Qualitative Research: Data Analysis and Interpretation

OBJECTIVES

After reading Chapter 18, you should be able to do the following:

1. Describe the purpose of qualitative research data analysis.
2. Identify the cautions to avoid premature analysis and action in qualitative research.
3. State approaches to qualitative data analysis.
4. Describe processes involved in analyzing and interpreting data.
5. Distinguish between data analysis and data interpretation.
6. Describe strategies for data analysis.
7. Describe strategies for data interpretation.

DATA ANALYSIS AND INTERPRETATION: DEFINITION AND PURPOSE

Analyzing qualitative data is a formidable task for all qualitative researchers, especially those just starting their qualitative careers. These novice researchers follow the urgings of mentors who emphasize the need to collect rich data that reveal the perspectives and understandings of the research participants. After weeks (months, years) of data collection using a variety of qualitative data collection techniques (observations, interviews, surveys, and the like), they find themselves sitting in their living rooms surrounded by boxes of data in all shapes and forms! This less-than-romantic image of qualitative researchers is a common one. Having immersed themselves in the systematic study of a significant problem, qualitative researchers are confronted with the somewhat daunting task of engaging in analysis that will accurately represent the mountains of descriptive data. There is no easy way to do this work: It is difficult, time-consuming, and challenging. And yet it is potentially the most important step in the research process as we try to understand what we have learned through our investigations.

Data analysis is an attempt by the researcher to summarize collected data in a dependable and accurate manner. It is the presentation of the findings of the study in a manner that has an air of undeniability. Given the narrative, descriptive, and nonnumerical nature of the data that are collected in a qualitative study, it is not possible to "number crunch" and quickly reduce the data to a manageable form, as in quantitative studies. Qualitative data analysis requires the researcher to be patient and reflective in a process that strives to make sense of multiple data sources, including field notes from observations and interviews, questionnaires, maps, pictures, and even audiotape transcripts and videotape observations. On the other hand, **data interpretation** is an attempt by the researcher to find meaning in the data and to answer the "So what?" question in terms of the implications of the study's findings. Put simply, analysis involves summarizing what's in the data, whereas interpretation involves making sense of—finding meaning in—that data.

Data analysis and interpretation are critical stages in the research process that require the researcher to both know and understand the data. When analyzing and interpreting qualitative data, challenge yourself to explore every possible angle and try to find patterns and seek out new understandings among the data. The techniques outlined in this chapter will serve as guideposts and prompts to move you through your analysis and interpretation as efficiently as possible.

⁘ DATA ANALYSIS DURING DATA COLLECTION

Data analysis in qualitative research is not left until all data are collected, as is the case with quantitative research. The qualitative researcher begins data analysis from the initial interaction with participants and continues that interaction and analysis throughout the entire study. To avoid collecting data that are not important or that come in a form that cannot be understood, the researcher must think about "How am I going to make sense of this data?" before conducting the study. During the study, the researcher tries to progressively narrow, and focus in on, the key aspects of the participants' perspectives. Thus, the qualitative researcher goes through a series of steps and iterations: gathering data, examining data, comparing prior data to newer data, writing up field notes before going back to the research site, and making plans to gather new data. Data collection and analysis continually interact, so that the researcher's emerging hunches or thoughts become the focus for the next data collection period.

While gathering data, the researcher reviews and asks questions about it: "Why do participants act as they do?" "What does this focus mean?" "What else do I want to know about that participant's attitude?" "What new ideas have emerged in this round of data collection?" "Is this a new concept, or is it the same as a previous one?" and so forth. This ongoing process—almost a protracted discussion with oneself—leads to the collection of new important data and the elimination of other data.

Anderson and colleagues suggest that qualitative researchers answer two questions to guide their work and reflections:

1. Is your research question still answerable and worth answering?
2. Are your data collection techniques catching the kind of data you wanted and filtering out the data that you don't?[1]

Consciously "pausing" during the research process will allow you to reflect on what you are attending to and what you are leaving out. Such a reflective stance will continue to guide your data collection efforts (in process) as well as to allow for early "hunches" about what you are seeing so far.

Although ongoing analysis and reflection is a natural part of the qualitative research process, it is important to avoid premature actions based on early analysis and interpretation of data. Researchers engaged in their first systematic study tend to zealously collect, analyze, and interpret data in a rapid-fire fashion. Their efforts can go awry if they become their own best informants and jump to hasty conclusions and impulsive actions. The qualitative research process takes time; researchers must be wary of the lure of quick-fix strategies and patient enough to avoid the pitfalls of stating research outcomes on the basis of premature analysis.

⁘ DATA ANALYSIS AFTER DATA COLLECTION

After the data have been collected, the romance of fieldwork is over and the researcher must concentrate solely on the task of data analysis. The researcher must fully examine each piece of information and, building upon those insights and hunches gained during data collection, attempt to make sense of the data as a whole. Qualitative data analysis is based on induction: The researcher starts with a large set of issues and data and seeks to progressively narrow them into small and important groups of key data. There are no predefined variables to focus analysis, as there are in quantitative research. The qualitative researcher constructs meaning by identifying patterns and themes that emerge during the data analysis.

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[1] *Studying Your Own School: An Educator's Guide to Qualitative Practitioner Research* (p. 155), by G. L. Anderson, K. Herr, and A. S. Nihlen, 1994, Thousand Oaks, CA: Corwin Press.

