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A typology of mixed methods research designs

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Abstract The mixed methods paradigm is still in its adolescence, and, thus, is still relatively unknown and confusing to many researchers. In general, mixed methods research represents research that involves collecting, analyzing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon. Over the last several years, a plethora of research designs have been developed. However, the number of designs that currently prevail leaves the doctoral student, the beginning researcher, and even the experienced researcher who is new to the field of mixed methods research with the challenge of selecting optimal mixed methods designs. This paper presents a three-dimensional typology of mixed methods designs that represents an attempt to rise to the challenge of creating an integrated typology of mixed methods designs. An example for each design is included as well as a notation system that fits our eight-design framework.

Keywords Mixed methods · Research design · Mixed methods design

1 Introduction

Understanding the various types of research designs can be a daunting task for many beginning researchers, doctoral students, and others. For years, the choice has seemed to be dichotomous; one could choose either a quantitative design or a qualitative design. Yet, there is a third viable choice, that of mixed methods. Mixed methods research, which involves combining

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quantitative and qualitative approaches, is still in its adolescence, and thus, is still relatively unknown and confusing to many researchers. Compounding the issue even more is that there are various mixed methods research designs from which to choose. Thus, the purpose of this paper is to outline a typology of mixed methods research designs in order to help simplify their choices when attempting to use quantitative and qualitative approaches within the same research framework.

There have been numerous waves or phases in research. In many disciplines, the quantitative research paradigm, which incorporates multiple types of quantitative research designs, was the first and only research design choice (circa the 19th century). The quantitative research paradigm was considered 'research' because it was the first research paradigm that incorporated ontological, epistemological, axiological, rhetorical, and methodological assumptions and principles. At the turn of the 20th century, researchers who refuted the quantitative paradigm's assumptions and principles turned to the qualitative research paradigm. Between 1900 and 1950, according to Denzin and Lincoln (2000), was the first historical moment for qualitative research. It was then, shortly after this period during the 1960s, that the concept of mixing the two approaches was introduced. Since the 1960s mixed methods research has become more popular in many disciplines including education (Johnson and Onwuegbuzie 2004; Onwuegbuzie and Johnson 2004; Rocco et al. 2003), psychology (Waszak and Sines 2003), nursing (Morse 1991; Dzurec and Abraham 1993; Sandelowski 2001; Twinn 2003), sociology (Hunter and Brewer 2003), health sciences (Morgan 1998; Forthofer 2003), management and organizational research (Currall and Towler 2003), library and information science research (Onwuegbuzie et al. 2004), and program evaluation (Greene et al. 1989; Rallis and Rossman 2003).

Recently, there has been an increase in the number of mixed methods research studies. Several journals now routinely publish mixed methods research (e.g. *Field Methods*, *Educational Evaluation and Policy Analysis, Quality and Quantity*, *Evaluation, Evaluation Practice, Research in Nursing and Health, Research in the Schools, The Qualitative Report*), and the list is growing. Most of these published mixed methods studies have been utilized to answer questions that could not be answered by one paradigm alone. The increase in recognition of mixed methods is marked by the publication of a mixed methods handbook (Tashakkori and Teddlie 2003a) and a special issue on mixed methods research recently was published in an internationally refereed journal (Onwuegbuzie and Daniel 2006).

The mixed method movement is rising so fast that it has prompted John Creswell, a leading research methodologist and author, to predict that the mixed methods paradigm will be the leading paradigm within the next five years (John Creswell personal communication April 12, 2004). However, as noted by Teddlie and Tashakkori (2003, p. 3), "the [mixed methods] field is just entering its 'adolescence' and that there are many unresolved issues to address before a more matured mixed methods research area can emerge". One of these unresolved issues relates to research design. Indeed, Teddlie and Tashakkori (2003) identified research design issues as one of the six unresolved issues and controversies in the use of mixed methods research.

