (i.e., before), to triangulate the qualitative findings (i.e., during), or to determine the effect size of qualitative results (i.e., after). These are only a few examples of the myriad ways of illustrating how qualitative approaches can convert a mono-method study to a mixed-methods investigation and how quantitative approaches can convert a mono-method study to a mixed-methods inquiry.

Once the rationale type(s), purpose(s) for mixing, and the mixing phase(s) of the investigation have been selected, the researcher can use the research question(s) to determine the paradigm emphasis (i.e., deciding whether to give the quantitative or qualitative components of the study the dominant status or give both components

4. This list of 65 research purposes for conducting mixed-methods studies, although comprehensive, is by no means exhaustive.

5. Sandelowski (1996) and Creswell, Fetters, and Plano Clark (2005) conceptualized that qualitative data can be collected and analyzed before, during, and after the study. However, in both of these conceptualizations, the qualitative phase was treated as the less dominant phase that was nested within the quantitative phase. Also, their conceptualizations only pertained to nesting or embedding of a qualitative phase within intervention (i.e., experimental) studies. Our use of this conceptualization is broader because it is applicable to *all* mixed-methods studies, regardless of the quantitative and qualitative research design, and irrespective of which approach (i.e., quantitative or qualitative) is dominant.

equal status). Thus, decisions made regarding the rationale type(s), purpose(s) for mixing, mixing phase(s), and paradigm emphasis lead to the determination of the major elements of the research design. This four-dimensional model is outlined in Figure 7. We call this a Rationale and Purpose (RAP) model for designing mixed-methods studies. By using our RAP model, which involves making four sets of decisions, special education researchers will get the most out of their mixed-methods research designs.



Note. B = Before Study; D = During Study; A = After Study; QN/qn = Quantitative; QL/ql = Qualitative; Uppercase = Dominant; Lowercase = Less Dominant; "-" = Sequential; "+" = Concurrent.

Figure 7. Four-dimensional rationale and purpose (RAP) model for designing mixed-methods studies.

Heuristic Examples from the Special Education Literature

This section provides two compelling examples of how the RAP model may be used both to classify and identify the rationale and purpose for mixing quantitative and qualitative approaches. Both investigations were selected from a list of nine articles published in the *Journal of Special Education* from 2000 through 2005 identified by Collins et al. (2006).

Study 1

Riggs and Mueller (2001) conducted a study utilizing quantitative and qualitative methodologies. The rationale for conducting this study was to provide information about three concerns that have evolved as the number of paraeducators employed in school districts has increased: (a) defining the job roles of paraeducators and their supervisors, (b) the quality of professional training and environmental support, and (c) the responsibilities of paraeducators towards implementing direct instructional services while working in inclusive settings. Specifically, the purpose of this study was to examine paraeducators' perceptions of the impact of district policies upon

their employment conditions and paraeducators' satisfaction with their employment conditions while employed in inclusive public school settings. Employment conditions were operationalized as: district policies regarding hiring and deployment, job responsibilities within inclusive classrooms, and professional training and environmental support.

Paraeducators' satisfaction with their employment was assessed by their retention rates and the quality of their community-based relationships. The qualitative data consisted of transcriptions of audio-taped guided interviews of 23 paraeducators. Descriptive codes that evolved from the qualitative analysis of the interviews were collapsed into broader themes focusing on topics such as administrative and policy issues, professional relationships, and job satisfaction.