A problem that faces virtually all qualitative researchers is the lack of agreed-on approaches for analyzing qualitative data. There are some guidelines and general strategies for analysis but few specific rules for their application. Thus, once data are collected, the qualitative researcher undertakes a multistage process of organizing, categorizing, synthesizing, analyzing, and writing about the data. In most cases, the researcher will cycle through the stages more than once, in a continual effort to narrow and make sense of what is in the data. The length of data analysis is difficult to state. It depends mainly on the nature of the study, the amount of data to be analyzed, and the analytic and synthesizing abilities of the researcher.

Remember, there is no substitute for taking time to fully immerse yourself in your data. You should bury yourself in what you have. Read and reread, listen and relisten, watch and rewatch. Get to know intimately what you have collected. Struggle with the nuances and caveats, the subtleties, the persuasive, the incomplete. Avoid premature judgment. These are lofty goals, but they are at the heart of what we are trying to achieve in qualitative data analysis and data interpretation.

⁘ STEPS IN ANALYZING QUALITATIVE RESEARCH DATA

If data are to be thoroughly analyzed, they must be organized. Ideally, the researcher will have carefully managed notes, records, and artifacts as they were collected. As we mentioned when discussing the qualitative research plan in Chapter 3, the importance of attention to detail in managing data becomes all too clear when it is time to write up the research! Nevertheless, some additional organization at the end of the data collection stage is usually necessary. Figure 18.1 lists some ways to "tidy up" your data, ensure their completeness, and make them easier to study. Once the data are organized, the analysis can begin in earnest.

One way to proceed with the analysis is to follow three iterative, or repeating, steps: reading/memoing, describing what is going on in the setting, and classifying research data. The process focuses on (1) becoming familiar with the data and identifying potential themes in it (reading/memoing); (2) examining the data in depth to provide detailed descriptions of the setting, participants, and activity (describing); and (3) categorizing and coding pieces of data and grouping them into themes (classifying).

Note that the interrelationships among these steps are not necessarily linear. At the start of data analysis, the logical sequence of activities is from reading/memoing, to description, to classifying, and finally to interpretation. However, as the researcher begins to internalize and reflect on the data, the initial ordered sequence may lose its structure and become more flexible. If you've ever been driving home pondering some issue or problem and out of the blue had a sudden flash of understanding that provides a solution, you have a sense of how qualitative data analysis takes place. Once you are *into* the data, it is not the three steps that lead to understanding; it is your ability to think, imagine, create, intuit, and analyze that guides

- Write dates (month, day, year) on all notes.
- Sequence all notes with labels (e.g., 6th set of notes).
- Label notes according to type (such as observer's notes, memo to self, transcript from interview).
- Make two photocopies of all notes (field notes, transcripts, etc.) and retain original copies.
- Organize computer files into folders according to data type and stages of analysis.
- Make backup copies of all files.
- Read through data and make sure all information is complete and legible before proceeding to analysis and interpretation.
- Begin to note themes and patterns that emerge.

FIGURE 18.1
Data organizing activities

the data analysis. Knowing the steps is not enough; the thinker, imaginer, and hypothesizer—that is, the qualitative researcher—is the data analyzer, and the quality of the research analysis will depend heavily on the intellectual qualities of the researcher. Let us be very clear about the process being discussed. It is a process of digesting the contents of qualitative data and finding related threads in it. You will not meaningfully accomplish these tasks with one or two or more readings of your collected data. To make the kinds of connections needed to analyze and interpret qualitative data, you must know your data—really know it, in your head, not just on paper. The process can be tedious, time-consuming, and repetitious; however, the steps can help you understand, describe, and classify qualitative data.

Reading/Memoing

As your first analytical step, you will read and write memos about all field notes, transcripts, and observer comments to get an initial sense of the data. To begin, find a quiet place and plan on spending a few hours at a time reading through the data. Krathwohl wisely points out that "the first time you sit down to read your data is the only time you come to that particular set fresh."[2] It is important that you write notes in the margins or underline sections or issues that seem important to you so that you will have a record of your initial thoughts and sense of the data. Later, when you are deeper into the analysis, you may find that many of these early impressions are not useful; however, you may also find that some initial impressions do hold up throughout. In addition to recording initial impressions from the data, at this stage of analysis you should also begin the search for recurring themes or common threads.

Describing

The next step, describing, involves developing thorough and comprehensive descriptions of the participants, the setting, and the phenomenon studied in order to convey the rich complexity of the research. The descriptions are based on your collected observations, interview data, field notes, and artifacts. The aim of this step is to provide a narrative picture of the setting and events that take place in it, so you will have an understanding of the context in which the study is taking place. Attention to the research context is a common and important theme in qualitative research, because the context influences participants' actions and understandings. Meaning is influenced by context; without a thorough description of the context, actions, and interactions of participants, analysis (and therefore, interpretation) is hampered.

An important concern of qualitative researchers is portraying the views of the research participants. It is crucial that you describe thoroughly how participants define situations and explain their actions. Also, your descriptions should make note of how interactions and social relations among the participants may have changed during the course of the study. The descriptions of the research context, meanings, and social relations can be presented in a number of forms. For example, you can describe events in chronological order, create a composite of a typical "day in the life" of a participant in the setting, focus on key contextual episodes, or illuminate different perspectives of the participants.

Classifying

Qualitative data analysis is basically a process of breaking down data into smaller units, determining their import, and putting the pertinent units together in a more general, analytical

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[2] *Methods of Educational and Social Science Research: An Integrated Approach*, by D. R. Krathwohl (2nd ed., p. 309), 1998, New York: Longman.

form. The typical way qualitative data are broken down is through the process of classifying or *coding* (discussed shortly) and categorizing pieces of data and grouping them into themes. A *category* is a classification of ideas or concepts. When concepts in the data are examined and compared to one another and connections are made, categories are formed. Categories are used to organize similar concepts into distinct groups.