A major problem with the current state of affairs regarding mixed methods designs is that there are a plethora of designs in existence. In the Tashakkori and Teddlie (2003a) book alone, 35 mixed methods research designs are presented. This leaves the doctoral student, the beginning researcher, and even the experienced researcher who is new to the field of mixed methods research with the challenge of selecting optimal mixed methods research designs. Although, it is not possible for a typology of mixed methods designs to be exhaustive (Teddlie and Tashakkori 2003) because 'the actual diversity in mixed methods studies is far greater than any typology can adequately encompass' (Maxwell and Loomis 2003, p. 244), in an attempt

to simplify researchers' design choices, several researchers have developed typologies (e.g. Greene et al. 1989; Patton 1990; Morse 1991, 2003; Creswell 1994, 2002; Greene and Caracelli 1997; Morgan 1998; Tashakkori and Teddlie 1998, 2003b; McMillan and Schumacher 2001; Creswell et al. 2003; Maxwell and Loomis 2003; Onwuegbuzie and Johnson 2004; Johnson and Onwuegbuzie 2004). Unfortunately, many of 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.

Because of the problems associated with existing typologies, as noted by Tashakkori and Teddlie (2003b, pp. 680–681), 'someone needs to create an integrated typology of mixed methods research designs'. Therefore, the three-dimensional typology of mixed methods designs that we introduce below represents an attempt to rise to this challenge of creating an integrated typology of mixed methods designs.

2 Research as a continuum

In general, mixed methods research represents research that involves collecting, analyzing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon. Moreover, mixed methods research falls on a continuum from not mixed (i.e. monomethod designs) to fully mixed methods, with partially mixed designs occupying regions somewhere between monomethod designs and fully mixed method designs (Onwuegbuzie and Johnson 2004). Specifically, monomethods, at one end of the continuum, involve the exclusive use of either quantitative or qualitative research techniques in a study. Once a study combines quantitative and qualitative techniques to any degree, the study no longer can be viewed as utilizing a monomethod design. At this level, the study either is using a fully mixed design or a partially mixed design.

Fully mixed methods designs represent the highest degree of mixing research methods and research paradigm characteristics. This class of mixed research involves using both qualitative and quantitative research within one or more of the following or across the following four components in a single research study: (a) the research objective (e.g. the researcher uses research objectives from both quantitative and qualitative research, such as the objective of both exploration and prediction); (b) type of data and operations; (c) type of analysis; and (d) type of inference.

When undertaking a mixed methods study, the researcher uses qualitative research methods for one phase or stage of a research study and quantitative research methods for the other phase or stage of the research study. Thus, a qualitative and a quantitative research study are conducted either concurrently or sequentially. The major difference between partially mixed methods and fully mixed methods is that whereas fully mixed methods involve the mixing of quantitative and qualitative techniques within one or more stages of the research process or across these stages, with partially mixed methods, the quantitative and qualitative phases are not mixed within or across stages. Instead, with partially mixed methods, both the quantitative and qualitative elements are conducted either concurrently or sequentially in their entirety before being mixed at the data interpretation stage.

3 Three-dimensional typology of mixed methods designs

A content analysis of the various available mixed research designs has led us to conceptualize that these designs can be represented as a function of the following three dimensions: (a)

level of mixing (partially mixed versus fully mixed); (b) time orientation (concurrent versus sequential), and (c) emphasis of approaches (equal status versus dominant status). Level of mixing refers to whether the mixed research is partially mixed or fully mixed. Despite the fact that these designs lie on a continuum, they can still be classified as representing either partially mixed methods or fully mixed methods. Time orientation refers to whether the quantitative and qualitative phases of the research study occur at approximately the same point in time (i.e. concurrent) or whether these two components occur one after the other (i.e. sequential). Finally, emphasis of approach pertains to whether both qualitative and quantitative phases of the study have approximately equal emphasis (i.e. equal status) with respect to addressing the research question(s), or whether one component has significantly higher priority than does the other phase (i.e. dominant status).

The 2 (partially mixed versus fully mixed) X 2 (concurrent versus sequential) X 2 (equal status versus dominant status) matrix derived by crossing these three dimensions yields eight types of mixed research designs: (a) partially mixed concurrent equal status designs; (b) partially mixed concurrent dominant status designs; (c) partially mixed sequential equal status designs; (d) partially mixed sequential dominant status designs; (e) fully mixed concurrent equal status designs; (f) fully mixed concurrent dominant status designs; (g) fully mixed sequential equal status designs; and (h) fully mixed sequential dominant status designs. These designs are presented as a typology in Fig. 1. As can be seen from this figure, the boxes on the last line represent the eight mixed research designs. We believe that most mixed research studies use designs that can be classified as falling into one of these eight designs. That is, we believe that this typology is adequately comprehensive. Each of these eight designs is described below.

