Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice

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This article discusses some procedural issues related to the mixed-methods sequential explanatory design, which implies collecting and analyzing quantitative and then qualitative data in two consecutive phases within one study. Such issues include deciding on the priority or weight given to the quantitative and qualitative data collection and analysis in the study, the sequence of the data collection and analysis, and the stage/stages in the research process at which the quantitative and qualitative data are connected and the results are integrated. The article provides a methodological overview of priority, implementation, and mixing in the sequential explanatory design and offers some practical guidance in addressing those issues. It also outlines the steps for graphically representing the procedures in a mixed-methods study. A mixed-methods sequential explanatory study of doctoral students' persistence in a distance-learning program in educational leadership is used to illustrate the methodological discussion.

Keywords: *mixed methods; quantitative; qualitative; design; survey; case study*

In recent years, more social and health sciences researchers have been using mixed-methods designs for their studies. By definition, mixed methods is a procedure for collecting, analyzing, and "mixing" or integrating both quantitative and qualitative data at some stage of the research process within a single study for the purpose of gaining a better understanding of the research problem (Tashakkori and Teddlie 2003; Creswell 2005). The rationale for mixing both kinds of data within one study is grounded in the fact that neither quantitative nor qualitative methods are sufficient, by themselves, to capture the trends and details of a situation. When used in combination, quantitative and qualitative methods complement each other and allow for a more robust analysis, taking advantage of the strengths of each (Green, Caracelli,

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and Graham 1989; Miles and Huberman 1994; Green and Caracelli 1997; Tashakkori and Teddlie 1998).

There are about forty mixed-methods research designs reported in the literature (Tashakkori and Teddlie 2003). Creswell et al. (2003) identified the six most often used designs, which include three concurrent and three sequential designs. One of those designs, the mixed-methods sequential explanatory design, is highly popular among researchers and implies collecting and analyzing first quantitative and then qualitative data in two consecutive phases within one study. Its characteristics are well described in the literature (Tashakkori and Teddlie 1998; Creswell 2003, 2005; Creswell et al. 2003), and the design has found application in both social and behavioral sciences research (Kinnick and Kempner 1988; Ceci 1991; Klassen and Burnaby 1993; Janz et al. 1996).

Despite its popularity and straightforwardness, this mixed-methods design is not easy to implement. Researchers who choose to conduct a mixed-methods sequential explanatory study have to consider certain methodological issues. Such issues include the priority or weight given to the quantitative and qualitative data collection and analysis in the study, the sequence of the data collection and analysis, and the stage/stages in the research process at which the quantitative and qualitative phases are connected and the results are integrated (Morgan 1998; Creswell et al. 2003). Although these issues have been discussed in the methodology literature and the procedural steps for conducting a mixed-methods sequential explanatory study have been outlined (Creswell 2003, 2005), some methodological aspects of this design procedure still require clarification. For example, how researchers decide on which method to assign priority in this design, how to consider implementation issues, how and when to connect the quantitative and qualitative phases during the research process, and how to integrate the results of both phases of the study to answer the research questions.

Providing some practical guidelines in solving those issues might help researchers make the right and prompt decisions when designing and implementing mixed-methods sequential explanatory studies. It might also provide additional insight into the mixed-methods procedures and result in more rigorous and reliable designs. It is also important to help researchers visually represent the mixed-methods procedures for their studies. Such graphical modeling of the study design might lead to better understanding of the characteristics of the design, including the sequence of the data collection, priority of the method, and the connecting and mixing points of the two forms of data within a study.

The purpose of this article is to provide such practical guidance when addressing methodological issues related to the mixed-methods sequential

explanatory design. We use a mixed-methods sequential explanatory study of doctoral students' persistence in the distance-learning program in educational leadership (Ivankova 2004) to illustrate the methodological discussion.

MIXED-METHODS SEQUENTIAL EXPLANATORY DESIGN

The mixed-methods sequential explanatory design consists of two distinct phases: quantitative followed by qualitative (Creswell et al. 2003). In this design, a researcher first collects and analyzes the quantitative (numeric) data. The qualitative (text) data are collected and analyzed second in the sequence and help explain, or elaborate on, the quantitative results obtained in the first phase. The second, qualitative, phase builds on the first, quantitative, phase, and the two phases are connected in the intermediate stage in the study. The rationale for this approach is that the quantitative data and their subsequent analysis provide a general understanding of the research problem. The qualitative data and their analysis refine and explain those statistical results by exploring participants' views in more depth (Rossman and Wilson 1985; Tashakkori and Teddlie 1998; Creswell 2003).