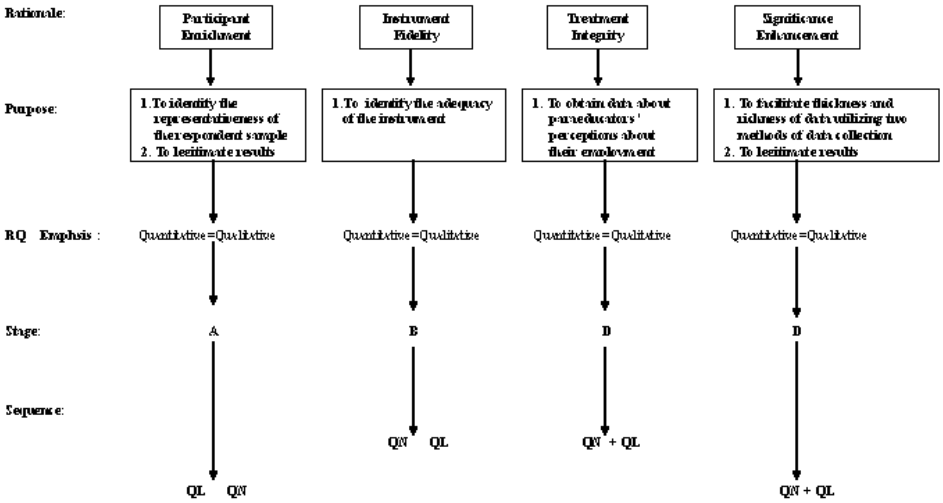
The quantitative phase of the study consisted of descriptive analysis (i.e., frequencies and percentages) of paraeducators' responses to a 100-item structured questionnaire developed for the study. The questionnaire was designed to obtain information from paraeducators regarding their job responsibilities, professional training, and their perceptions of the support they received within the environment. The sample completing the questionnaire comprised 758 paraeducators. Prior to data collection, the questionnaire was piloted with 20 paraeducators. After data collection, 20 randomly selected paraeducators, who had not responded to the initial request to participate in the research, were asked to complete and return the questionnaire. The responses of the post-study sample were compared to the responses of the 758 paraeducators to determine if differences existed between the two groups. Finally, a small percentage of the 758 respondents who completed the questionnaire ($n = 20$) agreed to complete a log of the time spent on their duties and responsibilities in the inclusive settings. These data were collected and compared to the estimates (i.e., percentages of time) produced by the 20 respondents on the eight categories of "duties and responsibilities" outlined on the questionnaire. At the data interpretation stage, the authors identified district policies, administrative issues, professional preparation, roles and responsibilities, and the quality of community relationships as important factors impacting paraeducators' employment conditions within inclusive settings.

Riggs and Mueller (2001) utilized a partially mixed-method design in which the quantitative and qualitative analyses were not mixed within and across any stage of the study until the data interpretation stage. The authors collected most of the data concurrently; that is, the quantitative and the qualitative data were collected at approximately the same point in time. However, they also collected some qualitative data before the study as part of a small pilot study (i.e., to identify the adequacy of the instrument) and after the study on the nonrespondent sample (i.e., to identify the representativeness of the respondent sample and legitimate the results). Based upon the purpose and the research questions guiding the study's design, at the data interpretation stage, both quantitative data and qualitative data were given equal status in forming interpretations and recommendations. The intent of the researchers was to utilize these findings to inform policy and to develop subsequent studies.

According to the RAP model, the rationale and purpose for using mixed-methods were *participant enrichment* (i.e., to identify the representativeness of the respondent sample and legitimate the results; after study); *instrument fidelity* (i.e., pilot study;

before study); and *significance enhancement* (i.e., to facilitate the thickness and richness of data by utilizing two methods of data collection and to legitimate results; during study). In addition, data collection was designed to evaluate *treatment integrity* of an indirect intervention (Boudah & Lenz, 2001) by obtaining data concerning paraeducators' perceptions about their employment conditions; particularly, their job roles and responsibilities, the quality of professional training, and environmental support while working in inclusive settings (i.e., during study).

By using the RAP model, the researchers could have optimized their design in a number of ways. For example, in a quest for participant enrichment, the researchers could have obtained important information and strengthened the study's inferences by identifying and further examining outlying (i.e., deviant) cases within the sample. Figure 8 provides a visual representation of the match between this study's components and the RAP model.



Note. B = Before Study; D = During Study; A = After Study; QN/qn = Quantitative; QL/ql = Qualitative; Uppercase = Dominant; Lowercase = Less Dominant; "-" = Sequential; "+" = Concurrent.

Figure 8. Visual representation of the match between Riggs and Mueller's (2001) study components and the RAP model.

Study 2

A study conducted by Jitendra, DiPipi, and Perron-Jones (2002) is an example of a single-subject design that incorporated both qualitative and quantitative methods. The purpose of this study was to measure the impact of strategy training on the mathematical performance of four middle school students with learning disabilities who were low performing in mathematics. These researchers utilized a multiple-probe-across-participants design that included data collection at four distinct stages: baseline, treatment, maintenance, and response generalization.