3.1 Partially mixed concurrent equal status design: P1

A partially mixed concurrent equal status design involves conducting a study that has two phases that occur concurrently such that the quantitative and qualitative phases have approximately equal weight. An example of this design is the study conducted by Onwuegbuzie and DaRos-Voseles (2001). These researchers examined the effectiveness of cooperative learning (CL) among graduate students enrolled in an introductory-level course in educational research. The study included a total of 193 participants; 81 students who were enrolled in course sections wherein CL groups were formed to undertake the major course requirements, and 112 in sections wherein all assignments were completed individually (IL). The quantitative facet of the study compared the CL and IL groups with respect to individual performance on midterm and final examinations. The qualitative facet of the inquiry involved students in both the CL and IL groups writing reflexive journals about their experiences in their respective research classes. The study of Onwuegbuzie and DaRos-Voseles can be classified as concurrent partially mixed research because the quantitative and qualitative portions of the study occurred at approximately the same point in time. That is, data were collected simultaneously. Also, the quantitative and qualitative portions of the study were not mixed until both data types had been collected and analyzed.

3.2 Partially mixed concurrent dominant status design: P2

A partially mixed concurrent dominant status design involves conducting a study with two facets that occur concurrently, such that either facet has the greater emphasis. The research undertaken by Senne and Rikard (2002) provides an example of this design. These

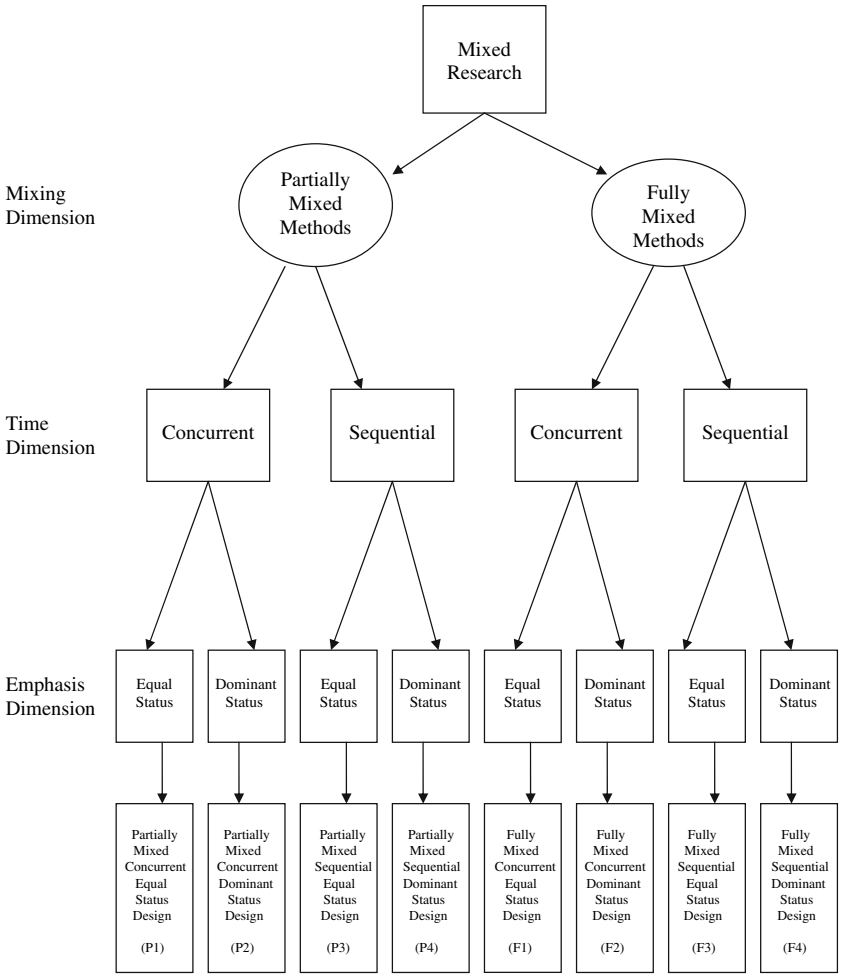

Fig. 1 Typology of mixed research

investigators undertook a comparative analysis of two types of PETE portfolio models (curricular interventions during the student teacher experience) in order to determine the effect of these models on student–teacher perceptions of the utility of the teaching portfolio and their professional growth. Both quantitative and qualitative data were collected in this study. During the quantitative facet of the study, which was given the least weight, the researchers administered an instrument that measured developmental growth (i.e. principled thinking and moral judgment reasoning). During the qualitative facet of the study, which took place concurrently with the quantitative component, the student teachers recorded their 15-week teaching experiences in weekly reflection logs. Further, the student teachers were asked to complete an eight-item questionnaire, which was designed for them to assess the portfolio process, the teacher education program as a whole, and the student teaching experience. Additionally, this instrument asked the student teachers to describe their achievements and overall professional growth. The quantitative and qualitative data were analyzed separately before being compared and inferences made.

