

# Qualitative Research Basics: A Guide for Engineering Educators

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# Introduction

It is our intention in this manual to provide an overview of the use of qualitative research methods in the engineering education context. Our assumption is that users of this guide will be fairly new to qualitative approaches—and perhaps new to educational research in general. We have tried, therefore, to avoid extensive citations and detail, focusing rather on a general synthesis of the main issues and approaches.

Because qualitative research rests on a different set of philosophical assumptions about the nature of truth and limitations of research than traditional research, the opening chapter begins with an explanation of these fundamental differences. Throughout the following chapters, the ways in which these assumptions play out in researcher choices are documented.

The chapters cover the essential information needed to conduct or evaluate a qualitative study. They describe the design of qualitative studies, basic data collection strategies, analysis techniques, trustworthiness considerations, and writing up the study. Resources for additional information are listed in the final chapter.

The power of qualitative research lies in its ability to adapt to natural settings such as the classroom or laboratory; enable exploration of motivations, reasoning, decision making, and other inner thoughts of participants such as students and teachers; and permit description of the interaction of context and actors in specific settings. For many research questions in engineering education, it is the ideal research approach. It is relatively new in some disciplines, however, and often regarded with suspicion. We hope that this guide will help many researchers to see the utility of the approach, use it well, and enrich the field with new understandings and informed practice.

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# 1. Epistemological Perspectives

## What is Qualitative Research?

To the novice researcher, the terms “qualitative” and “quantitative” imply something about the type of data that are collected. Thus, it may appear that the distinction between these two research approaches lies solely in the data; qualitative research is concerned with text or other non-numerical data, while quantitative research is concerned with numerical data. This distinction, however, is only at the surface. The differences between the two are much deeper, and go to the context in which the research is conducted.

In general, quantitative research is concerned with identifying relationships between variables, and generalizing those results to the world at large. In contrast, qualitative research seeks to understand phenomena in depth and within specific contexts. Denzin and Lincoln (2005) state that, “qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them” (p. 3), while Merriam (2002) says, “Qualitative researchers are interested in understanding what those interpretations (of those studied) are at a particular point in time and in a particular context” (p. 4). Thus, key characteristics of qualitative research are an in-depth focus on only a few individuals or situations, a focus on the context of the study, and recognition of the researcher as an instrument of the study.

Qualitative research, in its approach, assumptions, and outcomes, is very different from quantitative research. Questions of what constitutes truth, sample size and selection, how data are collected and analyzed, how findings are presented, and what is meant by trustworthiness and generalizability, are all different when one is conducting qualitative research. Denzin and Lincoln (2005) discuss five differences between the two approaches (pp. 11-12). According to them, qualitative research tends to have the following attributes:

- Less use of positivist or postpositivist perspectives
- Acceptance of postmodern sensibilities
- Capturing the individual’s point of view
- Examining the constraints of everyday life
- Securing rich descriptions.

Thus, qualitative research serves as a complement to quantitative research. While the general goal of quantitative research is to identify what is occurring in terms of context-free generalizations, the goal of qualitative research is to gain an understanding of why or how phenomena occur in terms of context-specific descriptions.

## **Epistemological Perspectives**

The epistemological perspective of a study is related to the assumed nature of truth and the approach used to understand and explain reality. Why is the epistemological perspective of a study important? Because it helps to shape the research design and makes explicit to others the phenomenon being investigated. Perhaps you are interested in determining whether students with a higher SAT score do better in engineering. Or you want to understand how the interactions between students in a problem-solving group do or do not contribute to better problem solutions. Or you want to show how particular faculty hiring practices tend to marginalize under-represented minorities. Each of these studies is informed by a different view of reality, or epistemological perspective, which in turn will shape the research design.

When designing a qualitative study, one of the first questions you must answer is what epistemological perspective will drive the research. This perspective serves as an umbrella to the entire research design, ensuring that there is consistency among research questions, the research approach, the methods, and the data analysis. Table 1, taken from Koro-Ljungberg and Douglas (2008), summarizes key aspects of the common epistemological perspectives that can be used. Further details regarding each of these perspectives appear in the following sections.

### **Positivist/postpositivist**

Most engineers are familiar with the positivist and postpositivist perspectives, which assume that there is an absolute truth. In the positivist perspective this truth can be found, while in the postpositivist perspective one can only say that current data is consistent with an assumed truth, because a counter-example could always be found (the concept of falsifiability). In either perspective, however, there is ultimately some universal truth that is independent of context, observer, or observed. In engineering research this approach makes sense. After all, the strength of a certain material should not depend on who made the measurement or where the material was made. Use of this perspective in social science research is generally associated with quantitative methods and its concern with validity, reliability, and generalizability.

### **Interpretivist**

Much qualitative research is based on an interpretivist perspective, which states that truth is contextual, depending on the situation, the people being observed, and even the person doing the observation. This concept can be difficult to grasp, but can be illustrated with a simple example. Consider a study that examines the relationship between SAT scores and student grades in engineering courses. From a positivist perspective the correlation between the two could be used to make predictive decisions about student performance in engineering based on SAT scores. Thus, this correlation is assumed to represent a generalized “truth” about the success of students. From an interpretivist perspective, however, one would examine each student’s situation. Students who have similar SAT scores and course grades might in fact be affected by different factors, such as inadequate

math preparation, test anxiety, etc. The qualitative study tells the individual stories of these students and identifies the many truths that underlie the quantitative correlation. Thus, the quantitative, positivist approach focuses on context free generalizations, while the qualitative, interpretivist approach focuses on context-dependent descriptions.

Under the broad umbrella of interpretivism, there are several epistemological perspectives that provide additional focus to how reality is defined:

**Phenomenology:** Phenomenology seeks to provide a description of the key elements of a phenomenon. New meaning can be obtained by laying bare the essential aspects of a particular experience and describing what are the common, key elements that make up that experience. Thus, in phenomenology researchers ask for a description of the phenomenon that is readily apparent to conscious minds. They do not attempt to describe how individuals arrived at a particular meaning for the experience. Rather, they seek to obtain a “careful description of ordinary conscious experience of everyday life...a description of ‘things’ ...as one experiences them” (Schwandt, 2001, p. 191).

Within phenomenology, there are two distinct schools. The classic European approach is critical, in the sense that it recognizes there are culturally defined meanings attached to our perceptions. The term “bracketing” is used to describe the attempt to set aside the meanings brought by both the researcher and the participants, in order to identify the true essence of the experience. Thus, its goal is to identify the true essence of the experience, unfiltered by either the researcher or the person experiencing the phenomenon. Critics of this approach to phenomenology point out that it resembles positivism in its assumption that there is an invariant aspect of the experience that is true for everyone. Phenomenology is also used in an uncritical way, in that the experience is described in terms of the perception of the person experiencing it. This approach is more interpretive in nature, in that it allows for differing perceptions depending on the individual. However, some authors lament this second approach, arguing that by being uncritical, “...there is at best a failure to capture new or fuller meanings or a loss of opportunities to renew the understandings that already possess us” (Crotty, 2003, p. 85). Ultimately, a researcher’s choice of which phenomenological approach to use depends on his or her own beliefs on the nature of experience.

**Constructivism:** Constructivism examines the meanings individuals create to describe the world around them. Meaning occurs as a result of the individual’s interaction with the world and the particular biases of that individual. Thus, what is known does not simply mirror the real world; rather, the meanings ascribed to the real world are created by individuals as they experience it. A constructivist viewpoint may seem clear for social concepts such as “freedom”. After all, a particular individual’s definition of “freedom” depends on his or her background, culture, economic status, etc. But what of the natural world? Even here Crotty (2003) argues for a constructivist (what he calls constructionist) stance (p. 57). He describes different meanings for the word “tree” depending on our own personal

perspective: a source of income for loggers, a sink for carbon dioxide for environmentalists, or an object of aesthetic beauty for an artist. A study based on the constructivist perspective seeks to identify a particular meaning and how that meaning was created by individuals.

***Social constructionism:*** Similar to constructivism, and sometimes considered a subset of it, this perspective describes meanings as being socially constructed, as opposed to the individual construction of meaning in constructivism. "...the focus here is not on the meaning-making activity of the individual mind but on the collective generation of meaning as shaped by the conventions of language and other social processes" (Schwandt, quoted in Crotty, 2003, p. 58). Meaning thus is created in a social context, through interactions between individuals. Meaning reflects a shared sense of the world, which Crotty (2003) describes as, "...viewing it (the world) through lenses bestowed on us by culture. Our culture brings things into view for us and endows them with meaning, and, by the same token, leads us to ignore other things" (p. 54). Similar to the constructivist approach, then, a social constructionist approach seeks to identify meaning and how that meaning was created out of the social context that occurs between individuals. Social constructionism is often considered critical, in that it seeks to examine how the meanings are derived within a culture.

***Symbolic interactionism:*** Symbolic interactionism focuses on how people act towards the world around them, based on the meanings that are socially constructed, but interpreted by the individual. This perspective focuses on obtaining understanding by placing oneself in the place of the individual. "Only through dialogue can one become aware of the perceptions, feelings, and attitudes of others and interpret their meanings and intent" (Crotty, 2003, p. 75). The focus is on understanding the interactions between people and the world, based on the meanings given to the world by that individual. Thus, in contrast to social constructionism, symbolic interactionism is very much uncritical. The researcher accepts the meanings put into place by the culture and explores their implications.

***Hermeneutics:*** Hermeneutics is primarily concerned with the analysis and interpretation of texts. Interpretation proceeds through the hermeneutic circle, which can be used to describe the relationship between the text as a whole and its individual parts, between the object and the interpreter, and between the interpreter and the interpreter's background (Schwandt, 2001, p. 112). In the hermeneutic circle, the individual parts of a text cannot be understood unless the whole work is understood, but neither can one gain a meaning of the work as a whole without understanding the parts. With regard to the interpreter, there is a feedback in which the background brought to the text informs the interpretation; however, that interpretation itself brings about new understanding in the mind of the interpreter, which can change the way in which the text is seen. Thus, there is an endless cycle of interpretation (the hermeneutic circle), which leads to endless evolving interpretations of the text. There is no one "true" meaning for the text,

and new meanings can be discovered that even the original author did not envision.

### **Critical**

The critical perspective goes one step further than the interpretive perspective by examining the power relationships present in society. It questions who has power, why, and what the presence or absence of power means for particular groups. As such, it is often focused on issues of race, class, or gender. As described by Merriam (2002), “Critical qualitative research, then, raises questions about the influence of race, class, and gender (and their intersections), how power relations advance the interest of one group while oppressing those of other groups, and the nature of truth and the construction of knowledge” (p. 10).

This last point by Merriam regarding the nature of truth is important. From the critical perspective, truth is defined by those in power. Truth as defined in other ways is marginalized, and those outside of the power structure are forced to either assimilate or remain at the margins. Thus, the critical perspective is often associated with action research, which seeks to not only understand, but to change the structures of society. By giving a voice to those who are powerless, critical researchers seek to empower them and expand the meanings ascribed to reality to include all views.

### **Postmodern/poststructural**

The postmodern and poststructural perspectives question all aspects of the world, especially “grand narratives.” These grand narratives are the theoretical frameworks that describe social behavior. In place of grand narratives, the “post” perspectives emphasize differences, multiple perspectives of the same phenomenon, and lack of absolutes. “Deconstruction” is an important element of these perspectives. When data are deconstructed, they are broken down to reveal hidden or latent meanings, revealing the assumptions inherent in the data and their interpretation.

### **The Role of Epistemological Perspectives**

The obvious question arises as to why epistemological perspectives are important at all. After all, in engineering research this aspect of the research design is rarely considered. In engineering research, it is well understood that the assumed perspective is positivist. There is no need to explicitly state, or even consider, whether the researcher is using a positivist perspective, because that is the only perspective that is used in engineering research. Because there is a great diversity of possibilities when conducting qualitative education research, however, it is important to consider the epistemological perspective in research designs, in order to ensure that they are consistent with the assumed view of reality and to make the epistemological perspective explicit in the reporting of the research so that readers will understand the context in which the research was conducted.

Consider, for example, a study on how industrial design teams operate. The study can be undertaken from a variety of perspectives:

- From a **phenomenological** perspective, the interest would center on the experience of being a part of a design team. The focus would be on describing what happens in a team and generating a description that captures the essence of how the team operates. The key question to ask would be: what are the essential elements of the experience of working in a design team?
- From a **social constructionist** perspective, the interest would be on knowing how the design team creates a shared understanding of their activities, roles, or understanding of the design process. The researcher would want to ask the question: what are those understandings, and how did they develop?
- From a **critical perspective**, the interest is with the power relationships in the design team. The researcher would be asking questions regarding how those power relationships were developed (formally or informally), how they influence the working of the group, and what effect they have on those seen not to be in power.

These examples illustrate that the epistemological perspective has a major influence on defining the direction and scope of our research.

## Summary

The epistemological perspective has an important influence on research. It provides an umbrella for defining how the researcher sees the world and informs the research design. Crotty (2003), in particular, proposes that the epistemological perspective determines what research questions can be asked and what methods can be used. Certainly consistency must be maintained among the epistemological perspective, research questions, and methods for any particular study. This is not to say that any particular researcher is limited to a single epistemological perspective. The design of a research study is an iterative process, with the general purpose and research questions informing the perspective, while at the same time the perspective informing the research questions. Thus, you may find yourself conducting one study from a constructivist perspective, and conducting another study that is critical. What is important is that any particular study is consistent across the entire research design, so that the findings can be interpreted and reported within the context that shaped the study.

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**Table 1: Comparison among epistemological perspectives. From Koro-Ljungberg & Douglas (2008).**

Epistemological perspective	Post-positivist	Interpretivist (constructivism, social constructionism, hermeneutics, phenomenology, symbolic interactionism)	Critical/emancipatory	Postmodern/poststructural
View on reality	Single falsifiable reality	Multiple subjective realities	Multiple subjective and political realities	Multiple fragmented realities
Purpose	To find relationships among variables, to define cause-and effect	To describe a situation, experience, or phenomenon	To produce a socio-political critique	To deconstruct existing 'grand narratives'
Methods	Methods and variables defined in advance, hypothesis driven	Methods and approaches emerge and are to be adjusted during study	Methods and approaches designed to capture inequities	Methods and approaches generated during the study
The role of researcher	Researcher is detached	Researcher and participants are partners	Researcher and participants are activists	Researchers and participants have various changing roles
Outcome or research product	Context-free generalizations	Situated descriptions	Critical essays, policy changes	Reconceptualized descriptions of the phenomenon

## 2. Research Strategies

### The Role of Research Strategies

Many authors refer to specific qualitative research approaches, traditions, or strategies. Denzin and Lincoln (2005) call them, “a bundle of skills, assumptions, and practices that the researcher employs as he or she moves from paradigm to the empirical world . . . strategies of inquiry connect the researcher to specific methods of collecting and analyzing empirical materials” (p. 25). However, one should not consider these research strategies as specific approaches that must be followed. After all, one of the inherent strengths of qualitative research is its flexibility. As noted by Denzin and Lincoln, “The qualitative researcher . . . uses the aesthetic and material tools of his or her craft, deploying whatever strategies, methods, and empirical materials are at hand . . . If the researcher needs to invent, or piece together, new tools, he or she will do so” (p. 4). In addition, they note that, “No specific method or practice can be privileged over any other” (p. 7).

