

Focusing on the Fundamentals: A Simplistic Differentiation Between Qualitative and Quantitative Research

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Research is categorized as quantitative or qualitative in nature. Quantitative research employs the use of numbers and accuracy, while qualitative research focuses on lived experiences and human perceptions (Polit & Beck, 2012). Research itself has a few varieties that can be explained using analogies of making a cup of coffee or tea.

To make coffee, the amount of water and coffee grounds to be used must be measured. This precise measurement determines the amount of coffee and the strength of the brew. The key word in this quantitative research analogy is *measure*. To make tea, hot water must be poured over a tea bag in a mug. The length of time a person leaves a tea bag in the mug comes down to perception of the strength of the tea desired. The key word in qualitative research is *perception*. This article describes and explores the differences between quantitative (measure) and qualitative (perception) research.

Types of Research

Nursing research can be defined as a “systematic inquiry designed to develop trustworthy evidence about issues of importance to the nursing profession, including nursing practice, education, administration, and informatics” (Polit & Beck, 2012, p. 736). Researchers determine the type of research to employ based upon the research question being investigated. The two types of research methods are quantitative and qualitative. Quantitative research uses a rigorous and controlled design to examine phenomena using precise measurement (Polit & Beck, 2012). For example, a quantitative study may investigate a

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This article describes qualitative, quantitative, and mixed methods research. Various classifications of each research design, including specific categories within each research method, are explored. Attributes and differentiating characteristics, such as formulating research questions and identifying a research problem, are examined, and various research method designs and reasons to select one method over another for a research project are discussed.

Key Words: Qualitative research, quantitative research, mixed methods research, method design.

patient's heart rate before and after consuming a caffeinated beverage, like a specific brand/type of coffee. In our coffee and tea analogy, in a quantitative study, the research participant may be asked to drink a 12-ounce cup of coffee, and after the participant consumes the coffee, the researcher measures the participant's heart rate in beats per minute. Qualitative research examines phenomena using an in-depth, holistic approach and a fluid

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Table 1
Comparison of Control

	Control Group	Experimental Group
Assignment	10 participants randomly assigned to the control group	10 participants randomly assigned to the experimental group
Pre-Intervention Data Collection	Heart rate prior to beverage consumption	Heart rate prior to beverage consumption
Intervention	Consume a placebo drink (i.e., decaffeinated coffee)	Consume the experimental drink (i.e., caffeinated coffee)
Post-Intervention Data Collection	Obtain heart rate 15 minutes after the beverage was consumed	Obtain heart rate 15 minutes after the beverage was consumed

research design that produces rich, telling narratives (Polit & Beck, 2012). An example of a qualitative study is exploring the participant’s preference of coffee over tea, and feelings or mood one experiences after drinking this favorite hot beverage.

Quantitative Research

Quantitative research can range from clinical trials for new treatments and medications to surveying nursing staff and patients. There are many reasons for selecting a quantitative research study design. For example, one may choose quantitative research if a lack of research exists on a particular topic, if there are unanswered research questions, or if the research topic under consideration could make a meaningful impact on patient care (Polit & Beck, 2012). There are several different types of quantitative research. Some of the most commonly employed quantitative designs include experimental, quasi-experimental, and non-experimental.

Experimental Design

An experimental design isolates the identified phenomena in a laboratory and controls conditions under which the experiment occurs (Polit & Beck, 2012). There is a control group and at least one experimental group in this design. The most reliable studies use a randomization process for group assignment wherein the control group receives a placebo (an intervention that does not have therapeutic significance) and the experimental group receives an intervention (Polit & Beck, 2012). For example, if one is studying the effects of caffeine on heart rate 15 minutes after consuming coffee, using a quantitative experimental design, the design may be set up similarly to the description in Table 1. Randomization will allow an equal chance for each participant to be assigned to either the control or the experimental group. Then the heart rate is measured before and after the intervention. The intervention is drinking decaffeinated coffee for the control group and drinking

caffeinated coffee for the experimental group. Data collected (heart rate pre- and post-coffee consumption) are then analyzed, and conclusions are drawn.

Quasi-Experimental Design

Quasi-experimental designs include an intervention in the design; however, designs do not always include a control group, which is a cornerstone to an authentic experimental design. This type of design does not have randomization like the experimental design (Polit & Beck, 2012). Instead, there may be an intervention put into place with outcome measures pre- and post-intervention implementation, and a comparison used to identify if the intervention made a difference. For example, perhaps a coffee chain store wants to see if sampling a new flavor of coffee, like hazelnut, will increase revenue over a one-month period. At location A, hazelnut coffee was distributed as a sample to customers in line waiting to purchase coffee. At location B, no samples were distributed to customers. Sales of hazelnut coffee are examined at both locations prior to the intervention (hazelnut sample given out to customers waiting in line) and then again one month later, after the intervention. Lastly, a monthly revenue is compared at both sites to measure if free hazelnut coffee samples impacted sales.

Non-Experimental Design

The final type of quantitative research discussed in this article is the nonexperimental design. Manipulation of variables does not occur with this design, but an interest exists to observe the phenomena and identify if a relationship exists (Polit & Beck, 2012). Perhaps someone is interested if drinking coffee throughout one’s life decreases the incidence of having a stroke. Researchers for this type of study will ask participants to report approximately how much coffee they drank daily, and data would be compared to their stroke incidence. Researchers will analyze data to determine if a causal relationship exists between coffee and stroke incidence by examining behavior that occurred in the past.