In the first stage of the study, quantitative data were collected that measured students' rate of accuracy when solving word problems and the degree to which students generalized their performance to novel problems. In the treatment stage, students

were given strategy instruction designed to facilitate their levels of conceptual and procedural understanding of the steps involved in solving word problems. Student mastery of each strategy was determined when the student obtained 100% accuracy on problems presented in two sessions. In the response generalization stage and the maintenance condition stage, each student's rate of accuracy while solving word problems was assessed, and a mean correct score in terms of percentage correct was tabulated per student. To validate the students' scores on the word problem tests, two evaluators (dassroom teacher and second author) independently rated and scored each test. In each experimental condition, the interscorer agreement was 100% across all students' word problem tests. To maintain treatment integrity, approximately 30% of the strategy training sessions were observed by two independent observers. The observers completed a checklist documenting that 10 critical lesson components were embedded in the observed sessions.

At the conclusion of the study survey data were collected. These data consisted of students' responses to a questionnaire that utilized a 5-point Likert-format scale measuring students' perceptions of the effectiveness of and their satisfaction with the various strategies. Students also responded to two open-ended questions that probed their perceptions of the most liked and the least liked aspects of solving multiplication and division word problems. Finally, a 5-point Likert-format scale measured the classroom teacher's impression of the strategies in the areas of effectiveness, efficiency, ease of implementation, application, and generalization.

The qualitative data consisted of students' and their teacher's written comments culled from the two questionnaires and the teacher's notes and observations obtained when the students were solving the word problems. Overall, these data indicated that both the students and the classroom teacher were positive in their evaluations of the strategies. Based upon the interpretation of the quantitative data, the researchers concluded that the strategy training had a positive impact upon the four students' rate of accuracy while solving word problems and upon students' conceptual understanding of the process of solving word problems. Results also indicated that the strategy training had a positive impact upon the students' levels of performance in the maintenance and generalization conditions.

Jitendra et al. (2002) employed a partially mixed-method analysis in which the quantitative and qualitative analysis were not mixed within and across any stage of the study until the data interpretation stage. The authors collected both sets of data concurrently; that is, the quantitative and the qualitative data were collected at approximately the same point in time. Based upon the purpose and the research questions guiding the study's design, at the data interpretation stage, the quantitative data were dominant compared to the qualitative data. The addition of qualitative data, which turned the study into a mixed-methods research design, occurred during the study. However, the researchers also collected some qualitative data before beginning the study, in the form of a teacher interview, to identify students who had not reached mastery level in mathematical problem solving during criterion testing.

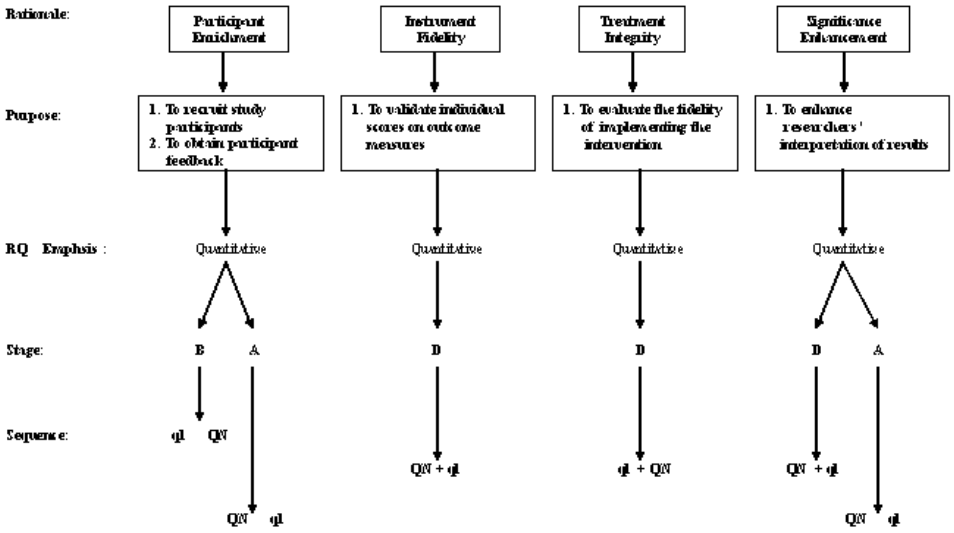
According to the RAP model, one rationale and purpose for the researchers using mixed methods was *participant enrichment*—to recruit study participants (i.e., before study) and obtain the participants' feedback to results by administering a follow-up survey (i.e., after study). A second rationale and purpose for using mixed methods

was *instrument fidelity*—to validate individual scores on outcome measures (i.e., during study).