Within these limitations, descriptions of qualitative research strategies can be useful. They provide a means to situate one’s research within a larger body of research and to design a study within the context of that particular strategy. They act as guidelines and help to ensure that the study design is consistent with accepted qualitative research practices.

### Types of Research Strategies

The flexibility of qualitative research means that it can be hard to identify a particular study with a particular approach. Denzin and Lincoln (2005) talk about “blurred genres,” meaning that a particular study might have characteristics of more than one type of approach. In categorizing the approaches, different authors have identified different sets of strategies. Creswell (2007) identifies five main approaches:

- narrative
- phenomenology
- grounded theory
- ethnography
- case study

Merriam (2002) identifies the following eight types of research:

- basic interpretive
- phenomenology
- grounded theory
- case study

- ethnography
- narrative analysis
- critical research
- postmodern research

Denzin and Lincoln (2005) list the following eight research strategies:

- case study
- ethnography/participant observation/performance ethnography
- phenomenology/ethnomethodology
- grounded theory
- life history
- historical method
- action and applied research
- clinical research

As these lists show, not all research strategies reflect the same aspect of the research design. Phenomenology is a theoretical perspective that also has important elements of data analysis, grounded theory is primarily a data analysis method, and case study refers to the bounds of sampling. Merriam (2002) notes this, pointing out that case study research can be approached as an ethnography or used to develop a grounded theory (p. 8). Six research strategies are highlighted here: ethnography, phenomenology, grounded theory, case study, narrative analysis, and basic interpretive research.

### ***Ethnography***

An ethnography is a description and interpretation of the cultural behavior of a group. By culture is meant the behaviors, language, and social practices that define the unique aspects of that group. While one might typically think of a culture as referring to ethnicity or religion, any group, such as an institution or organization, can be considered to have its own culture. Observation of a culture can be used to understand the meaning of the behavior that occurs within that group.

An ethnography involves in-depth immersion by the researcher in the culture being studied. The researcher is often called a “participant-observer” in that the researcher becomes, as much as possible, a member of the group while at the same time collecting data. Data collection techniques involve interviews, collection of documents and other artifacts, and observations. Ethnographers often record their observations in a field notebook, where they can also record their personal thoughts and impressions. Analysis of the data involves both creating a description of the group’s behavior as well as analysis of what that behavior means.

In some cases a study is called an “ethnography” if it involves any kind of participant observation. However, to truly be an ethnography it needs to contain the six features identified by Punch (1998):

- The behavior of the group is understood by understanding the culturally shared meanings within the group.

- The study is conducted to understand meanings from the perspective of the people in the group.
- The group is studied in its natural setting.
- The design evolves during the study, rather than being pre-defined.
- A variety of data collection techniques are used within a single study.
- Data collection occurs over a long period of time.

Thus, the focus of an ethnography is on understanding and interpreting the cultural practices of a group through prolonged observation as a participant-observer.

### ***Phenomenology***

As an epistemological perspective, phenomenology seeks to identify the single, invariant essence of the lived experience. Thus, phenomenology as a research strategy involves a set of methods and analysis techniques that are used to identify that essence. Creswell (2007) lists the following procedural steps involved in conducting a phenomenological study (pp. 60-62):

- An understanding of the philosophy of phenomenology, including the concept of bracketing, is needed.
- Research questions are developed that are focused on having the participants describe their experiences.
- Interviews are conducted with 5-25 participants who have experienced the phenomenon being investigated. The questions asked focus on how they have experienced the phenomenon and what contexts affect their experiences.
- The data are analyzed, typically by first dividing the transcripts into specific statements, clustering the statements based on psychological concepts, and then bringing these clusters together to create a general description of the experience.
- The final description of the experience provides an understanding of the underlying, invariant structure that is common for all instances of the experience.

Since phenomenology is focused on the lived experience of the participants, the researcher must “bracket,” or set aside, any pre-conceived notions of what that experience is. This is not to say that they are simply ignored. Rather, as with qualitative research in general, these pre-conceived notions are examined and made explicit in order to be transparent about any biases the researcher may have. By making these biases apparent, it is then possible to set them aside when examining the data. As described in Chapter 1, however, this approach to phenomenology has been criticized. Specifically, two beliefs tend toward a positivist perspective: the belief that there is a single true essence of any experience and the belief that the researcher’s own interpretation can be separated out in a way that will not influence the identification of that essence. This does not mean that phenomenology is not useful, but as with any approach one needs to be aware of its potential limitations.

## ***Grounded Theory***

Grounded theory is an approach to qualitative data that aims to develop theory that is “grounded” in data. Grounded theory was first described by Glaser and Strauss in 1967, and has since been refined and expanded. It was originally developed in reaction to the trend within sociology to propose theories and then test them (Creswell, 2007). In contrast, Glaser and Strauss emphasized the development of theory based on empirical data. The approach is inductive rather than deductive.

Grounded theory is primarily a data analysis technique, and details of the data analysis are covered in Chapter 6. Some of the key attributes of a grounded theory study are:

- Data collection and analysis occur simultaneously. As analysis occurs, missing elements are identified, which become targets for further data collection.
- Data analysis proceeds through the constant comparative method, in which interview statements are coded, categorized, and grouped to develop a theory.
- Data collection proceeds until the categories are “saturated,” that is, until no new information is obtained with further data collection.
- The theory developed is not necessarily high level theory. It is often what Creswell calls a “substantive-level theory,” which applies to the specific setting or context in which the data was collected.

Some authors, Charmaz (2006) in particular, argue that classic grounded theory is positivist in its theoretical perspective. This is seen in the original description of grounded theory that implies that the data are discovered by the researcher and are “untouched by the competent researcher’s interpretations” (Charmaz, 2006, p. 132). In contrast, Charmaz advocates a more flexible view of grounded theory. In her view of constructivist grounded theory, the researcher’s perspective becomes part of the data analysis and interpretation. There are no objective data waiting to be discovered; rather data and analysis are, “created from shared experiences and relationships with participants and other sources of data” (p. 130). Further, “the theory *depends* on the researcher’s view; it does not and cannot stand outside of it” (p. 130, italics in original). Charmaz’s view moves grounded theory closer to the interpretivist perspective than classic descriptions.

## ***Case Study***

A case study is characterized by in-depth study of a bounded system. The boundaries of the case may be defined in terms of time, space, or participants (Merriam, 2002). For example, a case may be a classroom, a particular event, or an organization. A case study is selected when one wants to study a specific situation (the case) in depth. Within this broad definition of a case study, there are many possible approaches that can be taken, depending on the overall purpose of the study. For example, Stake (2005) identifies three different types of case studies. The intrinsic case study has as its focus an in-depth understanding of that particular case. The case is not chosen because it is representative of a more general phenomenon, but simply because it is interesting in and of itself. The instrumental case study is chosen to provide insight into a more general phenomenon.

The instrumental case may be chosen because it is representative of that phenomenon, or because it is unusual and provides a useful contrast to the typical case. Finally, the collective case study involves study of several cases that, taken together, provide insight into the general phenomenon.

Punch (1998) lists four characteristics of a case study (p. 153):

- The case has boundaries. Even if the boundaries are not obvious, the researcher needs to define boundaries to limit the case.
- The case is a particular example of something.
- In analysis the researcher attempts to maintain the case as a single unit. At the same time however, there is often a focus on particular aspects of the case.
- A variety of data types and data collection methods are used.

Within a case study there is great flexibility on how to design the research. Data collection methods can include interviews, observation, and collection of archival materials. Analysis can be holistic, examining the entire case, or it can be focused on a specific aspect of the case. Specific data analysis techniques vary, and can include aspects of the strategies discussed above, such as phenomenology or grounded theory. Case studies can also be conducted on single cases, or can be conducted across multiple cases in order to obtain a broader view of the phenomenon.

In summary, Stake (2005) identifies the following responsibilities for researchers conducting case studies:

- Bounding the case, conceptualizing the object of study
- Selecting phenomena, themes, or issues (i.e., the research questions to emphasize)
- Seeking patterns of data to develop the issues
- Triangulating key observations and bases of interpretation
- Selecting alternative interpretations to pursue
- Developing assertions or generalizations about the case.

### *Narrative*

A narrative, or biography, describes a single person's experiences in order to identify and understand larger meanings that make up an individual's story. A narrative is clearly very individualized, but can also reveal broader truths that cut across many people's experiences. It is written as a story that leads the reader through the lived experiences of the individual. There are many forms of narrative. Creswell (2007, pp. 54-55). Merriam (2002) lists three approaches that a narrative can take (p. 287):

- **Biographical:** The analysis is focused on significant events, people, and other biographical elements of the person's life.
- **Psychological:** The emphasis is on personal thoughts and motivations, and how the person's experiences shape those thoughts and motivations.
- **Linguistic:** The specific language used by the subject of the narrative is analyzed using discourse analysis.

Creswell (2007) lists several steps in developing a narrative (pp. 55-57):

- Gather the stories of the individual through multiple data sources.
- Collect information on the context within which these stories occur.
- "Restory" these experiences into a general framework that may link key elements, provide a chronological story, or explore larger themes.
- Explore the meaning of these stories, with input from both the researcher and the subject.

Although narrative analysis is focused on the experience of single individuals, when framed properly it can provide insights into larger issues that cut across multiple experiences. For example, Merriam (2002) reprints a narrative study in which a woman in a management position in a large corporation confronted and dealt with issues of sexism (Bloom, 1996). Use of narrative can be a powerful tool for illuminating and understanding broader issues beyond the single individual.

### ***Basic Interpretive***

Merriam (2002) defines a basic interpretive study as one in which "the overall purpose is to *understand* how people make sense of their lives and their experiences" (p. 38) (italics in original). While this goal underlies all qualitative studies, Merriam states that studies based on other strategies have additional purposes not found in basic interpretive studies (e.g. developing theory in grounded theory, identifying the essence of a phenomenon in phenomenology, etc.). For Merriam, the basic studies are those that do not share the special characteristics of the other strategies. She gives the example of a study that examines adult learning in a non-Western culture. Although the culture was an important aspect of the interpretation, this is not an ethnography because it did not involve a prolonged stay or the researcher as a participant-observer.

### **Summary**

Research strategies are a set of qualitative research practices that have their own methods, history, and literature. Identifying which research strategy you are using in your own study can be useful to help situate your study in a particular literature and to guide your choice of data collection and analysis methods. At the same time, however, the types of research strategies enumerated in the literature should not be considered prescriptive. Qualitative researchers need to maintain their flexibility, selecting methods that answer their research questions and are consistent with the theoretical perspective of the study. Merriam's identification of basic interpretive studies as a research strategy highlights this flexibility. As she points out, "They are probably the most common form of qualitative research found in education..." Careful consideration of whether or not your study falls into one of these strategies, and if so, which one, can provide guidance as you move into the research design.

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## 3. Designing the Study

Designing a qualitative study is similar in many respects to other types of studies, yet different in some key ways. Like quantitative studies, one must identify the research questions of the study, align the data collection methods with those research questions, and consider the appropriate population to study. However, qualitative studies have additional considerations, such as the epistemological perspective that underlies the study and the role of the researcher in both data collection and analysis. This section will describe the major characteristics of qualitative design and elements that should be in a study proposal, such as decisions about data collection, sampling, Human Subjects, and ethics.

### Characteristics of Qualitative Studies

As Chapter 1 described, in accord with the epistemological assumptions on which they rest, qualitative studies have the following design characteristics:

**Naturalistic orientation:** The studies are almost always conducted in the natural setting, rather than under laboratory conditions. They do not normally rely on interventions or manipulations, but seek to understand existing conditions.

**Purpose:** The studies are not primarily aimed at prediction, control, or generalization, but rather understanding, and in the case of critical studies, critique.

**Researcher involvement:** In qualitative studies, the “researcher is instrument,” an essential lens through which the reality of the participants is documented. The researcher’s presence is acknowledged and his or her engagement is regarded as an asset rather than a contaminating factor.

**Holistic perspective:** Rather than isolating variables, the researcher is interested in looking at things in context and noting the patterns of interaction and change.

**Unique case orientation:** Depth is more important than breadth; individual characteristics are the focus rather than attempts to find the “typical” or to make statistical generalizations.

**Inductive approach:** The researcher works from particulars to patterns, not from theories to specific cases. The approach is exploratory rather than confirmatory. Theory is generated rather than tested; explicit hypotheses to be tested are not formally developed before the study begins.

**Emergent design:** Rather than laying out a fixed design in advance, qualitative researchers develop tentative plans and make adjustments as findings suggest new directions. A study that began with interviews as the primary method of data collection might turn to observation as well; one that anticipated being situated at only one site might move to others, all based on decisions made in process.

## Design Elements of a Study Proposal

Outlines of qualitative studies contain similar elements to quantitative studies, but these are approached somewhat differently in line with the assumptions above. The following list describes the major elements of a research outline from a qualitative perspective. Janesick (2000), Marshall and Rossman (2002), and Schram (2006) all offer helpful descriptions of study design.

- **Research topic and questions:** The foundations of good qualitative studies, like all other kinds of research studies, are good topics and questions. Topics should lend themselves to empirical exploration rather than be matters of preference (Is red better than blue?) or logic or metaphysics (Does God exist?). They should be highly relevant to the interest of the researcher and the field. Research questions should focus on a specific piece of the topic that is feasible for study. The question, “How is engineering best taught?” is too broad and ill-defined. A better question is, “How do highly independent students navigate the experience of working in cooperative learning groups in a freshman engineering course?”

The major research question can usually be broken into several other sub-questions. For the question above, sub-questions might include, “How does working in groups affect the students’ understanding of the subject matter? How does it influence their social networking? How does working in groups advance or slow down their preferred pace? How do the products that are generated in groups differ in quality and style from those generated individually?”