3.3 Partially mixed sequential equal status design: P3

A partially mixed sequential equal status design involves conducting a study with two phases that occur sequentially, with the quantitative and qualitative phases having equal weight. A compelling example of sequential partial mixed method is Phase I of a comprehensive evaluation of the New Hope program. New Hope was a 2-year voluntary anti-poverty program that occurred in targeted inner-city neighborhoods in Milwaukee, Wisconsin. In this program, residents from these neighborhoods who worked for 30 h a week were given, when appropriate, a wage subsidy, health insurance, and child care benefits. Bos et al. (1999) conducted the initial quantitative evaluation of the New Hope program. Specifically, a randomized experiment was employed in an attempt to derive causal explanations of targeted program outcomes including poverty reduction, full-time employment, and child and family mental and physical well being. Bos et al. collected administrative records and responses to teacher and family surveys both at baseline and at the end of the 2-year program. The experimental and control groups were compared with respect to these quantitative data.

At the end of 2 years, the qualitative phase of the study began. Weisner (2000) followed up the first phase of the study conducted by Bos et al. (1999). This second phase incorporated an ethnographic study in order to obtain an intricate understanding of the meaningfulness of the participants' experiences during the first 2 years of the program (Weisner 2000). Here, a random sample of 45 families, approximately half from the treatment group and half from the control group, were interviewed, and their responses compared. As with the previous examples, the quantitative and qualitative data sets were analyzed separately, and mixing took place at the data interpretation stage.

3.4 Partially mixed sequential dominant status design: P4

A partially mixed concurrent dominant status design involves conducting a study with two phases that occur sequentially, such that either the quantitative or qualitative phase has the greater emphasis. For example, Hayter (1999, p. 984) conducted what he called a 'two-stage, mixed method study' to (a) describe the prevalence and nature of burnout in clinical nurse specialists in HIV/AIDS care working in community settings; and (b) examine the association between burnout and HIV/AIDS care-related factors among this group. In the first stage of the study, the quantitative phase, 32 community HIV/AIDS nurse specialists were administered measures of burnout and the psychological impact of working with people with HIV/AIDS, as well as a demographic survey. In the second stage, the qualitative phase, five nurse specialists were randomly sampled for semi-structured interview. In this study, the quantitative research represented the dominant phase.

3.5 Fully mixed concurrent equal status design: F1

A fully mixed concurrent equal status design involves conducting a study that mixes qualitative and quantitative research within one or more or across the following four components in a single research study: the research objective, type of data and operations, type of analysis, and type of inference. In this design, the quantitative and qualitative phases are mixed concurrently at one or more stages or across the components. Both elements are given approximately equal weight. An example of this design is the study conducted by Daley and Onwuegbuzie (2004). The investigators in this study examined male juvenile delinquents' causal attributions for others' violent behavior, and the salient pieces of information they utilize in arriving at these attributions. A 12-item questionnaire, the Violence Attribution Survey designed by Daley

and Onwuegbuzie, was used to assess attributions made by juveniles for the behavior of others involved in violent acts. Each item consisted of a vignette, followed by three possible attributions (i.e. person, stimulus, circumstance) presented using a multiple-choice format (i.e. quantitative phase), and an open-ended question asking the juveniles their reasons for choosing the responses that they did (i.e. qualitative phase). Participants included 82 male juvenile offenders who were drawn randomly from the population of juveniles incarcerated at correctional facilities in a large southeastern state. By collecting quantitative and qualitative data via the same instrument, the researchers mixed methods at the research objective stage. Also, they mixed methods at the data analysis and inference stages, using what they called a six-stage concurrent mixed-methods analysis, which utilized mixed data-analytic techniques.