A third rationale and purpose for the researchers using mixed methods was *treatment integrity* (i.e., observer checklist to evaluate the fidelity of implementing the intervention; during study). Finally, a fourth rationale and purpose for using mixed methods was *significance enhancement* (i.e., enhance the researchers' interpretation of results; during study, after study)—specifically, to expand the interpretation of the quantitative results by obtaining qualitative data from students and teacher about the effectiveness and utility of the strategy training.

Although collecting and analyzing both forms of data revealed valuable information, the researchers could have enhanced their results and the study's implications by concurrently implementing data collection and data analysis in the form of student journals during the intervention phase. That is, at each stage of the strategy intervention, students could have been asked to document their feelings about using the various strategies while problem solving. As per the RAP model, the teacher field notes and observations and the student journals also could have been analyzed during the intervention phase to facilitate assessment of treatment integrity—in particular, to identify barriers that could impede and facilitators that could improve the intervention.

As was the case for Riggs and Mueller's (2001) investigation, use of the RAP model could have helped the researchers to strengthen their design even further. Figure 9 provides a visual representation of the match between this study's components and the RAP model.



Note: B = Before Study; D = During Study; A = After Study; QN/qn = Quantitative; QL/ql = Qualitative; Uppercase = Dominant; Lowercase = Less Dominant; "-" = Sequential; "+" = Concurrent.

Figure 9. Visual representation of the match between Jitendra et al.'s (2002) study components and the RAP model.

Thus, the RAP model is appropriate in mixed-methods studies regardless of the sample size. As seen from Jitendra et al.'s (2002) inquiry, our framework may be used even in single-subject designs, which are used frequently in research focused on special populations, providing further evidence of the flexibility of the RAP model. The RAP model may be used to classify the rationale and purpose for mixing quantitative and qualitative approaches (i.e., a posteriori), allowing readers more access to information about specific procedures used by the researcher(s) and the sequence and timeline involved. However, the model has its greatest utility when used to design mixed studies (i.e., a priori) because it provides a framework for researchers to optimize the mixing of the quantitative and qualitative components.

Summary and Conclusions

The purpose of the present article was to provide a framework for determining the rationale and purpose for conducting mixed-methods research in special education. In particular, we presented the RAP model to demonstrate how mixed-methods investigations may be planned according to (a) general rationale for using mixed methods (e.g., treatment integrity); (b) purpose of mixing; (c) stage of study where mixing occurs (i.e., before, during, or after); and (d) emphasis of approach (i.e., quantitative vs. qualitative) derived from the research question(s). This model yields a four-dimensional representation for planning mixed-methods research. A plethora of typologies exist for selecting mixed-methods research designs (e.g., Creswell et al., 2003; Johnson & Onwuegbuzie, 2004; Leech & Onwuegbuzie, 2005b; Maxwell & Loomis, 2003; Morgan, 1998; Morse, 1991; Onwuegbuzie & Johnson, 2004; Patton, 1990; Tashakkori & Teddlie, 1998, 2003b). However, as noted by Leech and Onwuegbuzie (2005), these typologies "either are (a) unnecessarily complicated, encompassing a myriad of designs; (b) too simplistic inasmuch as they do not include the most important criteria needed by mixed methods researchers; or (c) do not represent a consistent system" (p. 5). Further, with most of these typologies, the qualitative phase is treated as the less dominant phase nested within the quantitative phase. Thus, the qualitative research serves as mere "add-ons" to experimental research studies. This representation presupposes that mixed-methods designs should give primacy to quantitative approaches.

While this bias towards experimental research might be consistent with the endorsement of scientifically based research inherent in the No Child Left Behind Act of 2001 and the WWC standards, such a representation unnecessarily marginalizes qualitative research. Rather than the quantitative component always supervening on the qualitative component, the purpose and rationale of mixing—alongside the goal, objective, and research question(s)—should determine the relationship of the quantitative and qualitative components in mixed-methods designs. The RAP model does not have a bias towards either quantitative or qualitative approaches, allowing the mixed-methods design to emerge logically and systematically. Thus, we believe that our framework for planning mixed-methods studies is both more comprehensive and flexible than existing mixed-methods design typologies.

Finally, although we have provided our framework within the context of special education research, we believe that it is applicable for all fields in the social and behavioral sciences. Further, the RAP model is flexible enough to incorporate other design

typologies. For example, the framework subsumes typologies in which the qualitative component is nested or embedded within the quantitative phase. Thus, we hope that researchers in special education and beyond will consider using the RAP model and, therefore, be able to design their mixed-methods studies in an optimal manner.

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