The strengths and weaknesses of this mixed-methods design have been widely discussed in the literature (Creswell, Goodchild, and Turner 1996; Green and Caracelli 1997; Creswell 2003, 2005; Moghaddam, Walker, and Harre 2003). Its advantages include straightforwardness and opportunities for the exploration of the quantitative results in more detail. This design can be especially useful when unexpected results arise from a quantitative study (Morse 1991). The limitations of this design are lengthy time and feasibility of resources to collect and analyze both types of data.

ILLUSTRATIVE STUDY

We conducted this study to understand students' persistence in the Distance Learning Doctoral Program in Educational Leadership in Higher Education (ELHE) offered by the University of Nebraska–Lincoln. The program is delivered to students via the distributed learning software using multiple computer systems and platforms, such as Lotus Notes and Blackboard. It uses the Internet as a connecting link and provides asynchronous and collaborative learning experiences to participants (Stick and Ivankova 2004).

The purpose of this mixed-methods sequential explanatory study was to identify factors contributing to students' persistence in the ELHE program by obtaining quantitative results from a survey of 278 of its current and for-

mer students and then following up with four purposefully selected individuals to explore those results in more depth through a qualitative case study analysis.

In the first, quantitative, phase of the study, the quantitative research questions focused on how selected internal and external variables to the ELHE program (program-related, adviser- and faculty-related, institution-related, and student-related factors as well as external factors) served as predictors to students' persistence in the program. In the second, qualitative, phase, four case studies from four distinct participant groups explored in depth the results from the statistical tests. In this phase, the research questions addressed seven internal and external factors found to be differently contributing to the function discriminating the four groups: program, online learning environment, faculty, student support services, self-motivation, virtual community, and academic adviser.

Quantitative Phase

The goal of the quantitative phase was to identify the potential predictive power of selected variables on the doctoral students' persistence in the ELHE program. We collected the quantitative data via a Web-based cross-sectional survey (McMillan 2000; Creswell 2005), using a self-developed and pilot-tested instrument. The core survey items formed five seven-point Likert-type scales and reflected the following composite ten variables, representing a range of internal and external to the program factors: online learning environment, program, virtual community, faculty, student support services, academic adviser, family and significant other, employment, finances, and self-motivation. We identified those factors through the analysis of the related literature, three theoretical models of student persistence (Tinto 1975; Bean 1980; Kember 1995), and an earlier qualitative thematic analysis study of seven ELHE active students (Ivankova and Stick 2002). Reliability and validity of the survey scale items were established based on both pilot and principle survey administration, using frequency distributions, internal consistency reliability indexes, interitem correlations, and factor analysis. We used a panel of professors teaching in the program to secure the content validity of the survey items.

Criteria for selecting the participants for the quantitative phase included (1) being in the ELHE program; (2) time period of 1994 to spring 2003; (3) must have done half of coursework online; (4) be either admitted, both active and inactive, graduated, withdrawn, or terminated from the program; (5) for those who just started the program, they must have taken at least one online course in the ELHE program. A total of 278 students met those criteria. Over-

all, 207 participants responded to the survey, which constituted a response rate of 74.5%. For analysis purposes, we organized all respondents into four groups based on their status in the program and similarity of academic experiences: (1) students who had completed thirty or fewer credit hours of course work (beginning group; $n = 78$); (2) students who had completed more than thirty credit hours of course work, including dissertation hours (matriculated group; $n = 78$); (3) former students who had graduated from the program with the doctorate degree (graduated group; $n = 26$); and (4) former students who either had withdrawn from the program or had been inactive in the program during the past three terms (spring, fall, summer) prior to the survey administration (withdrawn/inactive group; $n = 25$).

We used both univariate and multivariate statistical procedures to analyze the survey data. Cross-tabulation and frequency counts helped analyze the survey demographic information and the participants' answers to separate items on each of the five survey scales. We used the discriminant function analysis to identify the predictive power of ten selected factors as related to students' persistence in the ELHE program.

The typical participants were between 36 and 54 years of age, predominantly women, employed full-time, mostly from out of state, and married with children. The descriptive analysis of the survey scale items showed that most of the participants were satisfied with their academic experiences in the program, claiming they received all the needed support from both the institution and external entities.