For example, consider a researcher who is conducting a qualitative study on characteristics of fifth-grade students' study methods. Suppose the researcher had collected 20 sets of field notes (describing observations) or 20 transcripts of interviews. The researcher's task is to read through all the notes or transcripts and categorize the meanings or understandings that emerge from the data. Without data that are classified and grouped, a researcher has no reasonable way to analyze qualitative studies. The categories provide the basis for structuring the analysis and interpretation. However, the categories identified by one researcher would not necessarily be the same as those identified by another researcher, even if they analyzed the same data. There is no one single "correct" way to organize and analyze the data. There are many reasons why different researchers would not produce the same categories from the same data. Some of these reasons are researcher biases, personal interests, style, and interpretive focus.

⁘ DATA ANALYSIS STRATEGIES

In this section we will describe strategies that are used to analyze qualitative data: identifying themes; coding surveys, interviews and questionnaires; asking key questions; doing an organizational review; concept mapping, analyzing antecedents and consequences; displaying findings; and stating what is missing. Each is important in identifying research categories and patterns.

Identifying Themes. Another way to begin analyzing data is to consider the big picture and start to list "themes" that you have seen emerge in your literature review and in the data collection. Are there patterns that emerge, such as events that keep repeating themselves, key phrases that participants use to describe their feelings, or survey responses that seem to "match" one another? Making a note of these themes can be helpful during the first reading of the data (as part of memoing). In subsequent readings of the data, additional themes may emerge.

Coding Qualitative Data. One of the most frequent data analysis activities undertaken by qualitative researchers is **coding,** the process of categorically marking or referencing units of text (e.g., words, sentences, paragraphs, and quotations) with codes and labels as a way to indicate patterns and meaning.

As you analyze and code your data, you will want to reduce that data to a manageable form. One way to proceed when working with field notes, transcripts of taped interviews, pictures, maps, charts, and so on is to record important data on index cards, which are manageable and allow for sorting. As you read and reread through your data (possibly now reduced to your cards), you can compile your data in categories or themes. Although there is nothing magical about the process of coding, it does take time and a willingness to check that the mountains of descriptive data have been analyzed in an accurate and reliable way. The way in which you code your data, in fact, will play a large role in determining the nature of the results. If, for example, you approach your data with preconceived categories and assumptions, you will likely begin analyzing your data by coding text units according to what you expect to find. Conceptually, you are beginning to construct a web of relationships that may or may not appear as you thought they would. If, on the other hand, you approach your data with questions you hope your research will illuminate, but no clear sense as to what the findings might be, you will likely start to build themes as you read through your data.

To get an idea of the process of coding, imagine that you are organizing a deck of playing cards, but you don't know the meaning of any of the cards' symbols. Each card in the deck contains data, and the order of the cards is random. As you initially scan the cards, you have an intuitive sense that the data on some of the cards looks similar to other cards. You finish carefully looking at all of the cards and reshuffle the deck. Again you look through the deck, but this time you group together the cards (data) that look alike. You end up with 13 collections of four cards that have some trait in common (the number or face value of the card). Again, you reshuffle the cards. This time as you start to sort through the cards, you notice a different theme (the suit of the card) and end up with four piles of 13 cards. Puzzling. Not to be thwarted in your efforts, you again reshuffle the deck and attempt to settle on an organizing theme. You group together cards (data) that have sufficient common characteristics that you feel confident that your analysis of the data is undeniably accurate. But there is just one problem: What do you do with the Joker that found its way into the pack?! And what about that wildcard?! Where did they come from, and where do they fit?! Just when you thought you had it all worked out, in crept something that challenges the themes you have used to organize and represent the data you have collected. The shuffling and sorting continues.

A few common sense guidelines may make this somewhat overwhelming activity of coding mountains of data more manageable:

1. Gather photocopies of your original data.
2. Read through all of the data, and attach working labels to blocks of text. These labels should have meaning for you; they should be a kind of shorthand that will serve as reference points when you return to the text later in the process.
3. Literally cut and paste the blocks of text onto index cards so that you now have the data in a manageable form. (Shuffling cards is much easier than sorting through reams of paper.) Use some kind of numbering system so that you can track the block of text back to the original context in which it appeared. For example, marking the data and time (1/26 10:15) can help you locate the text in the journal or field notes from which it was excerpted. Remember: Context is important and you will want to check that you have correctly labeled the text you are trying to funnel into a category with similar text.
4. Start to group together cards that have the same or similar labels on them.
5. Revisit each pile of cards, and see if in fact the label still fits or whether similar labels actually warrant their own category. This process is not dissimilar to brainstorming and seeking categories that will encapsulate similar thoughts and ideas.

Asking Key Questions. Another strategy used in data analysis involves asking key questions. According to Stringer, working through a series of questions can enable qualitative researchers to "extend their understanding of the problems and contexts"[3] they have investigated. Such questions might include the following: Who is centrally involved? Who has resources? Which ones? What major activities, events, or issues are relevant to the problem? How do acts, activities, and events happen? When does this problem occur? Although not all of these questions will be applicable to any single situation, they may provide a starting point for qualitative researchers who are engaged individually or collectively in analysis.

