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Research Methods (For Engineers)

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9. Qualitative Research

Suneeta Khanna Ganguly

Assistance Professor, Department of Psychology, Handique Girls College, Guwahati.

9.1 Qualitative Research:

Qualitative research is a type of scientific research. It seeks to understand a given research problem or topic from the perspectives of the local population it involves. Qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviors, and social contexts of particular populations.

The strength of qualitative research is its ability to provide complex textual descriptions of how people experience a given research issue. It provides information about the "human" side of an issue – that is, the often contradictory behaviors, beliefs, opinions, emotions, and relationships of individuals.

Qualitative methods are also effective in identifying intangible factors, such as social norms, socioeconomic status, gender roles, ethnicity, and religion, whose role in the research issue may not be readily apparent.

When used along with quantitative methods, qualitative research can help us to interpret and better understand the complex reality of a given situation and the implications of quantitative data.

Qualitative researchers are interested in understanding the meaning people have constructed, that is, how people make sense of their world and the experiences they have in the world. (Merriam, 2009, p. 13)

In general terms, scientific research consists of an investigation that:

- seeks answers to a question
- systematically uses a predefined set of procedures to answer the question
- collects evidence
- produces findings that were not determined in advance
- produces findings that are applicable beyond the immediate boundaries of the study

Although findings from qualitative data can often be extended to people with characteristics similar to those in the study population, gaining a rich and complex understanding of a specific social context or phenomenon typically takes precedence over eliciting data that can be generalized to other geographical areas or populations.

In this sense, qualitative research differs slightly from scientific research in general.

Qualitative Research

Qualitative Research	Qualitative Research
Uses words	Uses numbers
Concerned with meanings	Concerned with behavior
Induces hypotheses from data	Begins with hypotheses
Case studies	Generalization

9.2 Characteristics of Qualitative Research:

Source: adapted from Hammersley, 1992

- **Quantitative researchers** clearly use words as well as numbers. For instance, they usually offer verbal interpretations of their statistical tables. It is also not true that numbers are absent from qualitative research. Having discovered some phenomenon by qualitative means, there is every reason to see how frequently it occurs.
- Quantitative research is often concerned with meanings questionnaires or surveys are commonly designed to establish how people 'see' themselves or others. Qualitative researchers can be interested in behavior just as much as how people see things. Many qualitative studies examine how people interact with one another in particular settings like the workplace, a museum or an auction.
- The standard, published **quantitative study** usually does begin with a hypothesis which it then seeks to test. However, it is becoming more common for **qualitative researchers** to begin with a hypothesis.
- In **Quantitative research** they generalizes the information and infer it accordingly, whereas in qualitative research they literally focuses on the single case study or group cases.
- In **qualitative research** they are used to gather information at the location where the respondents usually experience problems. This is real-time information that forces the participants to come out of their geographic environment to assemble it.
- **Qualitative researchers** do not just focus on a single source of data. Instead, they collect data from different sources like interviews, observations, and documents.
- They also work to solve complicated problems by breaking them down into useful inferences. It makes it simple to understand and read.
- Lastly, such communicative methods can lead people to easily build their trust in the researcher.

9.3 Claimed Features of Qualitative and Quantitative Method:

Qualitative	Quantitative
Soft	hard
Flexible	Fived
Subjective	Objective
Political	Value-free
Case study	Survey
Speculative	Hypothesis testing
Grounded	Abstract