- **Significance:** As with other studies, it is important to specify why the topic is important to explore and of what use the findings will be.
- **Epistemological perspective:** Qualitative studies often begin with a brief explanation for why the epistemological assumptions of qualitative research fit the purpose of the study. For example, it might be argued that to understand the many ways in which first generation students experience being an engineering major, it is important to adapt a constructivist approach that values the multiple realities of these students. Some argue that since qualitative research has been in use for some time, it is no longer necessary to justify its use (after all, how many quantitative studies begin with an argument for the quantitative approach?). However, due to the relative novelty of the approach in engineering education, some discussion of the epistemological perspective during the design stage and in the study’s introduction still seems to be warranted.

- **Conceptualization:** Given the inductive nature of qualitative studies, the conceptual framework is viewed more tentatively than it is in traditional studies. The emphasis is on discovery and understanding, so energy devoted in advance to specifically describing the topic of interest, defining variables, and modeling it in terms of established theories is regarded as potentially hampering the researcher from seeing it in a new light. At the same time, it is important for the researcher to articulate his or her assumptions about the topic and the ways in which it is being approached. For example, thinking of incoming students as “underprepared” is not the same as thinking of them as “differently prepared.” Understanding teaching as “information transmission” is different from seeing it as “facilitating student engagement in learning.” When the researcher spends some time articulating how he or she thinks about the topic and its context, the questions and methods of the study are more intentional.
- **Choice of tradition:** As described in Chapter 2, there are a variety of approaches and traditions that qualitative researchers use. Deciding whether the research questions lend themselves to a phenomenological approach, an ethnography, a grounded theory study, or some other form is the next design task.
- **Literature review:** As with the conceptualization, there are some qualitative researchers who argue that working from previous scholarship might prevent the researcher from looking at the phenomenon of interest with fresh eyes. Approaches, arguments, and findings of other researchers can reinforce the taken-for-granted. However, most scholars believe in the importance of building on each other’s work and recommend that qualitative researchers explore the major types of studies that have been conducted in the area in which they are doing research. Unlike other researchers, however, qualitative researchers often broaden their literature review while they are gathering data and during analysis as new ideas and connections emerge. As with other literature reviews, this activity is situated as an argument: what has been studied that is pertinent to my topic and why is my study still needed?
- **Data collection strategies:** To describe how the research topic will be explored, the qualitative researcher next has to detail methods for data collection and sampling.
  - **Methods:** These are described in Chapter 4 of this handbook. It is important to delineate in a research plan the answers to some basic questions for each type of method. For example,
    - If observation:
      - Entry (How will I gain access to the site and gain trust?)
      - Stance (Will I be a participant, observer, or both?)
      - Way of recording (Will I use audiotape, videotape, notes, all?)
    - If interviewing:

- Interview type (Will I use an informal, structured, or semi-structured approach?)
  - Way of recording (Will I use audiotape, videotape, notes, all?)
- If document or materials analysis
  - Obtaining (How will I gain access to these sources?)
  - Way of recording (Will I take notes, file actual documents?)
- **Sampling:** In addition to type of method, the researcher has to anticipate what sites, participants, or artifacts will be explored, although in keeping with the emergent nature of qualitative designs, these decisions may be modified during the study. Sampling involves choosing both type and number/duration. A key characteristic of qualitative research is its reliance on the purposeful sample, rather than the random sample of traditional research. Instead of relying on the law of large numbers and chance to select a sample, qualitative researchers try to locate specific people or artifacts that are potentially the most information-rich for their study. Based on their topic, their initial assumptions, and the practicalities of their study, they develop an intentional rationale for choosing their sample. Patton (2002) enumerates some of the types of samples that a qualitative researcher might select in a convenient chart (pp. 243-244). Some of the more commonly used approaches include:
  - **Extreme or deviant case sampling:** Looking at unusual instances to arrive at an understanding of the essential characteristics and boundaries of the topic. An example would be looking at entrants to engineering programs who are extremely gifted in math or who have math anxiety.
  - **Maximum variation sampling:** Exploring as many different kinds of cases along the continuum of experience with or knowledge of the topic, such as including students from different subdisciplines, different years of study, and different genders and ethnicities. In maximum variation sampling, it is important to articulate why one expects to find differences on any given dimension as the rationale for varying the sample on that basis.
  - **Snowball sampling:** Seeking the assistance of initial study participants to generate contacts for additional cases that are potentially highly informative for the topic.
  - **Criterion sampling:** Selecting for study those people, places, or things that meet certain specifications, such as female second-year students in problem-based civil engineering courses. As with maximum variation sampling, it is important to argue why adhering to a given criterion is expected to produce a sample that is suited to the best exploration of the topic.
  - **Convenience sampling:** Working with people or things that are easy to access, such as one's own students, friends, or public Internet sources. Although this approach might not yield the most information-rich sources, it is probably the most frequently employed approach to sampling.

Determining the size of the sample also relies on intentional researcher choice as well. Because of both the desire to explore in depth and the labor intensity of data collection methods, qualitative researchers focus on small instances of the topic they are exploring. Case studies frequently study only one person or place or event. Often, researchers identify a tentative number of participants, documents, or sites they plan to study and as the study unfolds, add or subtract to this number based on the patterns they are seeing. Qualitative researchers are advised to “sample until redundancy;” that is, until significant new information or details are not appearing and the data are “saturated.” This requires judgment and will vary according to the purpose and type of study. Decisions about time in the field are sampling decisions that are as important as decisions on participant selection. They should be made on the same basis as other sampling decisions—the researcher should remain on site until data categories are saturated.

- **Mechanisms for trustworthiness:** In this section of a study plan, qualitative researchers anticipate what steps they will take to ensure that they have conducted the study according to criteria for quality research. Particular strategies that may be employed are described in Chapter 5.
- **Treatment of ethics:** This part of the outline describes how the researcher will ensure that his or her conduct as a researcher respects the site, the individuals, and/or the artifacts involved in the study. It also entails other ethical considerations, such as the responsibility to report data honestly. In the case of conduct during the study, research with human subjects is governed by federal laws which are designed to protect research participants from harm. In order to comply with these laws, all institutions have an Institutional Review Board (IRB) that reviews research plans. While details vary from institution to institution, some general guidelines are as follows:
  - All research, even studies that use standardized tests, must be reviewed by the IRB. In some cases, particularly education studies, the research may be considered “exempt,” meaning the IRB simply needs to be informed of the study. Other studies may be eligible for “expedited review,” which means that the full IRB does not need to review it, but a designee or smaller group will do the review. “Full review” by the board is rarely required for educational studies, but in cases where minors or sensitive information are involved, it is a possibility.
  - All studies require informed consent by the participants. Generally this means that you will provide a form for the participants that describes the study, what will be done, what benefits they will receive, and what the potential harms are. At some institutions this form must have an official approval stamp from the IRB before it can be used. This form must be signed by the participants before data collection begins. The signed copies must be kept on file for potential audits. It is also good practice to provide a second copy to the participants for their records.

- If there are changes to the research protocol during the study (e.g. there is a need to increase the number of participants beyond what was approved by the IRB), permission is generally needed from the IRB before the change is made.
  - Because of these requirements, it is important to begin the IRB approval process well before the start of data collection. Depending on the level of review, it can take several months for the study to be reviewed, and it is not unusual for the IRB to request changes to your protocol or informed consent form before granting approval. This issue is particularly problematic with qualitative studies. IRBs were established largely to deal with clinical medical studies, and therefore tend to be more familiar with quantitative studies in which procedures are well-established before the study begins. As has been discussed throughout this handbook, however, one of the characteristics of qualitative studies is that the design emerges throughout the study. There are no definitive ways to address IRB requirements for qualitative studies, since it depends very much on the local IRB. Researchers planning on conducting a qualitative study should contact their IRB early in the process to find out requirements for getting the study approved.
- **Method of analysis:** The study plan contains stated expectations for how data will be analyzed. Various methods for analyzing data are described in Chapter 6 of this handbook. The anticipated procedures for use in the study are outlined in this section of a study plan.
  - **Method of reporting:** The researcher next anticipates what format will be used to convey the study's findings and where the study may be reported. Ideas for this part of the study plan are contained in Chapter 7 on writing the study.
  - **Logistics and timeline:** Finally, a study plan lays out a projected task list and timeline. If multiple researchers are involved, specific responsibilities of each are delineated. As with other aspects of the study plan, this may be modified if new insights or logistical problems surface.

In addition to outlining a clear yet flexible study plan, designing a qualitative study includes the activities of pilot testing interview protocols or other tools as well as obtaining access to people, sites, or artifacts. Devoting time to careful and thorough preparation during the design phase of a study will reap important rewards later.

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## 4. Data Collection Methods

Data collection is not simply the mechanical gathering of data for later analysis. As with all aspects of the research design, data collection must be tied to the research questions and epistemological perspective of the study. Crotty (2003) points out, “Justification of our choice and particular use of methodology and methods is something that reaches into the assumptions about reality that we bring to our work. To ask about these assumptions is to ask about our theoretical [epistemological] perspective” (p .2). Table 2 is from Koro-Ljungberg and Douglas (2008), which links data collection methods to epistemological perspectives. While one should not feel constrained by the links shown in this table, it does emphasize that there is a connection between methods and perspective that needs to be considered as part of the study design.

This chapter focuses on the most commonly used qualitative data collection methods of interviews, observation, and documents and materials. The discussion covers not only some of the practical aspects of data collection, but also how the different kinds of data can be used and what assumptions are made in understanding the data.

### Interviews

Interviews are a common method for collecting data in qualitative research. Interviews allow the researcher to collect data from specific participants, focus the participants’ attention on specific items of interest, and obtain the participants’ views on the topic. From an interview the researcher learns about the experiences, perceptions, and feelings of those being interviewed. However, it is important to remember that interviewing does not produce an authentic re-creation of those experiences. Rather, interview data are filtered through the perceptions of the interviewees and reflect their own personal views. Thus, interviews are most appropriate when the researcher is interested in those views, such as in phenomenological or constructivist studies. The interview is a complex process that has many different elements and can be used in many different ways. In preparing for an interview, one needs to consider the type of interview that is most appropriate to the chosen research design, what types of questions to ask, and how to conduct the interview. Each of these areas will be considered in turn, and the treatment of the interview will then conclude with a discussion of the role of the interviewer in the process.

### Types of Interviews

There are many different ways to classify interviews, based on the types of questions being asked, the group that is being interviewed, or the purposes for which the interview data are to be used. Interviews are generally classified into three types:

- **Structured:** In this type of interview the interview questions are defined in advance. The answers are generally intended to be short and fit into pre-determined categories. This type of interview allows for standardization across all interviews, but does not allow unexpected information to be obtained.
- **Semi-structured:** The most common type of qualitative interview, it involves pre-determined, open-ended questions, but also allows the interviewer to explore themes that emerge during the interview process. Thus, the interviewer can ensure that certain key elements are covered, but allow flexibility.
- **Unstructured:** Unstructured interviews provide the most flexibility, but are also the most difficult to conduct. Unstructured interviews can be either formal or informal. The formal interview occurs in a setting in which there is a clear interviewer/interviewee relationship. The interviewer only has a few, “grand tour” questions prepared in advance to guide the interview process. The interviewer acts primarily as a guide, allowing the participant to explore the areas defined by these questions. The informal interview typically occurs in ethnographic studies in the natural setting (e.g. a street corner, a bar, etc.). The interviewer may have general topics to explore, but there are no pre-determined questions or categories.

Each of these types of interviews has its own purpose. As explained by Fontana and Frey (2005), the difference between structured and unstructured interviews is, “The former aims at capturing precise data of a codable nature so as to explain behavior within preestablished categories, whereas the latter attempts to understand the complex behavior of members of society without imposing any a priori categorization that may limit the field of inquiry” (p. 706). In reality, these types of interviews only represent specific points on a continuum, and the level of structure in an interview depends on the needs of the particular study.

Another way of categorizing interviews is by whom is being interviewed, an individual or a group. The group interview, or focus group, can be a powerful tool for gaining information not accessible in individual interviews. Quite often interactions between group members stimulate memories and ideas that would not have surfaced in an individual interview (Fontana & Frey, 2005). Group interviews can be especially useful for making apparent the views, perceptions, and motivations of the participants (Punch, 1998). However, there are some pitfalls inherent in the group interview. These include: some members of the group may dominate the conversation; some members may be reluctant to participate in the conversation; and there is the potential for “groupthink” to occur, which limits the information that is obtained (Fontana & Frey, 2005). From the interviewer’s standpoint, the group interview is more difficult to conduct than the individual interview and requires more practice and experience.

## **Interview Questions**

In preparing for an interview, it is important to develop a set of interview questions (often called an interview guide or protocol) that is consistent with the type of interview you intend to conduct and that will result in data that will answer your research questions. There are several types of questions that have varying levels of specificity. Grand tour

questions are broad questions that invite an open-ended response. Focusing questions ask for more specific responses to a broad question. Probes are used with focusing questions to prompt responses when the interviewee has some difficulty responding or when the interviewer seeks elaboration. During the interview itself you should generally start with the broader questions, and work towards more specific questions as needed, particularly if the person you are interviewing tends to give only short, not very descriptive answers to the broad questions. Examples of each of these types of questions are:

- Grand tour question: Tell me about your experience teaching design courses.
- Focusing question: How do you choose design projects for your course?
- Question with probes: How are students grouped into design teams in your course? Do you assign the groups based on grades? Randomly? Do the students select their own team?

Kvale (1996) further identifies interview questions that may be part of the original protocol, or may be used to elicit additional information in the course of the interview:

- Introducing questions: These are initial questions used to have the participant start to describe the topic of the interview.
- Follow-up questions: These are used to encourage the participant to expand on points given in response to the introducing questions
- Probing questions: These are general questions that seek to elicit additional information
- Specifying questions: The counterpoint to probing questions, these questions are still open-ended, but ask for more specific information regarding statements the participants have made.
- Direct questions: These questions allow the interviewer to ask about specific topics that the participant may not have brought up spontaneously.
- Indirect questions: These are questions that ask the participant to project beyond their immediate experience. These can be used to indirectly obtain information about the participant's own beliefs.
- Structuring questions: Statements or questions that allow the interviewer to maintain control over the interview. They are often used to end discussion on one topic and begin a new one.
- Silence: Silence on the part of the interviewer can often prompt spontaneous statements from the participant that expand on previous statements.
- Interpreting questions: These ask for interpretation on the part of the participant. They encourage the participant to go beyond mere statement of fact and explore the meanings of their experiences.