Doing an Organizational Review. Almost any educational problem is influenced in some way by the spoken and unspoken rules of organizations: state education departments, school districts, individual schools, teacher unions, and so on. Even in a qualitative study

[3] *Action Research: A Handbook for Practitioners* (p. 87), by E. T. Stringer, 1996, Thousand Oaks, CA: Sage.

where the emphasis is on the personal story of a single individual or the intimate workings of a small group, it is sometimes helpful to step back and take a look at the larger setting. Stringer[4] suggests that researchers consider undertaking an organizational review that focuses on the following features of the organization: vision and mission, goals and objectives, structure of the organization, operation, and problems, issues, and concerns. As Stringer notes: "As participants work through these issues, they will extend their understanding of the organization and aspects of its operation that are relevant to their problems, issues, and concerns."[5] A review of a school, for example, with these features in mind, may provide insight into the data you have collected.

Concept Mapping. As discussed previously, the qualitative researcher often works collaboratively with participants in a study, and that collaboration can extend to the data analysis process. To better visualize the major influences that have affected the study, Stringer[6] suggests that the researcher have participants create concept maps. What are the perspectives of the students, parents, teachers, and administrators involved in the study? For example, the concept map in Figure 18.2 shows a research participant's ideas about which factors influenced the success of his school absenteeism policy. Concept mapping gives participants an opportunity to display their analyses of the problem and helps the researcher to determine consistencies and inconsistencies that may exist between the disparate groups.

Analyzing Antecedents and Consequences. The process of mapping antecedents (causes) and consequences (effects) is another strategy to help qualitative researchers identify the major elements of their analysis, according to Stringer.[7] Using this framework provides a visual representation of the causal relationships that the qualitative researcher now believes exists. It is also helpful to revisit the causal relationships uncovered in your review of literature to determine challenges and support for your analysis and interpretations.

Displaying Findings. It is important to try to summarize the information you have collected in an appropriate and meaningful format that you can share with interested colleagues. To do this, it is helpful to "think display" as you consider how to convey your findings to colleagues. You might use matrixes, charts, concept maps, graphs, and figures—whatever works as a practical way to encapsulate the findings of your study. These visual displays of data serve an important function for qualitative researchers who wish to share findings and celebrate their insights in a public forum (such as a research conference). Putting your data into a visual format might also help you "see" new aspects of your data!

Stating What's Missing. Finally, as part of your full reporting, you should flag for the consumers of your research the pieces of the puzzle that are still missing and identify the questions for which you have not been able to provide answers. Often we find ourselves wanting and needing to provide answers, to move beyond our data with unwarranted assertions that may, in some cases, ultimately lead to embarrassing questions about what we actually did! In keeping with the theme of avoiding premature judgment (arriving at answers to problems without systematic inquiry), the data analysis strategy of stating what's missing allows you to hint at what might or should be done next in your quest to better understand the findings of your study.

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[4] Ibid., p. 90.
[5] Ibid., pp. 90–91.
[6] *Action Research* (p. 91), Stringer, 1996.
[7] Ibid., p. 96.

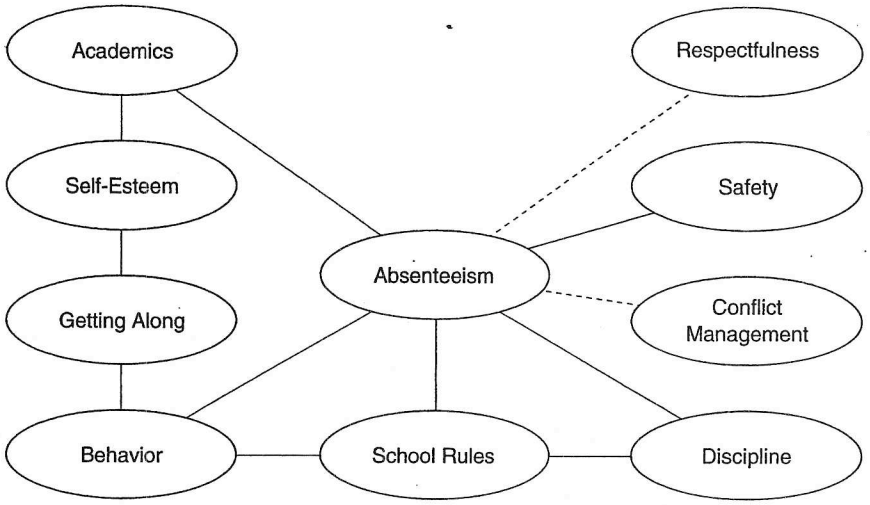

FIGURE 18.2

Concept map of the factors affecting absenteeism

Source: Mills, Geoffrey, *Action Research: A Guide for the Teacher Researcher,* 2nd Edition, © 2003. Reprinted by permission of Pearson Education, Inc., Upper Saddle River, NJ.

⁘ QUALITATIVE DATA ANALYSIS: AN EXAMPLE

The example that follows is intended to provide a sense of qualitative analysis. A true qualitative study would entail more data analysis than shown here. However, the basic ideas represent the process a qualitative researcher would undertake when analyzing data throughout a study.

Here is some basic information about the study:

- *Topics under study:* Concerns of parents regarding their first child's entering kindergarten; a kindergarten teacher's interactions with students and families.
- *Participants:* Four parents, three female and one male, representing four families; first child in each of the families (the children attend the same school); kindergarten teacher.
- *Data collection:* Observations and interviews with students, parents, and kindergarten teacher.