Source: Halfpenny, 1979: 799

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Type of Approach	Defining Features	Data Collection Implications
Phenomenology	Focuses on individual experiences, beliefs, and perceptions. · Text used as a proxy for human	Questions and observations are aimed at drawing out individual experiences and perceptions.
experience	· ·	In focus groups, group experiences and normative perceptions are typically sought out.
		In-depth interviews and focus groups are ideal methods for collecting phenomenological data
Ethnography	Oriented toward studying shared meanings and practices (i.e., culture).	Questions and observations are generally related to social and cultural processes and shared meanings within a given group of people.
	Emphasizes the emic perspective. Can have a contemporary or historical focus.	Traditionally, it is associated with long- term fieldwork, but some aspects are employed in applied settings.
		Participant observation is well suited to ethnographic inquiry
Inductive Thematic Analysis	Draws on inductive analytic methods (this would be same for Grounded Theory below	Most common analytic approach used in qualitative inquiry. ITA requires generation of free-flowing data.
	as well). Involves identifying and coding emergent themes	In-depth interviews and focus groups are the most common data collection techniques associated with ITA
	within data.	Notes from participant observation activities can be analyzed using ITA, but interview/focus group data are better
Grounded Theory	Inductive data collection and analytic methods.	As above, in-depth interviews and focus groups are the most common data collection techniques associated with
	Uses systematic and exhaustive comparison of	GT.
	text segments to build thematic structure and theory from a body of text.	Sample sizes for grounded theory are more limited than for ITA because the analytic process is more intensive and time consuming.

9.3.1 Research Approaches and Implications for Data Collection:

Qualitative Research

Type of Approach	Defining Features	Data Collection Implications
	Common analytic approach in qualitative studies.	Note: Many researchers incorrectly label all inductive thematic analyses "grounded theory," as a default. Technically, they are not the same thing.
Case Study	Analysis of one to several cases that are unique with respect to the research topic Analysis primarily focused on exploring the unique quality.	Cases are selected based on a unique (often rarely observed) quality. Questions and observations should focus on, and delve deeply into, the unique feature of interest.
Discourse/ Conversation Analysis	Study of "naturally occurring" discourse Can range from conversation to public events to existing documents. Text and structures within	These linguistically focused methods often use existing documents as data. Conversations between individuals that spontaneously emerge within group interviews or focus groups may be studied but are not preferred. Participant observation is conducive to
	discourse used as objects of analysis.	discourse analysis if narratives from public events can be recorded.
Narrative Analysis	Narratives (storytelling) used as source of data. Narratives from one or more sources (e.g., interviews, literature, letters, diaries).	If generating narratives (through in- depth interviews), then questions/ tasks need to be aimed at eliciting stories and the importance those stories, hold for participants, as well as larger cultural meaning
Mixed Methods	Defined as integrating quantitative and qualitative research methods in one study.	Collection of qualitative data in a mixed methods study can be informed from a wide range of theoretical perspectives and analytic approaches.
	Two most common designs are sequential and concurrent.	Researchers must specify up front, and in detail, how, when, and why qualitative and quantitative datasets will be integrated.

9.4 Types of Qualitative Research:

Have a look at the table below. It compares the five types of qualitative research in terms of focus, sample size, and the method of data collection.

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Туре	Focus	Sample Size	Data Collection Method
Ethnographic Approach	Culture	_	Observations and Interviews
Narrative Approach	Individual experience	1-2	Individual's stories and existing documents
Phenomenological Model	People involved	5-25	In-depth Interviews
Grounded Theory	To build a theory	20-50	Identifying relationships after interviews
Case Studies	Entity, event, or organization	_	Interviews, observation, focus group, documents, and reports

9.4.1 Sampling in Qualitative Research:

Even if it were possible, it is not necessary to collect data from everyone in a community in order to get valid findings. In qualitative research, only a sample (that is, a subset) of a population is selected for any given study. The study's research objectives and the characteristics of the study population (such as size and diversity) determine which and how many people to select. There are three most common sampling methods used in qualitative research:

- Purposive sampling,
- Quota sampling, and
- Snowball sampling.

Purposive Sampling: one of the most common sampling strategies, group's participants according to preselected criteria relevant to a particular research question (for example, HIV-positive women in Capital City). Sample sizes, which may or may not be fixed prior to data collection, depend on the resources and time available, as well as the study's objectives. Purposive sample sizes are often determined on the basis of theoretical saturation (the point in data collection when new data no longer bring additional insights to the research questions). Purposive sampling is therefore most successful when data review and analysis are done in conjunction with data collection.

Quota Sampling: sometimes considered a type of purposive sampling, is also common. In quota sampling, we decide while designing the study how many people with which characteristics to include as participants. Characteristics might include age, place of residence, gender, class, profession, marital status, use of a particular contraceptive method, HIV status, etc. The criteria we choose allow us to focus on people we think would be most likely to experience, know about, or have insights into the research topic. Then we go into the community and – using recruitment strategies appropriate to the location, culture, and study population – find people who fit these criteria, until we meet the prescribed quotas.