Based on the discriminant function analysis, only five variables (program, online learning environment, student support services, faculty, and self-motivation) significantly contributed to the discriminating function as related to the participants' persistence in the ELHE program. From these five variables, program and online learning environment had the highest correlation with the function and made the greatest contribution to discriminating among the four groups. Other variables (virtual community, academic adviser, family and significant other, employment, and finances) made no significant contribution to discriminating among the four participant groups.

Qualitative Phase

In the second, qualitative, phase, we used a multiple case study approach (Yin 2003) to help explain why certain external and internal factors, tested in the first phase, were significant or not significant predictors of students' persistence in the ELHE program. A case study is an exploration of a bounded system or a case over time through detailed, in-depth data collection involving multiple sources of information and rich in context (Merriam 1998). A

multiple case study design includes more than one case, and the analysis is performed at two levels: within each case and across the cases (Stake 1995; Yin 2003).

For this phase, we purposefully selected four participants, one from each group, from those who completed the survey. To provide the richness and the depth of the case description (Stake 1995; Creswell 1998), we used multiple sources for colleting the data: (1) in-depth semistructured telephone interviews with four participants; (2) researcher's reflection notes on each participant's persistence recorded immediately after the interview; (3) electronic follow-up interviews with each participant to secure additional information on the emerging themes; (4) academic transcripts and students' files to validate the information obtained during the interviews and to get additional details related to the cases; (5) elicitation materials, such as photos, objects, and other personal things, provided by each participant related to their respective persistence in the program; (6) participants' responses to the open-ended and multiple-choice questions on the survey in the first, quantitative phase; and (7) selected online classes taken by the participants and archived on the Lotus Notes server.

We audiotaped and transcribed verbatim each interview (Creswell 2005). We conducted a thematic analysis of the text data at two levels, within each case and across the cases, using QSR N6 qualitative software for data storage, coding, and theme development. The verification procedures included triangulating different sources of information, member checking, intercoder agreement, rich and thick descriptions of the cases, reviewing and resolving disconfirming evidence, and academic adviser's auditing (Lincoln and Guba 1985; Miles and Huberman 1994; Stake 1995; Creswell 1998; Creswell and Miller 2002).

Four themes related to the participants' persistence in the ELHE program emerged in the analysis of each case and across cases: quality of academic experiences, online learning environment, support and assistance, and student self-motivation. Despite being common for all participants, those themes differed in the number of and similarity of subthemes and categories comprising them. There were more similarities between the participants who were still in the program, although at different stages, than with those who graduated or withdrew from the program. The qualitative findings revealed that the quality of the program and the academic experiences of learning in the online environment, the importance of the student support infrastructure, and student goal commitment were integral components of those students' persistence in the ELHE program.

Analysis of the number of sentences per each theme across the four cases, using the matrix feature of the QSR N6, showed the priority of the discussed

themes for the participants. Thus, the quality of online learning experiences as related to the participants' persistence in the ELHE program was the most discussed theme. The participants were less inclined to talk about personal motivation but were more willing to focus on the advantages and/or disadvantages of the online learning environment and the supporting infrastructure, including institutional and external entities.

PROCEDURAL ISSUES IN THE MIXED-METHODS SEQUENTIAL EXPLANATORY DESIGN

As in any mixed-methods design, we had to deal with the issues of priority, implementation, and integration of the quantitative and qualitative approaches. Thus, we had to consider which approach, quantitative or qualitative (or both), had more emphasis in our study design; establish the sequence of the quantitative and qualitative data collection and analysis; and decide where mixing or integration of the quantitative and qualitative approaches actually occurred in our study. We also had to find an efficient way to visually represent all the nuances of the study design for our own conceptual purposes and to provide its better comprehension by both the potential readers and reviewers. In solving those issues, our decision-making process was guided by the purpose of the study and its research questions, as well as by the methodological discussions in the literature (Morse 1991; Morgan 1998; Tashakkori and Teddlie 1998; Creswell et al. 2003).