Data analysis would proceed as follows:

1. From the field notes of your classroom observations, you begin to list some common items or topics that you noticed. You recorded in your notes that during classroom instruction the teacher was using books, videos, and handouts. You also noted that at times, instruction was directed toward individual students, sometimes toward the whole class, and sometimes toward students who were working together in small groups.
2. From your interviews with the teacher, you realize that she gave you information about how she communicated with families about the children. You note that she talked about how she indirectly communicates through grading and report cards and how her lesson plans and tests were related to her overall assessment of the students' work. She also mentioned that she talked about report cards directly with families during conferences. Other ways that she communicated with families about their children were through progress reports and phone calls.
3. From your initial analysis, you decide how to group the individual items or topics together into categories that show how the items or topics are related. For example, as shown in Figure 18.3, you could group books, videos, and handouts under a category

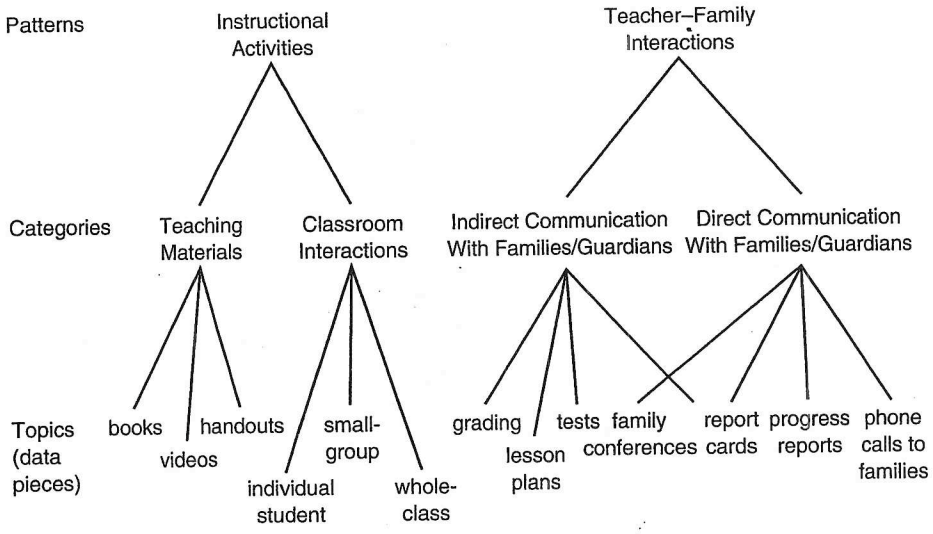

FIGURE 18.3
Diagram of category levels and organization

called "Teaching Materials." You could group together the ways in which the instruction was carried out—individual, small-group, and whole-class—and label this category as "Classroom Interactions." Using information from the interviews, you could construct the category "Indirect Communication With Families/Guardians" to include grading, lesson plans, tests, and report cards. A category of "Direct Communication With Families/Guardians" could include family conferences, report cards, progress reports, and phone calls to families. Notice that report cards appears in both the indirect and direct communication categories.

4. You organize your four categories into patterns. A pattern is made up of two or more categories. For example, the categories of "Teaching Materials" and "Classroom Interactions" indicate a pattern of "Instructional Activities." The categories of "Indirect Communication" and "Direct Communication" fit together under a pattern of "Teacher–Family Interactions."

You then decide whether you need to collect further data by interviewing students and parents about their experiences of interacting with the teacher to confirm your categories and patterns.

⁘ USING COMPUTER SOFTWARE TO ASSIST WITH DATA ANALYSIS

Increasingly, computer software is being developed to assist with the analysis of qualitative data. The key word in this sentence is *assist.* This software will not do the analysis for you! It is important for novice qualitative researchers to remember that computers alone do not analyze or even code data. They are designed only to help expedite these operations when researchers are working with large bodies of text and other kinds of data. The process of coding, retrieving, and subsequently mulling over and making sense of data remains a laborious process completely controlled by researchers. Even if a computer is used, researchers still must go through the process of creating codes and labels and keying these into the computer as they read through their interviews, field notes, and audio- and videotapes. Computers are merely handy and extremely fast labeling and retrieval tools. Researchers also must remember that

they alone can tell or program the computer to retrieve and sort data in specific ways; the machines do not do these tasks automatically. Although computers can enhance and broaden qualitative research analysis, if you are not connected in some way with a research university it is unlikely that you will have access to the software and the expertise of someone to teach you how to use it.

To help you with your decision about whether or not to proceed with locating and learning a qualitative data analysis software package, consider the following as some of the factors that might affect the decision:[8]

- Are you analyzing large amounts (for example, more than 500 pages of field notes and transcripts?)
- Are you adequately trained in the use of the programs and in using computers in general?
- Do you have the resources to purchase a program, or do you know someone who has the program?
- Do you need to be able to capture specific quotes from a large data base?

Four of the more common and popular qualitative analysis software packages are NVivo 2.0, The Ethnograph, HyperRESEARCH, and NUD*IST 6.

- NVivo is designed for qualitative researchers who need to work complex data (especially multimedia data). More information on NVivo can be found on the QSR International Web site at http://www.qsr-ecommerce.com/us/acatalog/ and the DataSense site at http://www.datasense.org.
- The Ethnograph is a program designed to help qualitative researchers work with text files (in any format) and search for, and code, segments of interest to the researcher. More information about The Ethnograph can be found on the Qualis Research Web site at http://www.qualisresearch.com/.
- HyperRESEARCH is a more advanced software program that allows the qualitative researcher to work with text, graphics, audio, and video sources, and to code and retrieve data. More information about HyperRESEARCH can be found on the ResearchWare Web site at http://www.researchware.com.
- NUD*IST 6 (N6), the latest version of the original NUD*IST, is a powerful program for teams of qualitative researchers working with large amounts of data. More information about N6 can be found on the QSR International Web site at http://www.qsr-ecommerce.com/us/acatalog/ and the DataSense site at http://www.datasense.org.