A Third Type of Sampling Snowballing: also known as chain referral sampling - is considered a type of purposive sampling. In this method, participants or informants with whom contact has already been made use their social networks to refer the researcher to other people

who could potentially. Snowball sampling is often used to find and recruit "hidden populations," that is, groups not easily accessible to researchers through other sampling strategies.

9.4.2 Methods of Qualitative Research:

Qualitative research methods reveal the attitude of the target audience with reference to a particular topic. They basically originate from behavioral and social science. Moreover, it presents detailed outcomes and the inferences can be described easily from the data analysis. The most commonly used qualitative methods are:

- In –dept Interviews
- Observation
- Case Study
- Record Keeping
- Content Analysis
- Focus Groups

The details are as follows:

A. In-Depth Interviews:

Organizing in-depth interviews is the most common method for qualitative research. It is a conversational method that involves one participant at a time. The benefits of this approach include collecting data about what people believe and what their motivations are. Such interviews can be conducted face-to-face or on the telephone. However, it can last from half an hour to two hours. Lastly, it provides a better idea of the respondent's body language. The in-depth interview is one of the most common types of qualitative research methods out there. It involves a personal interview with a single respondent. This method provides a great opportunity to capture rich, descriptive data about people's behaviors, motivations, beliefs and etc. You can use the in-depth interview as an individual research method or as part of a multimethod design. Depth interviews are typically performed face to face or by phone. In addition, you can pay attention to the body language of the respondent to understand better his/her answers. Interviewing takes time to organize it. The interview might take between half an hour to two hours or even more.

Observation:

It's a mechanism using empirical methodologies to collect systematic sources of data. Primarily, a participant is used to compare differences. This includes five essential sensory organs and their functions i.e.

- Sight
- Taste
- Hearing
- Smell
- Touch

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B. Focus Groups:

A focus group involves a limited number of participants used for data collection. Such a target audience is there to find the responses to 'what', 'how', and 'why' questions. Moreover, it does not require a researcher to necessarily communicate with the group directly. Instead, online surveys can be sent on several devices to collect the answers. This method is considered expensive in contrast to other qualitative research methods. Nevertheless, it is useful when it comes to market research and testing of new products.

A focus group is also among the most common types of qualitative research methods used in marketing data collection. A focus group normally includes a limited number of participants (around 6 to 12 from) within your target market. This research technique collects data through group interaction. A researcher leads a discussion amongst the group where the participants share lifestyle, needs or behavioral characteristics.

Focus groups aim to find an answer of why, what, and how questions. This research design need not be in person. Nowadays, focus groups can be hosted by several platforms. Focus groups are an expensive method of qualitative research. Typical they are used to explain complex processes from the basics, to identify customer motives and needs (where a complex interaction of factors presence), to identify how products are used and etc.

C. Case Study:

This method has advanced over the past few years. It is mainly used within a number of areas to explain an organization or an entity, business, or situation. A case study is in-depth research of a particular situation or event. This approach growing in the recent years because it is based on real-world experiences. Case study research methodology is used within a number of disciplines including education, social sciences, business, law, health, and many others. Despite this type of research sounds very easy to perform, it involves a deep understanding of a variety of data sources and types of statistical analysis. In addition, case studies can be qualitative and/or quantitative.

D. Content Analysis:

It is used for studying documents and communication artifacts. Social scientists use it to examine the study pattern in a systematic manner. This method includes interpreting words and images from a variety of documents, music, or other types of media. The researchers aim to find out how the words and images are used, and in what context. This way you can draw and come up with conclusions about the hidden culture and behavior. Nowadays, content analysis in researching digital and social media users is a common technique within the social sciences. The main goals of content analysis include identifying important aspects of the content, presenting them in a clear way, support of some argument and others.

E. Record-Keeping:

It uses reliable existing documents and similar information sources as the data source. To gather relevant data, a researcher may go over books and other reference material. It can be used in a new research study.