In developing questions, there are a number of common mistakes to avoid. First, it is important to ensure that the questions are open-ended and will not result in a limited response. For example, the question "Does your professor give examples of how to solve problems?" will only result in a "yes" or "no" answer. A more appropriate question would be "How does your professor demonstrate problem-solving?" This question will elicit a more complete response, and still leaves open the possibility for the interviewee to say "He doesn't." Another type of question to avoid is one that asks several different things. An example is the question, "How does your professor demonstrate problem

solving, stress critical thinking, and use technology?” It is better to phrase these into separate questions. Internal bias is also something to avoid. The question “How does being the only woman on your design team cause conflict?” assumes that the conflict is caused by there being only one woman. A more appropriate question is “What factors do you see as causing conflict on your design team?” This question allows the participant to fully articulate her own view of what causes conflict.

Another important aspect of developing interview questions is ensuring consistency with your epistemological perspective and overall research design. Consider as an example a study of critical thinking of engineering students. If one were conducting this study from a constructivist perspective, one interview question might be:

*What kinds of engineering problems require critical thinking?*

This question goes to the constructivist aspect of the study, in that it probes the student’s own view of what is meant by critical thinking and how it can be applied in engineering. The following question, although important, would not be consistent with a constructivist perspective:

*How do your engineering professors teach or demonstrate critical thinking?*

Asking the student about how they have learned critical thinking from their professors moves beyond the constructivist perspective towards social constructionism. Keeping the interview protocol focused within the areas of the general research design ensures that the specific research questions will be answered. In this example, while asking about the professors may seem important, including that question in the protocol can lead to a study that is unfocused and does not provide the data needed to answer the research questions.

## **Conducting the Interview**

Preparing for an interview takes considerable planning. Punch (1998) lists several issues to consider (p. 180):

- Who will be interviewed and why?
- How many will be interviewed, and how many times will each person be interviewed?
- When and for how long will each respondent be interviewed?
- Where will each respondent be interviewed?
- How will access to the interview process be organized?

Each of these aspects represents an important part of the research design process, and depends on the epistemological perspective and research questions of the study. A phenomenological study may involve single, one-hour interviews with 5-20 participants, while a narrative study might involve many hours of multiple interviews with a single person.

The interview itself is a complex process that requires considerable skill on the part of the interviewer. Kvale (1996) lists ten characteristics of effective interviewers:

- Knowledgeable
- Structuring
- Clear
- Gentle
- Sensitive
- Open
- Steering
- Critical
- Remembering
- Interpreting

Depending on the type of interview being conducted, the interviewer must be flexible, able to “read” the interviewee and guide the interview in directions that will elicit the desired information. Fontana and Frey (2005) point out the importance of nonverbal communication, such as body movement or changes in volume or pitch, in communicating information by both the interviewer and interviewee. These nonverbal aspects can provide important clues to the interviewer regarding the participants’ thoughts and feelings on the subject being discussed.

From the practical standpoint, interview data can be recorded in numerous ways. Quite often written notes are taken, especially in ethnographic informal interviews where the use of a recording device would be intrusive. Fontana and Frey relate examples of ethnographic studies in which the researcher would rush to a bathroom immediately after a discussion and record notes on toilet paper (p. 708)! More common is the researcher’s field notebook, in which notes can be taken. In more formal settings in which an individual or group is brought to a specific location for an interview, audio- or videotaping is common. Videotaping can be particularly useful for capturing the nonverbal aspects of the interview. For structured interviews, a simple checklist where the responses can be recorded may suffice.

After data collection, recorded interviews must be transcribed. In some cases it may not be necessary to do a complete transcription; paraphrasing or transcription of only selected portions will be sufficient. For the majority of studies, however, the entire interview should be transcribed. When doing transcription, frequent rewinding of the tape to check the accuracy of your transcription is recommended. Codes can be developed for nonverbal aspects of the interview (e.g. pauses, tone of voice, etc.) if they are considered to be important. As a general rule of thumb, one hour of tape will take three to four hours to transcribe, although that will vary depending on the complexity of the data and the experience of the transcriber. Digital recorders enable the transcriber to have access to the file on the same desktop as the transcription file, and can be more conveniently manipulated in terms of “rewinding” or stopping and starting. Although some experts discourage researchers from hiring transcribers, fearing that they will lose an opportunity to digest the data more deeply, practically speaking, it is often wise to have a professional

transcribe the recorded interviews, and to read these over carefully afterward against the voice recording, revising rather than doing the entire transcription yourself.

The quality of the interview data has a significant impact on the overall quality and trustworthiness of the outcomes of the study. Kvale (1996) lists the following criteria for determining the quality of an interview:

- The extent of spontaneous, rich, specific, and relevant answers from the interviewee
- The degree to which the interviewer's questions are shorter than the subjects' answers
- The degree to which the interviewer follows up and clarifies the meanings of the relevant aspects of the answers
- The extent to which the interview is interpreted throughout the interview
- The frequency with which the interviewer attempts to verify his or her interpretations of the subject's answers in the course of the interview
- The degree to which the interview is self-containing – it is a story contained in itself that hardly requires many extra descriptions and explanations.

### **Recent Perspectives on Interviewing**

The classic view of interviewing has tended towards a positivist perspective, seeking to maintain the interviewer as a neutral party who simply records the information and has no influence on the resulting data. More recently, however, it has been recognized that the interviewer plays an important role, even when there is an attempt to maintain this neutrality. Fontana and Frey (2005) discuss the “empathetic” view of interviewing, pointing out that, “interviewing is not merely the neutral exchange of asking questions and getting answers. Two (or more) people are involved in this process, and their exchanges lead to the creation of a collaborative effort called *the interview*. The key here is the ‘active’ nature of this process...that leads to a contextually bound and mutually created story – the interview” (p. 696, italics in original).

How does this contextualization occur? One way is the how the interview is framed. How one describes those being interviewed (pathological deviants vs. diverse individuals who are ostracized) leads to different understandings and uses of the data (Fontana & Frey, 2005). Fontana and Frey also point out that the researcher influences the data by deciding which aspects to include and which to exclude from the narrative that results from the data. In considering the role of the researcher, there are a variety of approaches. At one extreme, the role of the researcher is ignored, even though it is always present. At the other extreme, steps are taken to enhance the interaction between interviewer and interviewee, making them equal partners in creating the narrative. “Researchers are attempting to minimize status differences and are doing away with the traditional hierarchical situation in interviewing. Interviewers can show their human side and can answer questions and express feelings” (Fontana & Frey, 2005, p. 711). By becoming a partner in the interview, researchers can more explicitly recognize the role that the interviewer plays in the interview and encourage those being interviewed to be more open about their personal responses and emotions regarding the topic. Feminist scholars

are particularly adamant about power issues between researcher and participants, arguing for reciprocity in interviewing.

## **Observation**

Observation grew out of sociology and ethnography, initially focused on the study of non-Western cultures. In contrast to interviews, observation has the potential to provide a view of a particular setting that is unfiltered by those being observed. However, observation is not always a straightforward task. There are many different ways to conduct an observation, and the subjectivity of the researcher still needs to be considered when interpreting the results of an observational study. Each of these issues is discussed below.

### **Types of Observation**

Punch (1998) distinguishes between “direct observation” and “participant observation.” In his classification, direct observation occurs when the observer is an outsider. As he puts it, “observers neither manipulate nor stimulate the behaviour [sic] of those whom they are observing...The situation being observed is not contrived for research purposes” (p. 185). In contrast, participant observation occurs in ethnographic studies, when the observer is not neutral, but rather acts as a participant-observer. While this classification is useful, it does not include observation in a non-natural setting as might be more common in educational studies. For example, studies of problem-solving or design can be conducted in a research setting where the participants are given a problem to solve that is specifically created for the purpose of the research study.

Angrosino (2005) describes a similar set of observation categories (p. 732):

- Participant observation: The researcher becomes a part of the community or group being studied.
- Reactive observation: Observation is conducted in a controlled setting, with the participants aware that they are being observed.
- Unobtrusive observation: The participants are not aware that they are being observed.

Another classification scheme is whether the observation is structured or unstructured. In structured observation there are specific categories of behavior that are identified ahead of time. The observation protocol then involves identifying whether or not these behaviors occur. In contrast, an unstructured observation occurs by recording in some fashion everything that occurs. Subsequent analysis of the data is used to create meaning from what occurred.

In reality, all of these categorizations represent points on a continuum of possible observation protocols. Patton (2002) provides a list of six dimensions of observation. Each of these dimensions is a continuum, ranging between the two extremes listed (p. 277):

- Role of the observer: full participant to spectator

- Perspective: insider to outsider
- Who conducts the inquiry: professionals to people in the setting being studied
- Disclosure of the observer's role: full disclosure to no disclosure
- Duration of observations: short, single observation to long-term, multiple observations
- Focus: single element to holistic view of the setting

### **Conducting an Observational Study**

Prior to conducting an observational study, a number of decisions need to be made. As with any study, the question of whom and what will be observed is paramount, and must be consistent with the epistemological perspective and research questions. If one is approaching the research from a constructivist perspective, observations of groups would not be appropriate.

For a structured study, the specific data to be collected must be identified ahead of time. In an unstructured study, the process evolves as data collection proceeds. This process has been described as a “funnel” (Punch, 1998). Initially there are only broad questions that the researcher wants to answer. As observation proceeds and data are collected, the research questions are refined in light of the data collected, and the focus of the observations becomes tighter in order to narrow in on these revised questions. Punch (1998) lists five stages of an unstructured observation that were originally suggested by Silverman (p.186):

- Proposing a set of general questions
- Writing field notes, which are originally broad descriptive categories but which later are developed into focused categories
- Looking as well as listening
- Testing hypotheses
- Making broader links.

Angrosino (2005) similarly proposes the following levels of specificity that occur during an unstructured observation study:

- Descriptive observation: All details are recorded.
- Focused observation: Only those activities that are relevant are recorded.
- Selective observation: Specific elements of the general activities are recorded.

With any observational study, particularly one that occurs in a naturalistic setting, the question of gaining access is paramount. Often this involves identifying “gatekeepers,” key people who can provide access. Gaining the trust of those being observed is very important in order to gain a true picture of the setting, which is why observational studies can take a long time to conduct. Another important aspect of observation is identifying a “key informant.” This is a person who is particularly knowledgeable, insightful, or articulate and acts as a primary resource to access others.

Collection of data can be done in many ways. In structured observation, a checklist will often suffice. In unstructured observation there needs to be some way to record the

natural setting. In some cases audio- or even videotaping is possible. Taping is more likely to be possible in closed settings, such as observation of some kind of meeting or a class. In more open settings, typical of ethnography, even taping may not be possible. In this case, taking notes is necessary. These notes need to be as complete as possible, and may include observations of interactions between people, activities that occur in the setting, and other nonverbal information, as well as records of conversations. Field notes taken on site cannot capture as much detail as is being seen. They need to be expanded upon as soon as possible off-site since it will be easier to add details when memory is fresh. Most researchers recommend taking several kinds of notes and dividing the notebook page to accommodate these. These include descriptive notes (what the researcher is seeing), researcher notes (how the researcher is feeling about what is being seen and what ideas are developing about future research actions), and theoretical notes (emerging thoughts on what patterns are being seen.)

The issue of informed consent and Institutional Review Board (IRB) approval is particularly difficult for some forms of observational research. Angrosino (2005) points out that most IRBs require clear descriptions of who will be studied and how the study will be conducted. They tend to want to have complete protocols spelled out ahead of time so that potential harm to participants can be identified. However, observation, particularly ethnography, is often characterized by emerging research design and participation by the researcher in the activities of the people being studied. Thus, Angrosino states, ethnographers are caught in an ethical dilemma. On the one hand the IRB requirements would have one state that the study is not intrusive, and yet ethnography by its very nature is “intrusive” (although not harmful). There is no clear resolution to this dilemma, and its solution is very local, as IRBs at different institutions have different interpretations of the federal regulations. Researchers should be aware of this issue and include plenty of time before the start of data collection to work with their IRB to obtain approval for the project. Another related issue debated within the field is the extent to which researchers make participants aware that they are being observed for a study. This is an issue with all data collection methods, but is especially relevant to observation. It is discussed in the section on ethics in Chapter 5.

### **Recent Perspectives on Observation**

The issues associated with observation, as discussed by Angrosino (2005), are similar to those for interviews. Traditionally it was assumed that the observer was neutral and could report objectively on the setting to obtain some measure of “truth” in the description of the setting. Even when it was recognized that an absolute truth was unattainable, the procedures of observation were designed to ensure objectivity and reduce bias. These procedures include member-checking and triangulation across multiple data sources, which are discussed in Chapter 5.

It is now becoming recognized, however, that pure objectivity cannot be achieved. Biases come from both the observer and those being observed. Angrosino (2005) asks the question, “Because it is likely to be the ethnographers who write up (or at least collate or edit) the results of field studies, do they not continue to claim the implicit status of

arbiters/mediators of social/cultural knowledge?” Those being observed also bring differing perspectives, based on gender, ethnicity, class, or positions of power. Thus, observation, particularly in the area of ethnography, is coming to be seen as a collaboration between the observer and the observed. The result is a dialogue between the two that results in a shared understanding of the setting. Ultimately, Angrosino suggests that, “It might be useful to shift from a concentration on observation as a ‘method’ per se to a perspective that emphasizes observation as a context for interaction among those involved in the research collaboration” (p. 732).

## **Documents and Materials**

In many ways use of documents and other materials is the “forgotten” data source for social sciences research. Yet many scholars find that the paper trails, as well as the artifacts produced by people, are highly informative to their studies. While documents consist of a variety of print (hard copy or digital) sources, other materials that may be examined include photographs, visual art, music, instruments, clothing, or other products that can help to tell the story.

### **Documents**

McCulloch (2004) traces the history of document analysis, noting that the use of documents reached its height in the mid-20<sup>th</sup> century, but has been in decline in favor of interviews and observations since then. Nevertheless, there are instances of documents and materials being used in engineering education research: for example, Wankat's (2005) use of Web-based information on design contest winners and Jarosz and Busch-Vishniac's (2006) examination of syllabi to identify the current body of knowledge in mechanical engineering.