Priority

Priority refers to which approach, quantitative or qualitative (or both), a researcher gives more weight or attention throughout the data collection and analysis process in the study (Morgan 1998; Creswell 2003). Reportedly, it is a difficult issue to make a decision about (Creswell et al. 2003) and might depend on the interests of a researcher, the audience for the study, and/or what a researcher seeks to emphasize in this study (Creswell 2003). In the sequential explanatory design, priority, typically, is given to the quantitative approach because the quantitative data collection comes first in the sequence and often represents the major aspect of the mixed-methods data collection process. The smaller qualitative component follows in the second phase of the research. However, depending on the study goals, the scope of quantitative and qualitative research questions, and the particular design of each phase, a researcher may give the priority to the qualitative data collection and analysis (Morgan 1998), or both. Such decisions could be made either at the

study design stage before the data collection begins or later during the data collection and analysis process.

In the illustrative study, from the very beginning, we decided to give priority to the qualitative data collection and analysis despite its being the second phase of the research process. Our decision was influenced by the purpose of the study to identify and explain the factors that affect students' persistence in the distance-learning doctoral program. The first, quantitative, phase of the study focused primarily on revealing the predictive power of ten selected external and internal factors on students' persistence. Although this phase was robust, the data collection was limited to one source, a cross-sectional survey, and the data analysis employed only two statistical techniques: descriptive statistics and discriminant function analysis.

The goal of the qualitative phase was to explore and interpret the statistical results obtained in the first, quantitative, phase. To enhance the depth of qualitative analysis, we decided to use a multiple case study design, which implied extensive and tedious data collection from different sources, as well as multiple levels of data analysis (Yin 2003). We performed a thematic analysis on two levels, individual cases and across cases, comparing the themes and categories and used a number of cross-case analysis techniques, including text units (sentences) counts for each theme across the four cases.

Implementation

Implementation refers to whether the quantitative and qualitative data collection and analysis come in sequence, one following another, or concurrently (Green et al. 1989; Morgan 1998; Creswell et al. 2003). In the sequential explanatory design, the data are collected over the period of time in two consecutive phases. Thus, a researcher first collects and analyzes the quantitative data. Qualitative data are collected in the second phase of the study and are related to the outcomes from the first, quantitative, phase. The decision to follow the quantitative-qualitative data collection and analysis sequence in this design depends on the study purpose and the research questions seeking for the contextual field-based explanation of the statistical results (Green and Caracelli 1997; Creswell 1999).

In the illustrative study, we first collected the quantitative data using a Web-based survey. The goal of this phase was to identify the potential predictive power of selected variables on doctoral students' persistence and to allow for purposefully selecting informants for the second phase of the study. We then collected and analyzed the qualitative data to help explain why certain external and internal factors, tested in the first phase, were significant or not significant predictors of students' persistence in the program. Thus, the

quantitative data and statistical results provided a general understanding of what internal and external factors contributed to students' persistence in the ELHE program. The qualitative data and its analysis secured the needed explanation as to why certain factors significantly or not significantly affected the participants' persistence.

Integration

Integration refers to the stage or stages in the research process where the mixing or integration of the quantitative and qualitative methods occurs (Green, Caracelli, and Graham 1989; Tashakkori and Teddlie 1998; Creswell et al. 2003). The possibilities range from mixing in the beginning stage of the study while formulating its purpose and introducing both quantitative and qualitative research questions (Teddlie and Tashakkori 2003) to the integration of the quantitative and qualitative findings at the interpretation stage of the study (Onwuegbuzie and Teddlie 2003). In addition, in the mixed-methods sequential designs, the quantitative and qualitative phases are connected (Hanson et al. 2005) in the intermediate stage when the results of the data analysis in the first phase of the study inform or guide the data collection in the second phase. In the sequential explanatory design, a researcher typically connects the two phases while selecting the participants for the qualitative follow-up analysis based on the quantitative results from the first phase (Creswell et al. 2003). Another connecting point might be the development of the qualitative data collection protocols, grounded in the results from the first, quantitative, phase, to investigate those results in more depth through collecting and analyzing the qualitative data in the second phase of the study.

In the illustrative study, we connected the quantitative and qualitative phases during the intermediate stage in the research process while selecting the participants for the qualitative case studies from those who responded to the survey in the first, quantitative, phase based on their numeric scores. The second connecting point included developing the interview questions for the qualitative data collection based on the results of the discriminant function analysis in the first, quantitative, phase. We mixed the quantitative and qualitative approaches at the study design stage by introducing both quantitative and qualitative research questions and integrated the results from the quantitative and qualitative phases during the interpretation of the outcomes of the entire study.