Let's look more closely at one of these programs, N6, to see how it can help with your data analysis efforts.

The QSR NUD*IST (*n*onnumerical *u*nstructured *d*ata *i*ndex *s*earching and *t*heorizing) series, including N6, provides qualitative researchers with a system for storing, coding, and searching large amounts of word processed data, such as field notes, interview transcripts, and open-ended survey responses. Table 18.1 lists various data analysis elements, their manual tasks (writing objectives), and corresponding procedures that may be carried out or made easier by using NUD*IST.

Once the text is coded, N6 allows you to pose questions that involve the retrieval of one or more categories of responses. The computer program collates the coded "text units," but again it is the qualitative researcher who must construct meaning from the search results, to

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[8] List items adapted from *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (2nd ed., p. 234), by J. W. Creswell, 2005, Upper Saddle River, NJ: Merrill/Prentice Hall.

TABLE 18.1 Data analysis elements, writing objectives, and NUD-IST procedures

Data Analysis Element	Writing Objective	NUD*IST Procedure
Create a template for analysis	Develop a visual of data analysis plan	Create a tree of steps in analysis into which data segments are placed
Create headings in the manuscript for major themes	Create four or five major themes in the study in words of participants	Create a node for each heading and put text that applies into the node
Title the manuscript	Create a title in words of the participants—to make report realistic, to catch attention of readers	Create a node based on short phrases found in the text; create alternative titles in this node as they appear in analyzing the texts
Include quotes in the manuscript	Identify good quotes that provide sound evidence for the themes, description, interpretation, and so forth	Create a general node and place all good quotes in that node; create a node for quotes under each theme or category of information
Phrase study in words of participants	Locate commonly used words or phrases and develop them into themes	Use word search procedure, string or pattern search, and place contents into a node; spread text around the word (or phrase) to capture the context of the word (or phrase)
Create a comparison table	Compare categories of information	Use matrix feature of program
Show levels of abstraction in the analysis	Present a visual of the categories in the analysis	Present the "tree" diagram
Discuss metaphors	Find text in which metaphors are presented and group into categories	Set up one node for metaphors with children of different types of metaphors; place text in nodes by types of metaphors

Source: From J. Creswell, *Qualitative Inquiry and Research Design: Choosing Among Five Traditions,* p. 162, copyright © 1998 by Sage Publications, Inc. Reprinted by permission of Sage Publications, Inc.

look for patterns and contradictions, and to decide how best to proceed with the analysis. It is at this point that qualitative researchers often rethink their initial preconceptions or research questions and may even decide to revise or recode their data. It is also at this point that you may be glad your massive amount of data is stored, manipulatable, and responsive to new lines of questioning.

As an illustration of a researcher's thought processes while coding and recoding data, let's consider a study by William Greene on the ethnic identity among adolescents in Hawaii.[9] The study involved transcripts of 40 interviews and close to 400 pages of text. Each of the interview transcripts was initially coded by thematic categories. If a student's response related to more than one category, all related categories were coded with the corresponding portion of the response. For instance, this was common when the question asked for students' perceptions of ethnic relations within their school; sometimes aspects of several categories would be evoked simultaneously. In such cases, relevant passages were coded for all categories referenced.

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[9] "Ethnic Identity and the Sociocultural Playing Field: Choices Made by Ethnically Mixed Adolescents in Hawaii," by W. L. Green, 2002, in *Research on Sociocultural Influences on Motivation and Learning: Vol. 2. Sociocultural Influences on Motivation and Learning* (pp. 23–56), by D. M. McInerney and S. Van Etten (Series Eds.), Greenwich, CT: Information Age.

The initial categories of this study were family, peers, schoolwide/communitywide generalizations, ethnic self-identity, values, personal changes, intergroup relationships, ethnic group status, perceptions of ethnic groups, mixed ethnicities, differential treatment, and future plans. Initial categories evolved and new categories emerged as the transcripts were read and coded. In this process of changing and re-coding data during analysis, the researcher continually built upon and extended theoretical notions about the findings. An example of this occurred in coding for references to personal values. It became evident that comments frequently clustered in various subcategories: education, family, religion, social, ethnic, and maxims. Two weeks after the initial reading and coding was completed, the researcher read each transcript a second time, verifying the consistency of the initial coding and updating codes to reflect expanded or consolidated categories. Coding in more specific subcategories permitted a finer degree of analysis within the database.

In addition to the categorical coding, demographic coding allowed for comparisons across various subgroups of students interviewed. Demographic variables included the following: grade, gender, school, ethnic mix, birthplace, years of residence in urban or rural communities, and household (both parents, one parent, or other). For example, all of the coded statements about ethnic self-awareness were divided into subcategories by school, age, gender, ethnic mix, and years of Hawaii residence. Similarities and differences among subcategories were the basis for identifying patterns.[10]

As this example illustrates, the use of computer software will not do the data analysis for you, but it will help retrieve categories from a large amount of narrative (text) data. There will still be many decisions that you need to make about how to code your data. You will also want to revisit your data and verify that the computer "got it right"! (This is akin to estimating the outcome of a math problem for which a calculator has been used. Does the outcome make sense?)

⁘ DATA INTERPRETATION

Because the goal of data interpretation is to find the meaning of the data, it is based heavily on the connections, common aspects, and linkages among the data, especially the identified categories and patterns. One cannot classify data into categories without thinking about the meaning of the categories. To aid interpretation, it is important to make explicit what the conceptual bases or understandings of the categories are and what makes one category different from another. Interpretation requires more conceptual and integrative thinking than data analysis, because interpretation involves identifying and abstracting important understandings from the detail and complexity of the data.