3.6 Fully mixed concurrent dominant status design: F2

A fully mixed concurrent dominant status design involves conducting a study that mixes qualitative and quantitative research within one or more of, or across the aforementioned three components in a single research study. In this design, the quantitative and qualitative phases are mixed concurrently at one or more stages or across the stages. However, unlike the case for the F1 design, either the quantitative or the qualitative phase is given more weight. Collins' (2000) study provides an example of a fully mixed concurrent dominant status design. Specifically, Collins examined the relationship between elementary teachers' beliefs concerning National Council of Teachers of Mathematics (NCTM) recommendations, and the extent to which teachers believe it is feasible to implement these recommendations in their classrooms. Also studied was the extent to which teacher personal efficacy and outcome expectancy is influenced by students' regulatory styles, and the degree to which teachers' perceptions of the effectiveness and practicality of grouping strategies is influenced by students' self-regulatory styles. The researcher used the Teachers' Assessment of Mathematics Instruction (TAMI), an instrument developed for the study, to collect both quantitative and qualitative data simultaneously. Mixing occurred at the research objective and data analysis and inference stages of the research process.

3.7 Fully mixed sequential equal status design: F3

A fully mixed sequential equal status design involves conducting a study that mixes qualitative and quantitative research within one or more of, or across the stages of the research process. In this design, the quantitative and qualitative phases occur sequentially at one or more stages or across the stages. Both elements are given approximately equal weight. An example of this is Taylor and Tashakkori's (1997) study, in which teachers were classified into four groups based on their quantitative responses to measures of (a) efficacy (low versus high) and (b) locus of causality for student success (i.e. internal versus external). These four groups then were compared with respect to obtained qualitative data.

3.8 Fully mixed sequential dominant status design: F4

A fully mixed sequential dominant status design involves conducting a study that mixes qualitative and quantitative research within one or more of, or across the stages of the research process. In this design, the quantitative and qualitative phases occur sequentially at one or more stages or across the stages. It is similar to the F3 design, except either the quantitative or the qualitative phase is given more weight. An example of this is Waysman and

Savaya (1997), who evaluated a nonprofit agency (i.e. SHATIL) that provides organizational consultation and other support services to nonprofit agencies in Israel. The first phase of their study involved the use of qualitative techniques (focus groups and interviews) to obtain information about SHATIL, its clients and their concerns. The second phase, the quantitative phase, involved use of a questionnaire, whose items were more specific and focused. In the final phase (a second round of focus groups), involving an additional qualitative phase, the information elicited was even more specific and focused on one specific issue (i.e. sources of satisfaction and dissatisfaction). The data collected in each phase were used in the planning of the following phase, with the qualitative phases carrying the most weight in the study.

4 Notation system for mixed research

Morse (1991) is credited as being the first researcher to develop a notation system for use in mixed methods research. Since then, several mixed methods researchers have outlined their own notation systems; however, all these systems represent modifications of Morse's system. In Fig. 2, we have displayed a notation system that fits our eight-design framework. Like those of others, this system is a modification of Morse's representation. In Fig. 2, capital letters denote priority, the '+' sign represents a concurrent relationship and the '→' sign represents a sequential relationship. Using this notation yields 24 combinations between the qualitative and quantitative facets.

5 Summary and conclusions

Over the last 15 years, a myriad of mixed methods research designs has been conceptualized. Due to the number of designs available, selecting from among these designs often is a challenging task—thereby necessitating typologies. As noted by Teddlie and Tashakkori (2003), we believe that such typologies are needed because (a) they assist in providing the field with a flexible organizational structure, (b) they help to provide more credibility to the field of education in general and the social and behavioral sciences in particular by providing examples of research designs that are markedly different than monomethod designs, (c) they help to advance a common language for the mixed methods field, (d) they provide guidance and direction for researchers to design their mixed methods studies, and (e) they can be used to enhance the instruction of mixed methods research courses.

With this in mind, in the current paper, we introduced a typology of mixed methods research designs. The existing design typologies can be distinguished by criteria that differentiate the research designs they subsume. To date, several criteria have been identified, including purpose of study (e.g. triangulation versus complementarity versus initiation versus development versus expansion; Greene et al. 1989), theoretical framework of study (present versus absent; Greene and Caracelli 1997), time orientation (concurrent versus sequential; Morgan 1998), emphasis of approaches (equal status versus dominant status; Morgan 1998; Onwuegbuzie and Johnson 2004), and stage of integration (Tashakkori and Teddlie 1998). However, we believe that the following three criteria most distinguish mixed methods designs: level of mixing, time orientation, and emphasis of approaches. Crossing these three criteria led to eight mixed methods designs. We recognize that this typology is not exhaustive. However, we believe that most mixed methods studies can be represented by one of these eight designs.