Documents can be used in many ways. Punch (1998) provides four ways in which documents can be examined:

- Social production: What are the social, historical, or cultural conditions that led to the production of the document?
- Social organization: What information is intended to be conveyed by the document? How was it intended to be used?
- Meaning: What is the direct, surface meaning being conveyed by the document? What are the deeper meanings on which the surface meanings rely?
- Alternate epistemological perspectives: Use of critical or postmodern perspectives to examine documents in other ways.

Thus, documents can be used in many different ways. They can provide historical information that tells about how certain issues were perceived or dealt with in the past. As in the examples cited above, they can also provide a means for understanding current issues by collating information across several institutions. An alternate approach is through semiotics and textual analysis, in which the focus is not only the content of the document, but also the language used and the organization of the document (Punch, 1998). These approaches can be used to examine the underlying structures from which

meaning is derived, and the social context within which the documents were produced. Punch lists the following questions that need to be considered in examining a document:

- How are documents written?
- How are they read?
- Who writes them?
- Who reads them?
- For what purposes?
- On what occasions?
- With what outcomes?
- What is recorded?
- What is omitted?
- What does the writer seem to take for granted about the readers?
- What do readers need to know to make sense of them?

### **Types of Documents**

A common way of categorizing documents is as primary or secondary sources. Primary sources are generally considered to be created by individuals at the time of certain events, while secondary sources are analyses, interpretations, or summaries of the primary sources. However, McCulloch (2004) points out some problems with this classification. In some cases, documents that are considered to be secondary can also be considered a primary source in the sense that it serves as “a reflection of attitudes to issues in a particular context or period...” (p. 32). McCulloch also discusses autobiographies as documents that are primary in the sense of providing an eyewitness account of events, but also secondary in that they can include reflections and analysis of the person’s own life. Thus, the distinction between primary and secondary sources can at times be arbitrary, and may depend on the ways in which the document is used.

McCulloch instead builds his text around three general types of documents: records and archives; printed media and literature; and diaries, letters and autobiographies. The main points made by McCulloch surrounding each of these document types include:

***Records and Archives:*** Archives are repositories of records that are generally available for public access. Archives may contain official government documents, institutional records, or even personal documents that have been collected for general access. McCulloch discusses some of the issues associated with accessing archival materials. These include the use of catalogs to search for relevant documents, the time it takes to receive documents after ordering them, and the extent to which documents may be copied. For example, some documents may be immediately available, while others may take days to receive. In some cases copies can be made, while in other cases manual transcription is the only method for recording information from the document. Documents that appeared to contain relevant information may be limited in what they provide. Conversely, one should consider sources that may not initially seem relevant, because they may provide unexpected information. McCulloch provides the example of finding relevant information on 19<sup>th</sup> century education personnel of England in Treasury

Department records, rather than Education Department records. Overall, one must plan carefully for access to archives, but also be flexible in their use.

***Printed Media and Literature:*** This type of material includes publicly available reports, mass media, and literature. Much of this material is often created for advocacy purposes, and so care must be taken in interpreting their contents. One useful way of using these materials is to examine them in light of the broad social issues that they reflect. One can use them to understand the specific social context of a time period (past or present), or to trace broad social changes that occur over time. However, McCulloch points out that such documents, particularly government reports, should not be assumed to accurately portray how policies are enacted. Rather, “The influence of reports is often far less than their authors imagine, and they may be read and interpreted in ways that are not anticipated” (p. 83). Another way in which these documents can be understood is by examining the discourses that the document represents; that is, the particular assumptions and arguments that are used to define a particular worldview. Comparison across many documents can often reveal these assumptions and make clear what is being omitted.

***Diaries, Letters, and Autobiographies:*** All of these types of documents share the common characteristic that they provide a personal view of events and issues. However, there are important distinctions to be made among them. Diaries (and in more recent times blogs) often (although not always) provide an immediate description, with the emotions and reactions unaffected by time or reflection. Here, as McCulloch, points out, one must careful to consider the motivation for writing the diary or blog. In some cases it is a personal creation, not written with the explicit intention of being read by others. In other cases, however, they are written with the intent of being published or to espouse a certain view. This may be more descriptive of blogs than diaries, since by their nature blogs are immediately available for public reading. Letters are different, in that they represent a two-way exchange between the writer and the reader. Again, there are different categories of letters; some are “official” and seek to persuade or to provide a view on a public matter. Others are more personal. However, the distinction between these two types can be blurred. McCulloch provides several examples of personal letters that also reveal information about development of public policy. Autobiographies provide a personal view, but without the immediacy of diaries or letters. Events and their interpretation are modified through difficulties in memory, a desire to espouse a certain point of view, or an attempt to show the events in one’s life as contributing to an overall theme. Even though autobiographies are the telling of one person’s life, they can “offer interesting insights into broader social and public dimensions” (p. 121).

Throughout his book, McCulloch offers many examples of how these different types of documents can shed light on issues impacting education. Minutes of government agency meetings, diaries and letters of political figures, and policy documents all provide insight into the development of educational policies.

Minutes from local workshops are used to show how these policies are actually enacted. Newspaper articles and even works of fiction show the broader social context of these policies and the general view of society. This thread of education policy provides just one example of how documents can be used. McCulloch argues that documents provide an opportunity for “connections to be made, especially to enhance the appreciation for the historical dimension of education and society” (p. 128).

### **Other Materials and Physical Traces**

Although not as commonly used, other materials can also inform research studies. Participant products—their songs, their art, their clothing—have been very important traditional sources for ethnographic studies. Creative educational researchers have used time lapse photography to document ways in which a room changes as students do group work; they have examined the sculptures or drawings that participants produce to convey their sense of an experience or idea. In engineering education research, student products lend themselves to analysis. For example, the devices produced in the familiar “egg drop” competitions might be examined to document the basic assumptions or level of creativity of members of the group that produced them. A machine or device created in a laboratory can be analyzed according to the criteria that it was supposed to evidence in order to study students’ understanding of laboratory instructions and goals.

Merriam (1998) describes a body of literature on the use of physical traces as qualitative data. Some examples include: comparing the answers obtained from a group of people on how much beer was consumed at a party to the data collected by counting the beer cans in the trash; looking at how people seat themselves in classes as an indication of racial integration; and examining library records to see what the rate of withdrawals indicates about the specific usage patterns of patrons. She includes cautions about the assumptions behind these methods and advice for using these more creative data gathering strategies.

Ultimately, even though both materials and physical trace sources are not text sources, the researcher in qualitative studies converts them to text descriptions in the study. They are then part of the written data sources and are analyzed with other data.

### **Summary**

Consideration of data collection methods ranges across multiple issues. From the research design standpoint, it is important to select types of data and data collection methods that answer the research questions and are consistent with the epistemological perspective of the study. For example, we have seen that interviews are most appropriate for certain types of studies, such as phenomenology, and that the specific interview questions must also be consistent with the perspective. There are also a number of what might be called “mechanical” issues associated with data collection. These include items such as whom or what is being studied and what needs to be done to collect the data (e.g. how many interviews or observations, what is required to access documents). Finally, there are issues of interpretation: What biases are present in the data? How will these biases be

minimized or be articulated in the interpretation? Too often at least some of these issues are not considered until data collection is underway, or even worse not until after data collection is completed. Failing to address the issues compromises the integrity and trustworthiness of the study. The data you collect is at the heart of your study. Without good data you have no chance of answering your research questions, and thus it is vital that all aspects of data collection be considered during the initial research design.

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## 5. Maintaining and Judging Quality in Qualitative Research

Several scholars have called attention to the charged nature of the word “rigor” by associating it with “rigor mortis.” They argue that the pursuit of methodological orthodoxy (controlling all variables, eliminating all personal judgment, and the like) can result in a lifeless portrait, useless for any practical purpose. They frequently point out that the notion of “rigor” is often employed as a code word for particular methodological preferences and thus has become more political than substantive in nature.

Nevertheless, researchers and users of research universally ask questions about quality, as well they should. They want assurances that the research can be trusted, is useful, and was done ethically. These questions range from the traditional concern with research validity, reliability, generalizability, and objectivity to more overarching questions about the impact of the research on the people involved and the worth of the research to society. This chapter will deal with proper use of method, questions of research value, and ethics.

### Proper Use of Method

Given previous chapters that describe the various research approaches and purposes that qualitative researchers employ, it is difficult to fully address questions of methodological soundness universally. However, there are some overarching concerns that researchers everywhere ask about the quality of research.

- Was it designed well?
- Were appropriate methods used consistently?
- In what ways did the researcher influence the results?
- Can the findings be applied to other settings?

These questions have been addressed by scholars of qualitative research in several fashions over the years. At first, attempts were made to identify the equivalents of the traditional terms, “validity,” “reliability,” “objectivity,” and “generalizability.” Lincoln and Guba (1985) are frequently cited for describing equivalent goals and the ways in which qualitative researchers might achieve them. Their arguments are summarized below.

The concept of **internal validity** as the concern with capturing what is really present in a research study undergoes some modification in a paradigm that is based on multiple realities. Lincoln and Guba (1985) refer instead to “credibility.” They ask whether the

researcher's findings are plausible; that is, would reasonable people believe that they are accurate descriptions? In order to achieve credible findings, they advocate the following:

- Use prolonged engagement and persistent observation. Stay in the field long enough and look at as many cases as needed to thoroughly know the phenomenon of interest.
- Triangulate (compare results of) different methods, sources, and theories. Capture multiple points of view, use different approaches, and entertain different theoretical perspectives to look for patterns that persist across all of these.
- Triangulate researcher perspective using peer debriefing. Confer with colleagues about methods and data interpretation to ascertain whether approaches are reasonable and appropriate.
- Triangulate with participants using member checks. Interact with research participants or those who are contributing data to ask whether your data recording and interpretations are accurate from their points of view.
- Collect referential adequacy materials. Seek out descriptions, quotations, documents, or products that provide the support for your interpretations.
- Use structural corroboration. Make sure that your arguments hang together and make sense, that they are logical and describe the data well.

**Reliability** is the concern with consistency of the methods and findings. Its parallel in Lincoln and Guba's (1985) scheme is "dependability." They advocate that researchers use "overlap methods," by which they mean triangulation of method as described above, and "stepwise replication," the systematic checking of research processed during the study. They also suggest that researchers leave an "audit trail," describing their approaches carefully and detailing what inferences they made in drawing their conclusions. An external auditor should be able to look at the evidence and make a judgment about the dependability of the research.

**Objectivity** is another of the traditional criteria that requires reconceptualization in a multiple-truths paradigm. The concern is with researcher bias and there are several approaches to this issue. The most common is to have colleagues of the researcher, either through the triangulation or audit approaches described above, examine the work for bias. A more fundamental approach is to assert that all research is conducted from the position of the researcher and so is inherently "subjective." More conservative scholars suggest that by describing their positionality thoroughly, researchers can control their bias through the use of devices such as reflexive journals, surfacing to conscious awareness their emotional reactions and taken for granted assumptions. They also recommend that the researcher alert the user of the research to the point of view through which the research was conducted by describing this fully in the research report. Less conservative scholars argue that one's positionality is a source of strength and is an essential part of the research. They agree that this perspective should be described as openly as possible for the user of the research but not from the point of view of trying to control one's subjectivity, but to use one's life experience and judgments as an important research tool and to reveal this perspective as well. In critical approaches, an identified lens, such as Critical Race Theory, Feminist Theory, or Marxism, is an essential part of the method, which does not pursue an unbiased view, but rather an identified one. The avowed aim of

this research is to produce change rather than to capture reality independent of a knower, which is not believed possible.

**Generalizability** or external validity is the concern with whether the findings of the study describe all cases for which it is designed to apply. Lincoln and Guba (1985) substitute the term “transferability,” acknowledging the hope of all researchers that their findings will inform other cases in addition to the one they described. The goal of a particular study is not to provide generalized findings that apply in all contexts, but to provide a description that applies within the context being studied. Again, a paradigmatic difference enters within the context of multiple realities that contradicts the notion of absolute generalizability. The shift in qualitative research is to locate ultimate responsibility for applicability with the user rather than the researcher. That is, people seeking to know how applicable given research findings are to their cases of interest must estimate the match between the context of the research and their own cases in order to make this determination. The researcher can help by using what scholars call, “thick, rich description,” portraying in extensive detail the particulars of the context of the research, so that the user of the research can make the transfer.

Creswell and Miller (2000) summarize the steps that a researcher can take to assure methodological soundness. They recommend that researchers employ at least two of these approaches in a given study. Many of the steps echo the recommendations of Lincoln and Guba (1985) above:

- **Triangulation:** As described above, use multiple methods, sources of data, theoretical explanations or investigators to collect or analyze data. Look for convergence across these.
- **Divergent cases:** After generating preliminary themes or explanations to describe the data, seek out cases that do not fit and either modify or reject the original explanations.
- **Reflexivity:** Describe your bias to potential users of the research. Try to either suspend your own perspective or articulate your assumptions and position in a commentary or prologue to the research.
- **Member checks:** Ask participants in the study to confirm the accuracy of the data you have recorded or to respond to your interpretations.
- **Prolonged engagement:** Collect enough data to provide the basis for sound interpretations. Stay in the field for ample time, interview enough participants, and analyze sufficient documents.
- **Audit trail:** Provide evidence on how you conducted the study and formed your interpretations. This might be in the appendix (such as the interview questionnaire or the coding framework) or incorporated into the presentation of findings.
- **Peer debriefing:** Ask a colleague to review your decisions and interpretations for their reasonableness.
- **Thick description:** Use details to describe context and people in the study so that the reader can have as much information as possible to understand the findings. Illustrate the narrative of a qualitative study with images, quotations, and colorful descriptions.

- **Collaboration:** Work with research participants as co-researchers through generating research questions or research design together, by teaming to collect data, or by jointly interpreting data.

## Issues of Responsibility and Ethics

In addition to proper use of method, scholars of qualitative approaches identify other hallmarks of study quality that are less frequently discussed in the traditional research literature. For example, Lincoln (1995) lists the following: locating the research in and serving the purposes of the community in which it was carried out; giving voice to the participants through direct quotation rather than filtering through the researcher; and reciprocating through sharing trust, privileges, and ownership of the study with the participants. Other scholars discuss “usefulness” as an important criterion. If a study is trivial or has little potential to inform or change human behavior or enable deeper understanding of the human condition, it fails the quality test, even if it uses methods soundly.

Major ethical issues that are also associated with the quality of a qualitative study include the following:

**Informed Consent:** The participants should know what the research is about and how information will be shared and used. Their consent should be renegotiated if the design or usage arrangements change.