Qualitative Research

F. Action Research:

This is an interesting qualitative research method in which the researcher and recipients have the same characteristics. Action data collection aims to solve a problem and is conducted by individuals working with others as part of a "community of practice". It is a method of problem-solving led by people working with others in teams. Action research is known also as collaborative inquiry, emancipatory research, and contextual action research. Mainly, action research focuses on turning people into researchers.

The assumption is that people learn best when they do the research themselves. It also aims to promote improvement or change by stimulating knowledge sharing activities.

A great example of action research is psychotherapists conducting research to improve their therapeutic practice. This type of research might involve types of field research such as interviews, focus groups, observation, and others.

	Quantitative	Qualitative
General framework	Seek to confirm hypotheses about phenomena.	Seek to explore phenomena. Instruments use more flexible, iterative style of eliciting and
	Instruments use more rigid style of eliciting and categorizing	categorizing responses to questions.
	responses to questions.	Use semi-structured methods such as in-depth interviews, focus groups, and
	Use highly structured methods such as questionnaires, surveys, and structured observation	participant observation.
Analytical objectives	To quantify variation.	To describe variation.
	To predict causal relationships.	To describe and explain relationships.
	To describe characteristics of a population.	To describe individual experiences.
		To describe group norms.
Question format	Close-ended	Open-ended
Data format	Numerical (obtained by assigning numerical values to responses)	Textual (obtained from audiotapes, videotapes, and field notes)
Flexibility in study design	Study design is stable from beginning to end	Some aspects of the study are flexible (for example, the addition, exclusion, or wording of particular interview
	Participant responses do not influence or determine how and	questions)

9.4.3 Comparison of Quantitative and Qualitative Research Approaches:

Quantitative	Qualitative
which questions researchers ask next	Participant responses affect how and which questions researchers ask next
Study design is subject to statistical assumptions and conditions	Study design is iterative, that is, data collection and research questions are adjusted according to what is learned

9.4.4 Ethical Guidelines in Qualitative Research:

The ethical issues relevant to qualitative research. It is intended to provide a context for discussion in subsequent modules of procedures for safeguarding research participants' interests. Qualitative researchers, like anyone conducting research with people, should undergo formal research ethics training. The material presented here is not a substitute for training on research ethics. A list of ethics training resources is included. Research ethics deals primarily with the interaction between researchers and the people they study. Professional ethics deals with additional issues such as collaborative relationships among researchers, mentoring relationships, intellectual property, fabrication of data, and plagiarism, among others. While we do not explicitly discuss professional ethics here, they are obviously as important for qualitative research as for any other endeavor. Most professional organizations, such as the American Anthropological Association, the Society for Applied Anthropology, the American Sociological Association, and the American Public Health Association, have developed broad statements of professional ethics that are easily accessible via the Internet.

9.4.5 Why is Research Ethics Important in Qualitative Research?

The history and development of international research ethics guidance is strongly reflective of abuses and mistakes made in the course of biomedical research. This has led some qualitative researchers to conclude that their research is unlikely to benefit from such guidance or even that they are not at risk of perpetrating abuses or making mistakes of real consequence for the people they study. Conversely, biomedical and public health researchers who use qualitative approaches without having the benefit of formal training in the social sciences may attempt to rigidly enforce bioethics practices without considering whether they are appropriate for qualitative research. Between these two extremes lies a balanced approach founded on established principles for ethical research that are appropriately interpreted for and applied to the qualitative research context. Agreed-upon standards for research ethics help ensure that as researchers we explicitly consider the needs and concerns of the people we study, that appropriate oversight for the conduct of research takes place, and that a basis for trust is established between researchers and study participants. Whenever we conduct research on people, the well-being of research participants must be our top priority.

The research question is always of secondary importance. This means that if a choice must be made between doing harm to a participant and doing harm to the research, it is the research that is sacrificed. Fortunately, choices of that magnitude rarely need to be made in qualitative research! But the principle must not be dismissed as irrelevant, or we can find ourselves making decisions that eventually bring us to the point where our work threatens to disrupt the lives of the people we are researching.

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