The implicit issue in data interpretation is the answer to these four questions:

What is important in the data?
Why is it important?
What can be learned from it?
So what?

The researcher's task, then, is to determine how one identifies what is important, why it is important, and what it indicates about the participants and context studied. The process for answering these four questions is to a large extent idiosyncratic. Interpretation is personal. There are no hard and fast rules for how to go about the task of interpreting the meaning of data. As in most qualitative studies, it depends on the perspective and interpretive abilities of the researcher.

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[10] Ibid.

You may wonder, why bother with interpretation, especially since interpretation involves taking risks and making educated guesses that might be off base? Wolcott[11] argues for the importance of interpretation because as qualitative researchers, our interpretations matter to the lives of those being studied. In addition, the process of interpretation is important because it can challenge qualitative researchers' taken-for-granted assumptions and beliefs about the educational processes they have investigated.

The techniques for data interpretation that follow are adapted from those in Wolcott and in Stringer.[12]

Extend the analysis. One technique that is low on the data interpretation risk scale is to simply extend the analysis of your data by raising questions about the study, noting implications that *might* be drawn without actually drawing them. As Wolcott suggests, "This is a strategy for *pointing* the way rather than *leading* the way"[13] (italics added).

Connect findings with personal experience. Qualitative research is very personal business, so it makes sense to personalize our interpretations. For example, you may present your findings with the prelude, "Based on my experiences in conducting this study, this is what I make of it all." Remember, you know your study better than anyone else. You have been there for every twist and turn along the way, trying to make sense of discrepant events just when you thought you "had it right." Share your interpretations based on your intimate knowledge and understandings of the research setting.

Seek the advice of "critical" friends. If you have difficulty focusing an interpretive lens on your work, rely on your trusted colleagues to offer insights that you may have missed because of your closeness to the work. Offer your accounts to colleagues with the request that they share with you their possible interpretations. Similarly, you may ask your informants (students, parents, teachers, and administrators) for their insights. But beware! The more opinions you seek, the more you will receive, and often these suggestions will come with the expectation that you accept the advice! Over time you will develop reciprocity with a cadre of trusted, like-minded colleagues who will selflessly fulfill the role of critical friend. Take the time to build these relationships and reap the rewards they offer.

Contextualize findings in the literature. Uncovering external sources as part of the review of related literature is a powerful way for qualitative researchers to provide support for the study's findings. Making these connections also provides qualitative researchers with a way to share with colleagues the existing knowledge base on a research problem and to acknowledge the unique contribution the qualitative researcher has made to our understanding of the topic studied.

Turn to theory. Theory serves a number of important roles for qualitative researchers. First, theory provides a way for qualitative researchers to link their work to broader issues of the day. Second, theory allows the researcher to search for increasing levels of abstraction and to move beyond a purely descriptive account. Levels of abstraction allow us to communicate the essence of our descriptive work to colleagues at research meetings. Lastly, theory can provide a rationale or sense of meaning to the work we do.

Know when to say "when"! Finally, if you don't feel comfortable with offering an interpretation, don't do it. Be satisfied with suggesting what needs to be done next and use that as a starting point for the next research cycle. Restate the problem as you now see it, and explain how you think you will fine-tune your efforts as you strive to increase your understanding of the phenomenon you have investigated. As Wolcott cautions, "don't detract from what you have accomplished by tacking on a wimpy interpretation."[14]

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[11] *Transforming Qualitative Data: Description, Analysis, and Interpretation,* by H. F. Wolcott, 1994, Thousand Oaks, CA: Sage.
[12] Ibid., pp. 39–46; *Action Research* (p. 87–96), Stringer, 1996.
[13] *Transforming Qualitative Data* (p. 40), Wolcott, 1994.
[14] Ibid., p. 41.

All researchers, and qualitative researchers in particular, must face the prospect of not being able to report in their analysis all of the data they have collected. This is a difficult reality for any researcher, but more so for qualitative researchers because of the time and effort it typically takes them to obtain and understand their data. Rarely is every piece of data used in the report of a study. Remember, the task of interpreting data is to identify the important themes or meanings in the data, not necessarily *every* theme.

A final piece of advice regarding data interpretation is to share your interpretations wisely. At some time we have all been exposed to what are variously called "fads," "the pendulum swing," the "bandwagon," and so on. As such, many of us may hesitate to embrace anything new or different that comes our way in schools, calming ourselves with the mantra "This, too, shall pass!" If we as researchers attempt to use our qualitative research findings only as a soapbox from which we simply have sought findings to confirm our beliefs and values, then we risk being alienated by our colleagues. Avoid being evangelical about your interpretations, connect them closely to your data and analysis, and share your newfound understandings with colleagues in an appropriate manner.

ENSURING CREDIBILITY IN YOUR STUDY

Throughout this chapter we have emphasized the centrality of the researcher as the integrator and interpreter of data. You might infer that this emphasis means that researchers have carte blanche when analyzing and interpreting data; that is, they can rely strictly on their personal feelings or preferences. This is definitely not the case. If qualitative research were based solely on producing unsubstantiated opinions, ignoring data that did not confirm the researcher's expectations, and failing to examine biases of research participants, it would be of little value. Thus, although data analysis and interpretations are heavily determined by the researcher, there are criteria that researchers should respect and respond to in conducting their own studies. For example, Dey identifies six questions intended to help researchers check the quality of their data:[15]

- Are the data based on one's own observation, or is it hearsay?
- Is there corroboration by others of one's observation?
- In what circumstances was an observation made or reported?
- How reliable are those providing the data?
- What motivations might have influenced a participant's report?
- What biases might have influenced how an observation was made or reported?