Case selection. The options for case selection in the mixed-methods sequential explanatory design include exploring a few typical cases or fol-

TABLE 1
Participants per Group with Mean Scores within One Standard Error of the Mean

Group	*Participants*	*Group Mean*	*Standard Error of the Mean*
Beginning	11	3.13	0.05
Matriculated	6	3.20	0.04
Graduated	8	3.45	0.06
Withdrawn/inactive	5	2.91	0.09

lowing up with outlier or extreme cases (Morse 1991; Caracelli and Greene 1993; Creswell 2005). Although case selection was indicated as one of the connecting points in such design (Hanson et al. 2005), there are no established guidelines as to how researchers should proceed with selecting the cases for the follow-up qualitative analysis or the steps to follow. In the illustrative study, due to the explanatory nature of its second phase, we decided to focus on the typical case for each participant group. We developed the following systematic procedure to identify a typical respondent from four different groups.

Based on ten composite variable scores computed during the first, quantitative, phase, we first calculated the summed mean scores and their respective group means for all participants in each of the four groups. To limit the number of the participants eligible for consideration as prototypical representatives of their respective groups, we used the standard error of the mean to establish the lower and upper boundaries for the scores clustered around each group mean. Using the cross-tabulation procedure in SPSS, we identified a few participants from each group with the mean scores within one standard error of the mean (see Table 1).

Then, within each of the four groups, we compared the participants on the following seven demographic variables used in the following sequence: number of credit hours completed, number of online courses taken, age, gender, residence, employment, and family structure. Table 2 depicts a typical respondent for this ELHE participant sample.

Using these criteria, we identified two participants from each group bearing the characteristics listed in Table 2. Finally, we used a maximal variation sampling strategy (Creswell 2005) to select one participant per group, which allowed us to preserve multiple perspectives based on both the status in the program and critical demographics. So, from eight participants, we selected one man and three women who displayed different dimensions on the following demographic characteristics: age, gender, residency, and family status (see Table 3). All four agreed to participate.

TABLE 2
Typical Educational Leadership in Higher Education Respondent

	Group 1: Beginning	*Group 2: Matriculated*	*Group 3: Graduated*	*Group 4: Withdrawn/Inactive*
Credit hours completed	10–30	>45	NA	3–9
Online courses taken	>5	>6	>6	1–2
Age (years)	36–54	36–54	46–54	>46
Gender	Female	Female	Male	Female
Nebraska residency	Out of state	Out of state	Out of state	Out of state
Employment	Full-time	Full-time	Full-time	Full-time

TABLE 3
Participants Selected for Case Study Analysis Using the Maximal Variation Principle

	Group 1: Beginning (Gwen)	*Group 2: Matriculated (Lorie)*	*Group 3: Graduated (Larry)*	*Group 4: Withdrawn/Inactive (Susan)*
Age (years)	36–54	36–45	46–54	>55
Gender	Female	Female	Male	Female
Residency	In state	Out of state	Out of state	Out of state
Family status	Single	Married with children older than 18	Married with children younger than 18	Single

Interview protocol development. We then developed the interview protocol, the content of which was grounded in the quantitative results from the first phase. Because the goal of the second, qualitative, phase was to explore and elaborate on the results from the first, quantitative, phase of the study (Creswell et al. 2003), we wanted to understand why certain predictor variables contributed differently to the function discriminating four participant groups as related to their persistence in the ELHE program.

Thus, five open-ended questions in the interview protocol explored the role of the five factors (online learning environment, ELHE program, faculty, services, and self-motivation), which demonstrated statistically significant predictive power for this sample of the ELHE students. Two other open-ended questions explored the role of the academic adviser and virtual learning community as related to students' persistence. Although those two factors did not significantly contribute to the function discriminating four participant groups in our study, their important role in students' persistence

in traditional doctoral programs was reported in numerous studies (Bowen and Rudenstine 1992; Golde 2000; Brown 2001; Lovitts 2001). We pilot tested the interview protocol on one participant, purposefully selected from those who had completed the survey in the first, quantitative, phase of the study. Based on this pilot interview analysis, we slightly revised the order of the protocol questions and developed additional probing questions.