**Confidentiality:** Participants' identities are only revealed to agreed-upon extent (usually not at all) and the findings and data are communicated in such a way that these identities are protected. Pseudonyms or codes are used in records and records are kept secure.

**Avoiding Harmful Consequences:** Research manipulations, interventions, or suggestions should not threaten the well being of participants. The researcher should not use his or her authority as a platform for influencing participants' thinking.

**Genuine Reasons for Conducting Research:** The decision to undertake research should stem from sincere interest in the topic or commitment to change. The researcher should avoid pursuing trendy topics or fundable projects only out of opportunism rather than sincere belief in the importance of the study. Researchers, especially in evaluation contexts, should avoid being co-opted by those in control.

**Honesty:** The researcher should avoid forcing conclusions, fudging data, or other clearly dishonest approaches.

**Reciprocity:** Responsibility for respecting the contributions of participants at minimum involves reporting back findings. In addition, some researchers feel that they should share the royalties or other benefits accruing from the study with the

participants or seek to promote change in the setting as a result of the new understandings.

## Paradigmatic Issues

As the above discussion indicates, paradigm issues in the conducting of research figure quite significantly in discussions of research quality. Prevailing quantitative standards can seem to be at odds with the purposes and assumptions of qualitative research, which can put the researcher in a somewhat defensive position. Patton (2002) articulates some stances that can help to bridge the gap in expectations by focusing on the different goals of research traditions. Three of his main points include:

- ***Stress fairness rather than researcher distance.*** Instead of claiming that the researcher is absent, dispassionate, or totally without perspective, assure readers that the researcher used all his or her intellectual and methodological tools to describe the focus of the research in a way that was fair and reasonable. This can be seen as a strength, compared with traditional studies in which the reader knows nothing of the researcher stance and how it affected the use of methods. As Patton says, “Distance does not guarantee objectivity; it only guarantees distance” (p. 575).
- ***Stress “promeaningfulness” rather than “antinumbers.”*** Although numeric data have a credibility in our society that is often way beyond their intended strength or capacity, emphasize the strength of text rather than attacking numbers. Focus on difference, not deficiency, concentrating on showing how the approach was able to illuminate the really important questions of the study and how it produced compelling results.
- ***Stress usefulness rather than truth tests.*** Instead of engaging in debates that are predicated on the assumption of absolute truth, focus on the usefulness of having actual portraits and insights into the perspectives of research participants for understanding present realities and determining future actions. Emphasize the pragmatic nature of qualitative findings and their utility and compelling nature for those who use them. Although it is often said that decision makers want hard numbers, a powerful story frequently makes a more lasting impression and engenders quicker response.

## Summary

Conducting sound qualitative research should be the primary goal of all who use these approaches. Although the usual definitions of terms referring to the quality of research are often embedded in philosophical assumptions that are not shared by qualitative researchers, scholars have been able to articulate standards of good research that apply to qualitative studies. Strategies for achieving high quality research have been identified. Researchers should employ these in their work and users of research should seek evidence that they have been employed in determining the quality of the studies that they encounter.

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## 6. Data Analysis

Novices to qualitative research often experience delight during data collection. Although they may encounter glitches along the way, the work of observing, interviewing, or examining documents or products is engrossing and often seems easier than expected. When it comes to analyzing the data, however, qualitative research often throws novices into a quandary. How can all the pages of text that have accumulated be sorted in an organized fashion? What strategies should be used to interpret and communicate the patterns that are present?

Although there are many ways to analyze qualitative data, and in the end, the strength of the approach relies on what the researcher brings to the table by way of personal insight and experience, the steps that follow outline a general approach. After that, some strategies for particular types of qualitative studies are included.

### **Begin at the Beginning**

The activities of qualitative research are more recursive than linear. Since the design is flexible rather than fixed, the researcher begins analysis during data collection, rather than collecting data first, then turning to analysis. This work, called *interim analysis*, starts from the early days of data collection and escalates gradually so that as the study proceeds more time is devoted to data analysis and less to collection. Reflective notes that record the researcher's feelings and thoughts about the data help by stimulating ideas during analysis and by documenting possible bias. Analytic notes are used for hypotheses, interpretations, and growing realizations about the data. Examples of interim analysis activities include writing analytic memos about methodological choices, patterns that are noted, reactions to what is being collected, or the like. Entries might be of the following sort:

- Should I also talk to the lab instructor about this issue? She might offer a different perspective than what I'm getting from the students.
- Does the level of confusion in this course appear to be related to which approach was used in their introductory sequence?
- It looks like the ability to picture oneself as an engineer might be related to personal experience with an engineer during the precollege years.
- It appears that students who are more convergent thinkers are having more problems with this than divergent thinkers.

These notes to self are the beginnings of analytic thinking about the study and are critical in directing the researcher toward additional data collection activities, literature, or questions to be asked of the data.

It is a good habit to review one's data daily during collection to make sure raw notes are edited into a form that will be usable even after time has dimmed the memory of the actual experiences of the day. Expanded notes that add the detail that there was not time enough to note while collecting data are written frequently by researchers in the pauses between data collection activities during a study.

A second activity that needs to take place right from the start of data collection is data storage and organization. Given the large volume of text that normally accrues from a qualitative study, even the most casual researcher has to adopt structured habits for labeling data in standard fashion (who, when, where, pagination, file name, and the like) and keeping it safe (according to Human Subjects confidentiality agreements) and with like pieces (such as in binders, electronic file folders or drives, or in labeled paper folders in a locked file cabinet).

## **Reviewing and Selecting Data**

As data accumulate, the more the researcher reviews them, the easier subsequent work becomes. Some of the data collected in a qualitative study, especially the data collected in the early period of a study before the focus was narrowed, will be peripheral to the main research questions. Interview transcripts will contain whole pages that document times when the interviewee strayed from the subject or digressed into an amusing but not relevant memory. Field notes will often contain laborious descriptions of the actions of a participant who later dropped out of the study. These data segments are candidates for what some researchers call “data reduction.”

Deciding what data are most pertinent to the study, however, is not always straightforward and requires the judgment of the researcher. Like all other analysis activities, selecting useful data from the total data collected is an activity that depends on the care and sensitivity that the researcher brings to it. Researchers vary in their selection decisions, some finding that they can reduce the amount of data they analyze at an early stage without damaging its integrity, and others feeling that they must work with a larger amount of data through the whole process. While data not considered relevant at the start of analysis can be set aside as other data become the main focus, they should not be destroyed in the event that their importance only becomes clear as the analysis proceeds.

## **Sorting the Data into Categories**

As data are selected for further analysis, the researcher develops a sense for the ways in which they can be fitted together. Often, a preliminary sort can be made on the topics that were explored through the observations or interviews. These may correspond to interview questions when structured interview formats are used. For example, all comments in the interviews on first-year students who abandoned engineering as a field of major study might be placed in such preliminary categories as “perception of lack of fit,” “academic issues,” “time management,” “financial,” or the like. Selecting a comment is called “chunking,” and deciding how much or little of a given text should be selected for classification is a decision made on the basis of the type of study. For standard studies (as

opposed to microlinguistic studies when each word is scrutinized), one to five sentences are usually taken to be a “chunk;” that is, an appropriate unit to code.

The category names are attached to the data passages in some way, either as marginal annotations, labels on cards on which the passages have been pasted, or category fields on a database record. Often, the category names are abbreviated for this coding process (“fit,” “academic,” “time,” “money”), but they should not be so shortened that the researcher has a hard time remembering what the label stands for. This sorting may be fairly straightforward. Frequently, however, the decisions become more complex—the researcher realizes that some categories seem to be a blend of others, such as “academic issues” may include prior preparation, instructor conflicts, or level of challenge, in the case above. Some comments or notes or document passages seem to belong to more than one category. The distinctions between the categories become blurred. New categories seem necessary after much of the data have already been sorted. Frustration sets in. Some of this is inevitable, but can be alleviated by thinking of sorting as an iterative activity that continually requires refining categories until they accommodate the data.

It helps to first sort through a part of the data in an exploratory fashion, simply writing down a list of category names that seem useful and continually adding to, subtracting from, or modifying this list. Next to each of these names a definition of the boundaries of the category can be written that also can be modified as the researcher proceeds. Such notations help with decisions as to whether a piece of data fits into that category. This preliminary list of categories and their definitions will almost always change as analysis proceeds, but it can form the core of the category system that will eventually be used. Researchers call this a coding taxonomy or a codebook. Depending on the complexity of the study, the list of categories might resemble a tree structure. For example in the study above, there are several kinds of academic issues, which are in turn an attrition issue. When more than one researcher is working on a set of data, more formal use of a preliminary list of codes will be necessary. Researchers then code the data and compare and reconcile coding for differences.

## **Managing the Data**

There are several different ways for indicating selection of data and subsequent labeling of the data. Some researchers use highlighting pens or stickers affixed to note pages or transcripts; some pencil in bracket marks around the selected passages; some cut selected portions of the data from copies of the notes, transcripts, and documents and paste these on cards; some enter the passages into a computer database management record. Standard database programs such as Access or Filemaker Pro and spreadsheets such as Excel can be helpful. Specialized qualitative research analysis software packages such as NVivo or Atlas are also available, relying on tags applied to text strings to store data. The latter are the preferred method for a study with large amounts of data. With any method, care must be taken to be able to trace text excerpts back to their original context. Cards and database records should contain transcript numbers, page or line numbers, or other identifiers that will enable the researcher to trace the passage to its original context easily as analysis proceeds. Specialized software does this automatically.

Using database software for data management involves the following:

- Creating fields for, at minimum, the ID number and location of the segment, the category of the segment, the theme(s) represented by the segment, and the text of the segment
- For each coded segment, pasting the selected text from the original document to the text field
- Filling in the ID number and category name for each segment (the themes will be entered later)

For example, two records might look like this (the theme field will be discussed later):

ID	Location	Category	Theme	Text
7	Transcripts, p. 118	Time	Self- pacing	In high school, my parents made me study at night, but here, I had to decide when and how much to study and I got caught up in other things and never got around to it.
5	Transcripts, p. 87	Fit	Critical mass	I looked around and there wasn't anybody like me in the class or really in the whole engineering school.

Essentially, an electronic grid of numbered segments (records) is being created for storage and sorting. Spreadsheets can serve the same function, although special database programs are more suited for more complicated text manipulations. Selecting the “memo” option during creation of the text segment field in Access expands the amount of text allowable in the field.

## Displaying the Data

Even when the data have been reduced in quantity and coded carefully, it is hard to develop a sense of the patterns and meanings they suggest until they can be visually scanned in their categories. Some researchers cut and paste the coded data at this point on to long sheets of paper or group together index cards on which they have pasted the segments of interest; those using computers sort their records and visually scan them or obtain printouts by category. In the example above, separate printouts or screen displays of each category (time, fit, money, etc.) would be made, allowing the researcher to look at all the text segments that have been placed into this category together. Ways of displaying the data will vary according to the resources that the researcher has, the type of data and study, and the amount of data on hand. Through looking at the assembled segments, the researcher can decide to change the category label in the field, to move some segments to other categories where they fit better, to split one category into more than one and recode the segments accordingly, or to rename to category or readjust its

boundaries to better accommodate the data. Data analysis in qualitative research is recursive.

## **Reviewing Within and Across Categories for Themes**

Once data are grouped into formats that permit scanning, they can be reviewed for common ideas or "themes" that they contain. In the hypothetical study about attrition, for example, when all the comments about time management are arrayed together, the researcher may find that in one way or another, almost all of the respondents said that their newfound autonomy and the distractions of living with others their age led to poor choices on time management (a label called "self pacing" might be used to convey this). Themes are not always stated explicitly, but labeling the main idea or ideas in a text segment helps the researcher organize and capture the sense of the data. The themes generated during analysis form the basis of the findings of the study. In complex data sets, themes are labeled and coded just like categories so that instances of the theme in the data can be retrieved and displayed. Each segment can be labeled with more than one category or theme so that it will be retrieved with multiple sorts.

## **Synthesizing the Information**

Making sense of the organized data involves summarizing the information either by frequency (Self pacing was a problem of all but two students who left engineering.) or itemizing (The main reasons why students experienced academic issues were...) or description (Women, first-generation students, and Black and Hispanic students provided the following examples of the ways in which they felt they did not belong...) As Miles and Huberman (1994) illustrate, making grids and charts can be helpful at this point. Often, this activity involves testing hypotheses that are formed during the analysis against the evidence to see if claims are warranted (Did students who lived on campus have more problems with time management than those who lived off?) Negative cases must be accounted for in explanations or descriptions that are formed (the off-campus student who had no time management issues). Often, the original hypothesis must be modified or discarded because support from the data is lacking.

At other times, qualifying or contextual data must be considered in interpreting the meaning or strength of a given finding. Fitting the pieces together involves "triangulation" (testing data against each other), building a logical chain of evidence, and "structural corroboration" (making sure that the picture of the whole that is portrayed makes sense, is supported by the pieces of evidence that constitute the finding). Whenever possible, the researcher should check his or her interpretations with the original respondents or colleagues for support or disconfirmation.

When data are organized by category and theme, an outline of the presentation of findings can be derived. As each topic is discussed, the arrays of the particular category or theme being treated can be used to supply examples, quotations, or frequencies to add detail to the report. Charts and tables made from the arrays can also be helpful in the final report.

## Specialized Approaches to Analysis

While the steps above describe a basic approach to text analysis (also see Richards, 2005, for a detailed description), different traditions within qualitative research have developed specific ways of handling data analysis. Creswell (2007) does an excellent job of summarizing these. Notes on a few types of differences are provided here.

**Case Studies:** In embedded case studies, in which there are cases within the case (for example, students within a class), each case is analyzed separately and then themes across the cases are analyzed.

**Critical Studies:** In addition to doing the usual thematic analysis, the researcher in a critical study analyzes the data in terms of the critical perspective that is taken. For example, in a cultural reproduction study, the researcher would undertake a special examination of the data for instances in which the existing power structure is being supported by the actions of those in control. Some critical theorists believe that inherent in the analysis activity is the responsibility for the research to produce actual change leading to informed action (praxis) in the setting.

**Phenomenological Studies:** In phenomenological analysis, the researcher first examines his or her own experience with the phenomenon of interest to separate this out, as far as possible, from that of the participants. Next is a listing of the significant statements made by the participants about how they experience the subject of the study (horizontalization). These are then grouped into broader units of meaning and summarized with examples of what was experienced (textual descriptions) and how it occurred (structural descriptions). A brief composite statement is then written that summarizes the essence of the experience. Moustakas (1994) is a source for additional details.