Qualitative researchers who attend to these guidelines for conducting credible data analysis and data interpretation are rewarded with a trustworthy research report that will withstand the scrutiny of the research community.

SUMMARY

Data Analysis and Interpretation: Definition and Purpose

1. Data analysis is an attempt by the qualitative researcher to summarize collected data in a dependable and accurate manner. It is the presentation of the findings of the study in a manner that has an air of undeniability.
2. Data interpretation is an attempt by the researcher to find meaning in the data and to answer the "So what?" question in terms of the implications of the study's findings.

[15] *Qualitative Data Analysis* (p. 224), by I. Dey, 1993, New York: Routledge.

Data Analysis During Data Collection

3. A great deal of data analysis occurs before data collection is complete. Researchers think about and make hunches about what they see and hear during data collection.
4. An important step in the ongoing analysis of qualitative data is to reflect on data collection efforts by answering two questions:
   a. Is your research question still answerable and worth answering?
   b. Are your data collection techniques catching the kind of data you wanted and filtering out the data that you don't?
5. Although ongoing analysis and reflection is a natural part of the qualitative research process, it is important to avoid premature actions based on early analysis and interpretation of data.

Data Analysis After Data Collection

6. Once fieldwork has been completed, the researcher must concentrate solely on the multistage process of organizing, categorizing, synthesizing, analyzing, and writing about the data. During the process, the researcher works to progressively narrow a large set of issues and data into small and important groups of key data.
7. The length of data analysis is difficult to state. It depends mainly on the nature of the study, the amount of data to be analyzed, and the analytic and synthetic abilities of the researcher.

Steps in Analyzing Qualitative Research Data

8. There is no single, agreed-on approach for analyzing qualitative data. Once data are organized, one approach is to follow three iterative steps: reading/memoing, describing what is going on in the setting, and classifying research data.
9. Qualitative data analysis is a cyclical, iterative process of reviewing data for common topics or themes. The researcher has the key role, and the quality of the analysis will depend heavily on his or her intellectual qualities.
10. Reading/memoing is the process of writing notes in the field note margins and underlining sections or issues that seem important during the initial reading of narrative data.
11. Describing involves developing thorough and comprehensive descriptions of the participants, the setting, and the phenomenon studied in order to convey the rich complexity of the research.
12. Classifying small pieces of data into more general categories is the qualitative researcher's way to make sense and find connections among the data. Field notes and transcripts are broken down into small pieces of data, and these pieces are integrated into categories and often to more general patterns.

Data Analysis Strategies

13. Identifying themes is a strategy that relies on the identification of ideas that have emerged from the review of literature and in the data collection.
14. Coding is the process of categorically marking units of text with codes or labels as a way to indicate patterns and meaning in data. It involves the reduction of narrative data to a manageable form to allow sorting to occur.
15. Asking key questions is a strategy that involves the researcher asking questions of the data such as "Who is centrally involved?" "What major activities, events, or issues are relevant to the problem?" and so on.
16. Doing an organizational review is a strategy for helping the researcher understand the school or other organization as the larger setting. A review should focus on the following features of an organization: vision and mission, goals and objectives, structure of the organization, operation, and problems, issues and concerns.
17. Concept mapping is a strategy that allows the qualitative researcher to visualize the major influences that have affected the study and to create a visual display that allows for the identification of consistencies and inconsistencies that may exist between disparate groups.
18. Analyzing antecedents and consequences is a strategy that allows the researcher to map the antecedents (causes) and consequences (effects) that have emerged throughout the study.
19. Displaying findings is a strategy for using matrixes, charts, concept maps, graphs and figures to encapsulate the findings of a study.
20. Stating what's missing is a strategy that encourages the researcher to reflect on the pieces of the puzzle that are still missing at the conclusion of the study and to identify any questions for which answers have not been provided.

Using Computer Software to Assist with Data Analysis

21. Many computer programs are available to aid in analyzing qualitative data.

22. It is important for novice qualitative researchers to remember that computers alone do not analyze or code data.
23. N6, a version of NUD*IST, is one popular qualitative analysis software package used by researchers.

Data Interpretation

24. Data interpretation is based heavily on the connections, common aspects, and linkages among the data pieces, categories, and patterns. Interpretation cannot be meaningfully accomplished unless the researcher knows the data in great detail.
25. The aim of interpretation is to answer four questions: What is important in the data? Why is it important? What can be learned from it? So what?
26. Extending the analysis is a data interpretation strategy in which the researcher simply extends the data analysis by raising questions about the study, noting implications that might be drawn without actually drawing them. This is a strategy for pointing the way rather than leading the way.
27. Connecting findings with personal experience is a strategy that encourages the researcher to personalize interpretations based on intimate knowledge and understanding of the research setting.
28. Seeking the advice of "critical" friends is a strategy that involves inviting a trusted colleague to offer insights on the research that may have been missed due the researcher's closeness to the study.
29. Contextualizing the findings of the study in the related literature is a strategy that uses the review of related literature to provide support for the study's findings and encourages the researcher to link to "external authority."
30. Turning to theory is a strategy that encourages researchers to link their findings to broader issues of the day and, in so doing, to search for increasing levels of abstraction and to move beyond a purely descriptive account.
31. Knowing when to say "when" is a strategy that encourages the researcher to refrain from offering an interpretation rather than offer a wimpy interpretation.
32. As a qualitative researcher, you should share your interpretations wisely and avoid being evangelical about your interpretations. Provide a clear link between data collection, analysis, and interpretation.

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