Integrating the Outcomes of Both Phases of the Study

We integrated the results of the quantitative and qualitative phases during the discussion of the outcomes of the entire study. As indicated at the beginning of the article, we asked both quantitative and qualitative research questions to better understand doctoral students' persistence in the ELHE program. In the Discussion section, we combined the results from both phases of the study to more fully answer those questions and develop a more robust and meaningful picture of the research problem. First, we interpreted the results that helped answer the study's major quantitative research question: "What factors (internal and external) predicted students' persistence in the ELHE program?" Then, we discussed the case study findings that were aimed at answering the guiding research question in the qualitative phase of the study: "How did the selected factors (internal and external) identified in phase I contribute to students' persistence in the ELHE program?" This process allowed for the findings from the second, qualitative, phase to further clarify and explain the statistical results from the first, quantitative, phase.

We then discussed the study results in detail by grouping the findings to the corresponding quantitative and qualitative research subquestions related to each of the explored factors affecting students' persistence in the ELHE program. We augmented the discussion by citing related literature, reflecting both quantitative and qualitative published studies on the topic. Thus, combining the quantitative and qualitative findings helped explain the results of the statistical tests, which underscored the elaborating purpose for a mixed-methods sequential explanatory design (Green, Caracelli, and Graham 1989; Creswell et al. 2003).

VISUAL MODEL

A multistage format of the mixed-methods research, which typically includes two or more stages, is difficult to comprehend without graphically representing the mixed-methods procedures used in the study. A graphical representation of the mixed-methods procedures helps a researcher visualize

TABLE 4
Ten Rules for Drawing Visual Models for Mixed-Methods Designs

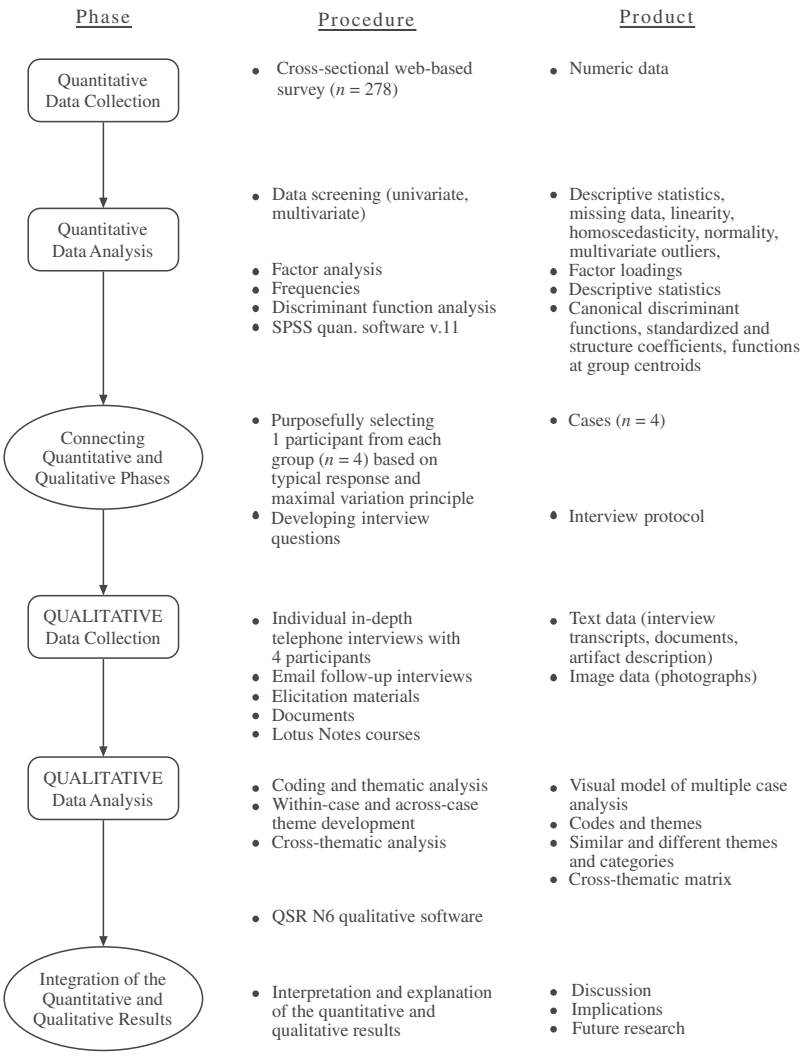
Give a title to the visual model.
Choose either horizontal or vertical layout for the model.
Draw boxes for quantitative and qualitative stages of data collection, data analysis, and interpretation of the study results.
Use capitalized or lowercase letters to designate priority of quantitative and qualitative data collection and analysis.
Use single-headed arrows to show the flow of procedures in the design.
Specify procedures for each quantitative and qualitative data collection and analysis stage.
Specify expected products or outcomes of each quantitative and qualitative data collection and analysis procedure.
Use concise language for describing procedures and products.
Make your model simple.
Size your model to a one-page limit.

the sequence of the data collection, the priority of either method, and the connecting and mixing points of the two approaches within a study. It also helps a researcher understand where, how, and when to make adjustments and/or seek to augment information. In addition, it facilitates comprehending a mixed-methods study by interested readers, including prospective funding agencies.