**Grounded Theory Studies:** Grounded theory studies also involve a multistage process. Line-by-line open coding (similar to the description above) first occurs, followed by dimensionalizing, which calls for arraying the data along a continuum, and axial coding, which engages the researcher in drawing logical connections between a category and its subcategories. The researcher then creates a conditional matrix, a diagram that maps the range of conditions and consequences and then performs theoretical sampling, testing emerging hypotheses against the cases. Finally, the researcher integrates the conclusions into a theory statement. Charmaz (2006) offers a modern perspective on analysis in grounded theory studies.

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## 7. Writing Up Qualitative Research

*As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare (NSPE, 2008).*

Qualitative research and the written dissemination of findings are natural extensions of the idea that an engineer's role is to serve humanity. Qualitative writing within this context not only recognizes the *humanity* of the participants or phenomena studied but deliberately and *conspicuously* reflects it.

The effective reporting of findings, whether quantitative or qualitative, involves the accurate and complete reporting of *meaning*. Nevertheless, there exists a difference in how this meaning is constructed and ultimately relayed depending on the research approach. Richardson and St. Pierre (2005, p. 960) describe this distinction: "Unlike quantitative work that can carry its meaning in its tables and summaries, qualitative work carries its meaning in its entire text. Just as a piece of literature is not equivalent to its 'plot summary,' qualitative research is not contained in its abstract. Qualitative research has to be read, not scanned; its meaning is in the reading."

The goals of this chapter are to: 1) introduce several overarching, rhetorical issues related to qualitative writing of any kind, and 2) present a general organizational structure as well as specific (or *embedded*) writing devices/techniques associated with each of the six major approaches to conducting qualitative research presented in Chapter 2.

### Overarching Rhetorical Issues in Qualitative Writing

So what makes qualitative writing so different? First, there exists a major shift in paradigm from the more traditional reporting associated with technical research to the purposeful *recognition of* and *reflection on the voices* of both the researcher and the participants in a given study. Intuitively, the typical engineering researcher understands that people are complex and cannot be calibrated. Concurrently, every variable associated with the lives and experiences of the engineering professor charged with developing a new curriculum or 8<sup>th</sup> graders attending their first engineering summer camp cannot be controlled. Qualitative writing recognizes the complexity of the human experience and acknowledges, as Creswell (2007, p.179) suggests, "...the impact of the writing on the researcher, on the participants, and on the reader."

Qualitative writing is contextual in the sense that the researchers shape the writing based on their own interpretations, background, or experiences (Creswell, 2007). The authors' level of reflexivity, meaning their ability to recognize, accept, and write openly about their perspectives, is a key component to reporting qualitative findings effectively.

Related to issues of author reflexivity are those associated with how participants in the study are both *impacted by* and ultimately *impact* the research. Gilgun (2005) contends:

Any form of science requires that researchers do careful observations and represent observations as well as they can. Social scientists observe, interact with, transform, and are transformed by other human beings. Thus, we social scientists have the task of figuring out how to represent ourselves and other human beings in the most full and accurate way possible (p. 260)

Consequently, it is prudent for the researcher to ensure that the writing reflects the unique voice of the participant. This critical examination of context also extends to the reader who may form an entirely different interpretation of the findings, different from both the author and the participants (Creswell, 2007).

A second rhetorical issue to be considered is the audience for whom the report is written. The key idea is to purposefully reflect on who may ultimately read your work and extract their own meaning from your findings. The goal is to present your findings in such a way as to maximize their usefulness to readers (Rossman & Rallis, 2003). In most cases, your audience may be other scholars who read and submit to refereed journals; however, your audience may also consist of engineering department administrators, student affairs professionals, or even the parents of current students who all want to understand the value, as they each *uniquely* define it, of the new engineering service-learning initiative or study abroad program you are exploring.

Last, the language used to shape qualitative writing must also be considered. How researchers *encode* qualitative reports reflects both their perceptions of the findings as well as what they perceive to be of value to the reader (Creswell, 2007). For example, if you perceive the voice of the participants in the study to be of particular value to helping the reader find meaning in your findings, then you may consider including various direct quotes from the participants. Conversely, if your study involves working with engineering faculty and you happen to be faculty member, it is likely that including your own insights from this shared point of view will add a critical depth and richness to your report.

As mentioned previously, it is also important to consider your audience as you contemplate the language of your text. When writing for the academic community, for example, it is common to use terminology, metaphors, or images inherent to that particular field. Writing for non-academic or lay audiences may require language that reflects a greater focus on practical application and less concern with research methods and the like (Richardson, 1990). Even in cases where a more structured format is required, the language of qualitative writing reflects these various paradigm shifts as *methods* become *procedures*, *results* are now *findings*, and *subjects* are now *participants* (Creswell, 2007).

The important point is that qualitative writing should reflect the complex and iterative interactions that exist between the author, the participant, and the audience throughout the study. Qualitative research and the subsequent reporting of findings require an intense,

critical examination of myriad data and the ability to make and communicate meaning. Lichtman (2006, p. 178) contends that to do this effectively, the researcher must “develop a structure that fits the data you have collected, the ideas you are trying to convey, and your personal style.”

In summary, some characteristics of the writing in qualitative studies are different from traditional studies, although as will be described in the next section, there are variations and exceptions. The main differences in general are that qualitative studies:

- May have different divisions. The usual sequence of introduction, justification, literature review, definition of terms, description of methods, presentation of results, and discussion may not be present or may be included in a different order. An opening may begin: *Jogi Singh, a first-year mechanical engineering student, groaned when he heard that his Principles course would revolve around collaborative learning groups. “There is always a person who does the work (me) and the others who wait for me to pull them along,” he complained.*
- May be written in first person. The researcher is not trying to imply that he or she had no active role in the study. A statement in the methods section might read: *I had always resisted group work myself, so I was curious about the reasons why. I set about to explore this by ...*
- May be tentative about literature, theory. The focus may be more on the description of a particular case or cases.
- Usually do not define terms, operationalize variables, or list hypotheses.
- Include discussion about the specific tradition of inquiry and why it was chosen. This discussion might begin: *I chose an ethnographic approach for this study since I wanted to describe the culture of the practicum experience at this university. Questions I wanted to ask centered on the rules of the game—how does one get a good placement? How must one operate in order to be thought a “sharp prospect?” ...*
- Articulate the rationale for purposeful sampling. This may be expressed in terms such as the following: *I chose maximum variation sampling because I wanted to see how the virtual laboratory was experienced by students who differed in gender, prior GPA, and comfort with technology (as measured by our earlier survey). It seemed to me that these factors might influence their use of the lab because prior studies {citations} have talked about these as three key factors.*
- Provide more information about the context of the study. For example: *The students in the sample were all first-generation males who were recruited through a four-week summer program. This program has had a history of innovation. Its director talks about the ways in which it has changed [quote]. Support for the program had varied, depending on the college leadership over the years [details] ...*
- Spend more time treating ethics, trustworthiness, and reflexivity.

- Include more description about analysis procedures.
- Present quotations, examples, displays, or other documentation that make the report come alive . . . and often cause it to be longer than traditional reports.

## **Overall and Embedded Rhetorical Structures for Six Qualitative Approaches**

The varying levels of structure and flexibility associated with reporting one's findings are dependent upon the qualitative research design being employed. Below are specific considerations for the six major approaches described in Chapter 2.

### **Narrative Studies**

The process of writing up narrative research is essentially an exercise in experimentation with flexibility and form (Clandinin & Connelly, 2000). Identifying your own narrative form involves thinking about your own personal preferences as a reader or reviewing the narrative works of other authors. As Chapter 2 described, narrative research is interested in the life story of an individual or individuals. Depending on the individuals, their ability to recall specific life events or the ascribed importance they may place on certain events over others, the telling of these stories may transcend any specific boundaries related to time (e.g., present versus past tense) or theme (e.g., childhood school versus home life) all within one interview session.

Several kinds of narrative writing structures are available to the researcher to complement this inherently dynamic process. In a more structured approach, the author is free to disseminate the participant's story chronologically. This approach is likely to work best when you are attempting to show some sort of personal development on the part of the participant over time. Conversely, a more flexible and widely used approach is the *three-dimensional inquiry space model* (Clandinin & Connelly, 2000). This narrative framework mirrors the story-telling in the sense that the author is free to report on life events without *strict* regard to *time* (e.g., looking backward and forward) or *point of view* (e.g., looking inward and outward between the story as told by the participant and the author's interpretation of it) while situating the story within a specific context.

Creswell lists several widely used writing strategies to facilitate the development of a narrative text (2007, pp. 184-187):

- The author is free to give more space and emphasis to certain participant stories and voices than others.
- The author may use the *progressive-regressive method*, in which she or he begins with a key event in the participant's life and proceeds to work forward and backward from that event.

- Writing may emphasize certain key events or *epiphanies* defined as interactional moments and experiences that mark people's lives. It is important to note that these epiphanies may be the result of the participant's reliving the experience while speaking with the researcher.
- Narrative reports may emphasize certain themes that inform participants' life development.
- Devices that help create and facilitate a smoother, more creative flow to the text consist of *transitions* in the form of words or phrases or even time shifts. *Foreshadowing* is often used to provide hints of events or themes to come later. Finally, *metaphors* may be employed as a means of richly describing people, places, time, and scenes, or to promote greater understanding for the reader.

### Case Studies

Merriam (1998, p. 238) contends that . . . "the major point about case studies to keep in mind is that they are richly descriptive in order to afford the reader the vicarious experience of having been there." Case study narratives are inherently and purposefully substantive as the author attempts to paint as complete a picture as possible of what has taken place. Although there is no standard format, researchers have provided workable models of reporting. Lincoln and Guba's *substantive case report format*, as summarized in Creswell (2007, p. 196), prescribes a thorough explanation of the problem or issue; a detailed description of the context and setting; a description of the interactions or processes observed within the setting; identification of "salience" (elements studied in depth) at the site; and elaboration of outcomes of the study.

Concurrently, a case study narrative may also be informed by both your research design and unit of analysis. Yin's (2003) 2 x 2 matrix describes instances where single or multiple-case designs may be used when the unit of analysis is either holistic (single unit) or embedded (multiple units). As the researcher, it your responsibility to discern which approach to use depending on your research questions and purpose of the study. These decisions ultimately affect the vantage point of the text and the subsequent level of engagement of the reader in the case. In most cases, vignettes are used to introduce the case to the reader as well as provide final points of emphasis to take away from the case.

Creswell lists additional devices to properly develop a case-study narrative (2007, pp. 184, 196-197):

- Authors may use a *funneling approach* to describe the context and setting of the case. The reader is taken from a broader picture (e.g., a mechanics of materials course lecture) to a narrower one (e.g., a specific engineering student attending that lecture).

- Researchers must also decide *how much description* to provide in the text in comparison to the amount of analysis and interpretation. Merriam (1998) suggests a 60/40 or 70/30 proportion of description versus analysis.

## Ethnographies

Ironically, many ethnographies are written in the tradition of the third-person, relatively detached mode of report writing, or *realistic* tales (Van Maanen, as described in Creswell, 2007). However, more researchers are exploring alternative ways of reporting on a studied culture. Van Maanen, summarized in Creswell (2007, p. 192), describes the *confessional* tale, in which the author focuses more on the fieldwork experiences than on the culture. Alternatively, the *impressionistic* tale is seen as a “personalized account of fieldwork in dramatic form” and exhibits elements of both realistic and confessional writing while maintaining a first-person point of view.

Wolcott (1994) also offers a framework for quality ethnographic writing. He contends that a description of the culture can be provided using any number of approaches as a starting point, such as a chronological ordering of events, an analytical framework, or a story told through several perspectives. Data analysis follows this detailed description, including, but not limited to, the reporting of fieldwork procedures, identifying thematic patterns in the data, and/or critiquing the research process itself. Lastly, a thorough process of interpretation takes place during which the researcher is free to extend the analysis, make inferences from the data based on existing literature, or interpret findings within the context of his or her own experiences as an investigator.

It is apparent that ethnographic writing allows one to adhere to some sort of systematic approach to a greater extent than the basic interpretative, narrative, or case-study approaches. Emerson, Fretz, and Shaw, as summarized in Creswell (2007, p.193), suggest that the development of an ethnographic study can best be described as a “. . . thematic narrative . . . constructed out of a series of thematically organized units of fieldnote excerpts and analytic commentary.”

The following suggested techniques for ethnographic writing were drawn from Creswell’s (2007, pp. 184, 194-195) summary of embedded rhetorical structures related to the ethnographic approach to qualitative inquiry:

- Ethnographers often use *tropes*, or figures of speech, in their writings. Examples are metaphors; synecdoches, in which authors present examples, vignettes, and/or illustrations; and storytelling.
- Denzin (summarized by Creswell) talks about the importance of *thick description* in presenting the detail, context, emotions, and complex relationships of the culture being studied. The goal is to facilitate a strong empathetic response in the reader by painting as complete a picture as possible.

- Reporting findings in an ethnographic study usually includes myriad examples of *dialogue* normally written in the dialect and natural language of the culture. Concurrently, members of the particular group are often shown talking and relating to each other using characterization.
- Ultimately, a good ethnographer is a good *storyteller*. Consequently, *evocative* literary techniques are used to enhance the reader's experience. Several examples are the flashback, interior monologue, or dialogue, to name a few. Researchers use many literary techniques.

## Grounded Theory Studies

As Chapter 2 stated, grounded theory as a qualitative research approach originated from a desire to incorporate a more analytical, systematic process of theory development when conducting qualitative research. Over time, the original framework offered by Glazer and Strauss (Creswell, 2007) has been reinterpreted and modified; however, the primary focus of grounded theory research as a means of generating a theory to adequately explain a process or phenomena has not changed. Charmaz (2006, p. 151) argues "... the potential strength of grounded theory lies in its analytic power to *theorize* how meanings, actions, and social structures are constructed." Charmaz further states that..."grounded theory preserves and presents the form and content of the analytic work" (p. 151), suggesting that the presentation of the theory should possess structural similarities with the process of its development.

The writing suggestions provided by Corbin and Strauss (2007) coincide with this interpretation. They suggest the development of a clear analytic story originating in the selective coding phase of the study. Writing is to be kept on a conceptual level, void of highly detailed descriptions of the phenomenon itself and focused more on analytic theory at an abstract level. Purposeful attention is paid to specifying relationships between categories uncovered during the axial coding phase of analysis, when the foundation of the theory occurs. Finally, the writer denotes possible variations and different conditions under which the theory holds. Throughout this process, the narrative may reflect changes in methodology in response to new data.