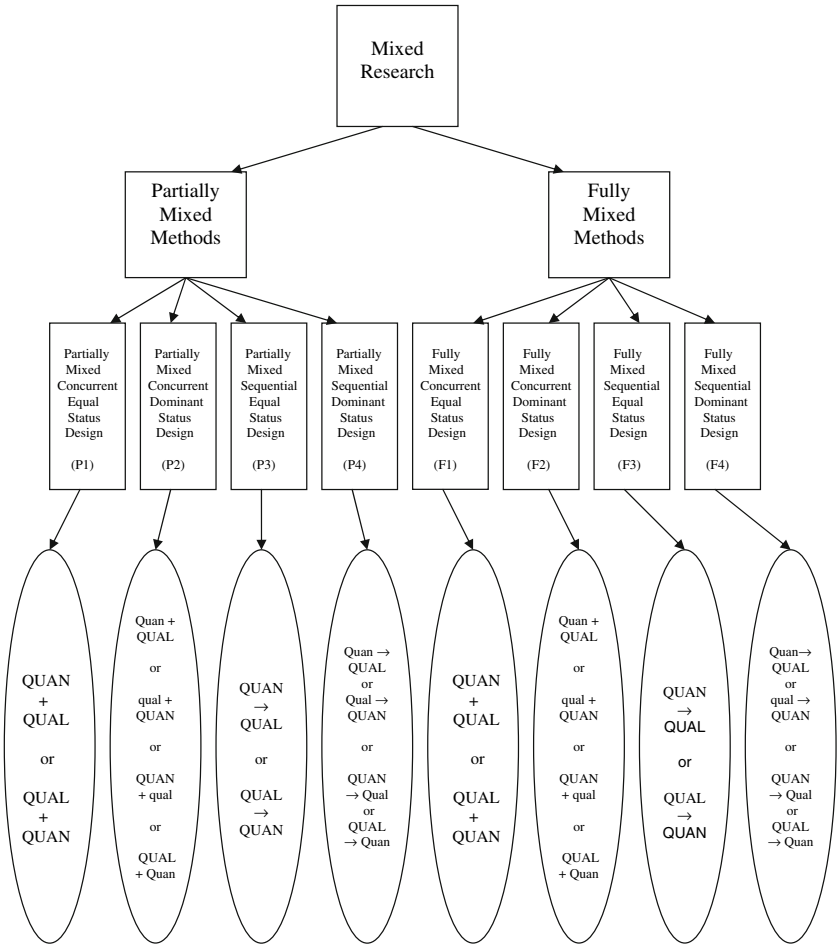

Fig. 2 Notational system for mixed methods designs

Conveniently, the present typology can incorporate other typologies. For example, the level of mixing dimension (i.e. partially mixed versus. fully mixed) subsumes Tashakkori and Teddlie's (1998) mixed model versus mixed methods dimension. Tashakkori and Teddlie (1998) define mixed models designs as representing studies that combine quantitative and qualitative approaches within different stages of the research process. Mixed methods designs are those that integrate quantitative and qualitative approaches in a single study or a multi-phased study, comprising the following five specific designs: sequential studies, parallel/simultaneous studies, equivalent status designs, dominant-less dominant designs, and designs with multilevel use of approaches wherein researchers utilize different techniques at different levels of data aggregation (see also Creswell 1994). Interestingly, sequential studies and parallel/simultaneous studies are subsumed by the time orientation dimension of our model; equivalent status designs and dominant-less dominant designs are subsumed by emphasis of approaches dimension; finally, designs with multilevel use of approaches also are subsumed by the level of mixing dimension. Other typologies similarly can be incorporated into our framework.

In mixed methods studies for which our current typology is inadequate, we encourage researchers to consider using one of the other typologies (e.g. Greene et al. 1989; Patton 1990; Morse 1991, 1998, 2003; Creswell 1994; Greene and Caracelli 1997; Tashakkori and Teddlie 1998, 2003b; McMillan and Schumacher 2001; Creswell 2002; Creswell et al. 2003; Maxwell and Loomis 2003; Onwuegbuzie and Johnson 2004; Johnson and Onwuegbuzie 2004). Alternatively, researchers could design their own typologies. In any case, whatever framework is used, we recommend that researchers thoughtfully create designs that effectively address their research objectives, purposes, and questions.

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