The value of providing a visual model of the procedures has long been expressed in the mixed-methods literature (Morse 1991; Tashakkori and Teddlie 1998; Creswell et al. 2003; Creswell 2005). Morse (1991) developed a notation system to document and explain the mixed-methods procedures and suggested a terminology that has become part of the typology for mixed-methods designs. Other authors (Tashakkori and Teddlie 1998; Creswell et al. 2003; Hanson et al. 2005) provided some visual presentation of major mixed-methods designs. However, more detailed "how-to" guidelines are missing. Using Morse's (1991) notation system and following the recommendations of Creswell (2005), Creswell et al. (2003), and Tashakkori and Teddlie (1998), we developed ten rules for drawing a visual model for the mixed-methods procedures with the intent of offering researchers some practical tools to present their often complicated mixed-methods designs. These rules include both the steps to follow while drawing the visual model and specific guidelines related to its content and format.

Using the ten rules presented in Table 4, we then created a graphical representation of the mixed-methods sequential explanatory design procedures used for the illustrative study (see Figure 1). The model portrays the sequence of the research activities in the study, indicates the priority of the

FIGURE 1
Visual Model for Mixed-Methods
Sequential Explanatory Design Procedures



qualitative phase by capitalizing the term QUALITATIVE, specifies all the data collection and analysis procedures, and lists the products or outcomes from each of the stages of the study. It also shows the connecting points between the quantitative and qualitative phases and the related products, as well as specifies the place in the research process where the integration or mixing of the results of both quantitative and qualitative phases occurs.

CONCLUSION

In this article, we discussed some methodological issues researchers face while using the mixed-methods sequential explanatory study design. Those issues included decisions related to prioritizing the quantitative or qualitative approach (or both), implementing the data collection and analysis, connecting the quantitative and qualitative phases during the research process, and integrating the results of the two phases of the study. The use of the study of doctoral students' persistence in the distance-learning program in educational leadership helped illustrate how we addressed those procedural issues.

We showed that establishing the priority of the quantitative or qualitative approach within a sequential explanatory study depends on the particular design a researcher chooses for each phase of the study, the volume of the data collected during each phase, and the rigor and scope of the data analysis within each phase. In this mixed-methods design, the sequence of the quantitative and qualitative data collection is determined by the study purpose and research questions. A quantitative phase comes first in the sequence because the study goal is to seek an in-depth explanation of the results from the quantitative measures.

Mixing in the sequential explanatory design can take two forms: (1) connecting quantitative and qualitative phases of the study through selecting the participants for the second phase and developing qualitative data collection protocols grounded in the results of the statistical tests and (2) integrating quantitative and qualitative results while discussing the outcomes of the whole study and drawing implications. Such mixing of the quantitative and qualitative methods results in higher quality of inferences (Tashakkori and Teddlie 2003) and underscores the elaborating purpose of the mixed-methods sequential explanatory design. The complexity of the mixed-methods designs calls for a visual presentation of the study procedures to ensure better conceptual understanding of such designs by both researchers and intended audiences.

The limitations of this methodological discussion rest on its reliance on one mixed-methods design, sequential explanatory. Other mixed-methods

designs exist, and although the discussed methodological issues are also relevant to all those designs (Creswell et al. 2003), other decisions and considerations might guide researchers' choices. This article has highlighted only some of the issues facing a researcher who elects to use the mixed-methods sequential explanatory design. More methodological discussions are warranted on these and other mixed-methods procedural issues. Specifically, researchers might benefit from the discussions on prioritizing the quantitative and qualitative approaches within other sequential and concurrent mixed-methods designs, ways of integrating quantitative and qualitative methods within a mixed-methods study, specific forms of mixed-methods data analysis, and establishing the validity of mixed-methods research. Providing researchers with some guidance on how to design, conceptualize, implement, and validate mixed-methods research will help them conduct research with clean designs and more rigorous procedures and, ultimately, produce more meaningful study outcomes.

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