Creswell (2007, pp.184, 191-192) presents several widely used embedded writing techniques that exist when reporting on findings from a grounded theory study:

- The *extent of data analysis* can play a significant role in influencing what is ultimately addressed, and to what degree, in the narrative. Some researchers may focus on the process of linking categories around a core category in axial coding while others may write significantly on the subsequent generation of their formal theory.
- Another embedded structure is the *examination of forms* used in stating the propositions or theoretical relationships derived from the study. It is possible to

relay these propositions in a narrative (or *discursive*) form or by simply providing a bulleted series of statements or hypotheses.

- Segments of data may be represented in the form of *vignettes* or *quotes* as explanatory tools and should demonstrate how well the theory is grounded in the data.
- Finally, as is customary in the narratives of many grounded theory studies, a *logic or integrative diagram* is included to visually present the theory. The structure of this visual model is identified during the axial coding phase and through the use of arrows, descriptive, and/or qualifying statements, illustrates flows of causality, context, intervening conditions, and consequences related to the theory. This representation is usually presented at the end of the report and may be coupled with a narrative version.

### **Phenomenological Studies**

Contrary to the assumptions of many who are new to qualitative research, some approaches such as phenomenology are highly structured and follow a systematic process of data analysis and write up. The dissemination of findings associated with a phenomenological study represents a *type* of rigor normally associated with more traditional forms of reporting. However, it is important to note that the overarching tenets associated with qualitative writing, such as capturing participant voices, writing with the audience in mind, and researcher reflexivity continue to hold true.

According to Moustakas (1994), individuals are surprised at the level of structure in phenomenological research despite the highly sensitive topics that are often studied (e.g., childhood abuse, insomnia, etc.). The reader should come away with a highly empathetic response leading to a deeper understanding of the participants' experience as a result of reading a phenomenological narrative. To accomplish this effect a complete and accurate description of the experience is needed. Consequently, the data analysis and organization of the report are key activities. Moustakas suggests a rhetorical structure in creating this "research manuscript" that looks strikingly similar to traditional reports, complete with separate chapters to organize the report.

The first chapter normally contains an introduction, statement of topic and outline and includes research questions, purpose of the study, and the like. Next, a thorough review of the literature is reported followed by a chapter devoted to the conceptual framework driving the research and subsequent analysis. From there, a detailed discussion of research methodology is presented, followed by the presentation of data and its analysis. The final chapter provides a summary accompanied by implications, and outcomes.

It is common for phenomenological writers to focus more on these overall writing structures; however Creswell (2007, pp. 184, 188-189) describes embedded rhetorical structures that are still valuable in that they allow for the humanity of both the participant

and the researcher to be included in the narrative without sacrificing rigor. These are summarized below:

- The primary goal of the phenomenological writer is to effectively relay the *essence of the experience* for the participants.
- Authors often use a *figure or table* within the narrative or end with a *creative closing* to provide an in-depth, exhaustive description of the phenomenon.
- As a means of educating the reader, a *philosophical discussion* about phenomenology and its assumptions may also be included.
- Although the focus is clearly on describing the phenomenon from the vantage point of the study participant, you are encouraged to refrain from *bracketing* yourself out of the narrative in order to introduce the *reflexivity* you bring to the study. This may involve an introduction to the phenomenon within an autobiographical context (e.g. this author's reflections on first learning of the Engineers' Creed as an undergraduate engineering student would likely inform a study on a student's first engineering service-learning experience).

### **Basic Interpretive Studies**

As stated in Chapter 2, basic interpretive research is concerned with a general understanding of the human experience and how we make sense of these experiences (Merriam, 2002). Because this approach lacks the added, specified purpose of a grounded theory design, for example (e.g., the added purpose of theory development), it provides the most flexible approach to writing about one's findings. Consequently, you are free to use all structural and/or embedded devices to attain this understanding. However, it is important to note that your voice as the researcher has a more prominent role in the text as the reader draws meaning through your interpretive lens. As a result, a critical examination of your own biases, perceptions, and assumptions prior to engaging the participants in the study is useful.

### **Summary**

The writing style of qualitative research reports is as diverse as the researchers who do it and the approaches they take. It is a style that is consistent with the philosophical foundations upon which qualitative research rests. Rather than employing passive voice and presenting the results as removed from the researcher, qualitative studies bring the voice of the researcher to the table. Rather than abstracting out only the targeted information about the participants, qualitative studies present context and personal perspective. They strive to preserve the participants' own voices and represent their experiences with thick, rich, detail. This chapter has talked about a variety of different structural and rhetorical approaches to writing qualitative studies. In the end, however, it is the skill and creativity of the researcher that determines the effectiveness of a study.

The goal of this chapter was to introduce the overall structural and embedded writing techniques associated with several qualitative research designs. These techniques should be seen, not as a substitute for technical or quantitative research reporting, but as a valued tool in your quest to make the results of your educational studies tangible.

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- Merriam, S. B. (1998). *Qualitative research and case study applications in education*. (2<sup>nd</sup> ed.). San Francisco, CA: Jossey-Bass.
- Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage
- National Society of Professional Engineers (2008). <http://www.nspe.org/ethics/eh-cred.asp>
- Richardson, L. (1990). *Writing strategies: Reaching diverse audiences*. Newbury Park, CA: Sage.
- Richardson, L., & St. Pierre, E. A. (2005). Writing: A method of inquiry. In N. K. Denzin & Y. S. Lincoln (Eds.). *The Sage handbook of qualitative research* (3<sup>rd</sup> ed.). (pp. 959-978). Thousand Oaks, CA: Sage.
- Rossmann, G. B., & Rallis, S. F. (2003). *Learning in the Field: An introduction to qualitative research* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

Wolcott, H. F. (1994). *Transforming qualitative data: Description, analysis, and interpretation*. Thousand Oaks, CA: Sage.

Yin, R. K. (2003). *Case study research: Design and method* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

## 8. Resources

The literature on conducting qualitative research studies in education has exploded over the last thirty years. In addition to general overviews, books on specific approaches to qualitative research as well as topics within qualitative research have been issued and periodically revised. Journals and online forums have also appeared during these years of growth. This section will describe some of the most accessible sources for those new to qualitative research. Consulting the online catalog of Sage Publications (<http://www.sagepub.com/>), the major source of educational methods texts, or other publishers such as Jossey-Bass (<http://www.josseybass.com/WileyCDA/>), will yield additional titles.

### General Overviews

The major comprehensive volume on cutting-edge thinking about qualitative research is *The Sage Handbook of Qualitative Research*, edited by N. K. Denzin and Y. S. Lincoln, now in its third edition (2005, Thousand Oaks, CA: Sage). Although some of the chapters in this volume and its previous editions are accessible to novice researchers, in general it is a volume for more experienced researchers and scholars of qualitative methods. Another more advanced text that focuses specifically on epistemological perspectives is *Foundations of Social Research* by Michael Crotty (2003, Thousand Oaks, CA: Sage). This text would be appropriate for researchers who want a more in-depth coverage of epistemological perspectives beyond what is described in introductory texts.

A selection of introductory texts that are comprehensive in their coverage and helpful to the new qualitative researcher is listed below. These volumes vary in the amount of attention they devote to particular topics and the range of examples and aids included, but all are readable and useful.

Bogdan, R.C., & Biklen, S. K. (2006). *Qualitative research in education*. (5th ed.).

Boston: Allyn & Bacon. As its multiple editions attest, this text has stood the test of time. It clearly explains the background assumptions of qualitative research and the fundamentals of data collection strategies. It is particularly strong in the area of document/artifact analysis, especially photography. The data analysis and writing sections are also helpful. Its treatment on different types of studies and design is brief.

Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage. This volume is a new edition of a favorite of graduate students. It describes, more clearly and extensively than other introductory volumes, the differences between five selected approaches to

inquiry: narrative, ethnography, phenomenology, grounded theory, and case study. It includes such helpful devices as fill-in-the blank problem statements and examples of each type of study in appendices. Its treatment of data collection methods is rather limited and it does not include critical studies as one of the selected approaches.

Jones, S. R., Torres, V., & Arminio, J. (2006). *Negotiating the complexities of qualitative research in higher education: Fundamental elements and issues*. New York: Routledge. This volume is unique in that it is situated specifically within a higher education context. It covers all of the basic issues relating to design, data collection, analysis, and writing, with an interest in intentional practice. It is particularly strong in its consideration of social identities.

Mason, J. (2002). *Qualitative researching* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage. This compact guide from a British scholar is organized around decisions that the researcher must make. It treats all of the basic design, data collection, and analysis areas, but does not focus on the more philosophical aspects of qualitative research.

Merriam, S. B. (1998). *Qualitative research and case study approaches in research* (2<sup>nd</sup> ed.). San Francisco: Jossey-Bass. Expanded from the first edition, which focused only on case studies, this volume has been a favorite of many newcomers to qualitative research. It is especially good on data collection techniques, but also has sections on data analysis, trustworthiness, ethics, and writing.

Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3<sup>rd</sup> ed.). Thousand Oaks, CA: Sage. This comprehensive volume devotes extensive attention to the philosophical underpinnings and theory bases supporting qualitative research, as well as design, data collection, and analysis activities. It has extremely helpful charts on such topics as sampling approaches and observation choices. Examples of field notes, interview questionnaires, and analysis tasks are included. The author's extensive experience in evaluation research leads to the inclusion of substantial material on evaluation. He illustrates with parables, cartoons, and personal experiences, which some readers find interesting and others find excessive.

Punch, K. F. (1998) *Introduction to social research*. Thousand Oaks, CA: Sage. This book is a general overview of social research, covering quantitative, qualitative, and mixed methods approaches. Qualitative approaches are discussed in three chapters, which cover research design, data collection, and data analysis. The author mixes practical advice with philosophical aspects in a way that is more accessible to novice researchers than some of the more advanced texts. It also provides numerous examples through summaries of published studies.

Rossmann, G. B., & Rallis, S. F. (2003). *Learning in the field: An introduction to qualitative research* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage. This book takes three

student researchers through their studies and thus provides practical insights on the basics of how to approach the research act, data collection, analysis, and reporting the study. It provides examples of the data collected from these three hypothetical studies. Some newcomers find the concrete approach especially helpful; others prefer less narrative.

## **Helpful References on Specific Topics**

In addition to the number of general books available, a short list of volumes that treat specific types of approaches or topics within qualitative research is below.

### ***Approaches***

For more in-depth description of the major approaches to qualitative design, the following can be consulted.

Charmaz, K. (2006). *Constructing grounded theory*. Thousand Oaks, CA: Sage.

Corbin, J. M., & Strauss, A. C. (2007). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3<sup>rd</sup> ed.). Thousand Oaks, CA: Sage.

Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.

Willis, J. (2007). *Foundations of qualitative research: Interpretive and critical approaches*. Thousand Oaks, CA: Sage.

Yin, R. (2002). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.

### ***Design***

Although many volumes treat design issues, the following are expressly devoted to this topic. The first offers ideas on theoretical frameworks specifically.

Anfara, Jr., V. A., & Mertz, N. T. (Eds.). (2006). *Theoretical frameworks in qualitative research*. Thousand Oaks, CA: Sage.

Marshall, C., & Rossman, G. B. (2006). *Designing qualitative research* (4<sup>th</sup> ed.). Thousand Oaks, CA: Sage.

Schram, T. H. (2006). *Conceptualizing and proposing qualitative research* (2<sup>nd</sup> ed.). Upper Saddle River, NJ: Pearson.

### ***Interviewing***

A number of guides to qualitative interviewing have appeared in recent years. These describe methods for individual as well as focus group interviews. Among the most popular are the following:

Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: Sage. (Second edition due in 2008).

Rubin, H. (2004). *Qualitative interviewing: The art of hearing data* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

Seidman, I. (2005). *Interviewing as qualitative research* (3<sup>rd</sup> ed.). New York: Teacher's College Press.

Stewart, D.W., Shamdasani, P. N., & Rook, D. W. (2006). *Focus groups* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

### ***Data Analysis***

For special advice on general approaches to data analysis, the following are leading guides that provide ideas on data displays, strategies, and theoretical considerations.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

Richards, L. (2005). *Handling qualitative data: A practical guide*. Thousand Oaks, CA: Sage.

Silverman, D. (2001). *Interpreting qualitative data: Methods for analyzing talk, text, and interaction* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

### ***Writing***

Special strategies for reporting the results of qualitative studies are described in the following:

Holliday, A. (2007). *Doing and writing qualitative research* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

Wolcott, H. F. (2001). *Writing up qualitative research* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

### **Dictionaries**

Helpful guides for defining the specialized terms that are used in qualitative research have become very popular among novices and experienced researchers alike. The two below are commonly accessed.

Bloor, M. (2006). *Keywords in qualitative methods*. Thousand Oaks, CA: Sage.

Schwandt, T. A. (2007). *The Sage dictionary of qualitative inquiry* (3<sup>rd</sup> ed.)  
Thousand Oaks, CA: Sage.

## Examples

Often, an example can be one of the most illustrative means for understanding how qualitative studies are designed and conducted. The anthology by Merriam in the following list not only showcases examples of leading types of studies, but provides introductory commentary to each type and author comments on each piece. Yin's anthology concentrates on examples of case studies from different disciplinary perspectives. Creswell's volume, in the general section above, presents five examples of different approaches.

Merriam, S. (Ed.) (2002). *Qualitative research in practice: Examples for discussion and analysis*. San Francisco: Jossey-Bass.

Yin, R. (2004). *The case study anthology*. Thousand Oaks, CA: Sage.

Engineering education journals are beginning to publish some qualitative studies as well. The best source is the *Annals of Research on Engineering Education* (<http://www.areeonline.org/>). Some pieces are also being published in the *Journal of Engineering Education* (<http://www.asee.org/publications/jee/>).

## Qualitative Research Journals

A variety of journals on various kinds of qualitative research approaches have been established in recent years. The list below contains four of the leading general titles, two in print format and two online.

*International Journal of Qualitative Studies in Education*  
<http://www.tandf.co.uk/journals/tf/09518398.html>

*Qualitative Inquiry*  
<http://www.sagepub.com/journalsProdDesc.nav?prodId=Journal200797>

*The Qualitative Report* (online-Nova Southeastern University)  
<http://www.nova.edu/ssss/QR/index.html>

*Qualitative Research Journal* (online-Association for Qualitative Research)  
<http://www.latrobe.edu.au/aqr/index.php?option=content&task=view&id=17&Itemid=35>