Quantitative Study Attributes

In quantitative studies, the researcher uses standardized questionnaires or experiments to collect numeric data. Quantitative research is conducted in a more structured environment that often allows the researcher to have control over study variables, environment, and research questions. Quantitative research may be used to determine relationships between variables and outcomes. Quantitative research involves the development of a hypothesis – a description of the anticipated result, relationship, or expected outcome from the question being researched (Polit & Beck, 2012). For example, in the experimental study mentioned in Table 1, one may hypothesize the control group will not see an increase in heart rate. However, in the experimental group, one may hypothesize an increase in heart rate will occur. Data collected (heart rate before and after coffee consumption) are analyzed, and conclusions are drawn.

Qualitative Research

According to Choy (2014), qualitative studies address the social aspect of research. The researcher uses open-ended questions and interviews subjects in a semi-structured fashion. Interviews often take place in the participant's natural setting or a quiet environment, like a conference room. Qualitative research methodology is often employed when the problem is not well understood and there is an existing desire to explore the problem thoroughly. Typically, a rich narrative from participant interviews is generated and then analyzed in qualitative research in an attempt to answer the research question. Many questions will be used to uncover the problem and address it comprehensively (Polit & Beck, 2014).

Types of Qualitative Research Design

Types of qualitative research include ethnography, phenomenology, grounded theory, historical research, and case studies (Polit & Beck, 2014). Ethnography reveals the way culture is defined, the behavior associated with culture, and how culture is understood. Ethnography design allows the researcher to investigate shared meanings that influence behaviors of a group (Polit & Beck, 2012).

Phenomenology is employed to investigate a person's lived experience and uncover meanings of this experience (Polit & Beck, 2012). Nurses often use phenomenology research to better understand topics that may be part of human experiences, such as chronic pain or domestic violence (Polit & Beck, 2012). Using the coffee analogy, a researcher may use phenomenology to investigate attitudes and practices around a specific time of day for coffee consumption. For example, some individuals may prefer coffee in the morning, while some prefer coffee throughout the day, and others only enjoy coffee after a meal.

Grounded theory investigates actions and effects of the behavior in a culture. Grounded theory methodology may be used to investigate afternoon tea time practices in

Europe as compared to morning coffee habits in the United States.

Historical research examines the past using recorded data, such as photos or objects. The historical researcher may look at the size of coffee mugs in photos or mugs from antique photos over a few centuries to provide a historical perspective. Perhaps photos are telling of cultural practices surrounding consuming coffee over the centuries – in solitude, or in small or large groups.

Qualitative Research Attributes

When selecting a qualitative research design, keep in mind the unique attributes. Qualitative research methodology may involve multiple means of data collection to further understand the problem, such as interviews in addition to observations (Polit & Beck, 2012). Further, qualitative research is flexible and adapts to new information based on data collected, provides a holistic perspective on the topic, and allows the researcher to become entrenched in the investigation. The researcher is the research tool, and data are constantly being analyzed to identify commencement of the study. The decision to select a qualitative methodology requires several considerations, a great amount of planning (such as which research design fits the study best, the time necessary to devote to the study, a data collection plan, and resources available to collect the data), and finally, self-reflection on any personal presumptions and biases toward the topic (Polit & Beck, 2014).

Selecting a sample population in qualitative research begins with identifying eligibility to participate in the study based on the research question. The participant needs to have had exposure or experience with the content being investigated. A thorough interview will uncover the encounter the participant had with the research question or experience. There will most likely be a few standard questions asked of all participants and subsequent questions that will evolve based upon the participant's experience/answers. Thus, there tends to be small sample size with a high volume of narrative data that needs to be analyzed and interpreted to identify trends intended to answer the research question (Polit & Beck, 2014).

Mixed Methods

Using both quantitative and qualitative methodology into a single study is known as a mixed methods study. According to Tashakkori and Creswell (2007), mixed methods research is “research in which the researcher collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry” (p. 4). This approach has the potential to allow the researcher to collect two sets of data. An example of using mixed methods would be examining effects of consuming a caffeinated beverage prior to bedtime. The researcher may want to investigate the impact of caffeine

on the participant's heart rate and ask how consuming the caffeine drink makes him or her feel. There is the quantitative numeric data measuring the heart rate and the qualitative data addressing the participant's experience or perception.

Polit and Beck (2012) describe advantages of using a mixed method approach, including complementary, practicality, incrementality, enhanced validity, and collaboration. Complementary refers to quantitative and qualitative approaches complementing each other. Mixed methods use words and numbers, so the study is not limited to using just one method of data collection. Practicality refers to the researcher using the method that best addresses the research question while using one method from the mixed method approach. Incrementality is defined as the researcher taking steps in the study, where each step leads to another in an orderly fashion. An example of incrementality includes following a particular sequence, or an order, just as a recipe follows steps in order to accurately produce a desired product. Data collected from one method provide feedback to promote understanding of data from the other method. With enhanced variability, researchers can be more confident about the validity of their results because of multiple types of data supporting the hypothesis. Collaboration provides opportunity for both quantitative and qualitative researchers to work on similar problems in a collaborative nature.

Once the researcher has decided to move forward with a mixed-method study, the next step is to decide on the designs to employ. Design options include triangulation, embedded, explanatory, and exploratory. Triangulation is obtaining quantitative and qualitative data concurrently, with equal importance given to each design. An embedded design uses one type of data to support the other data type. An explanatory design focuses on collecting one data type and then moving to collecting the other data type. Exploratory is another sequential design, where the researcher collects one type of data, such as qualitative, in the first phase; then using those findings, the researcher col-

lects the other data, quantitative, in the second phase. Typically, the first phase concentrates on thorough investigation of a minutely researched occurrence, and the second phase is focused on sorting data to use for further investigation. While using a two-step process may provide the researcher with more data, it can also be time-consuming.

Conclusion

In summary, just like tea and coffee, research has similarities and differences. In the simplest of terms, it can be viewed as measuring (how many scoops of coffee grounds?) compared to perception and experience (how long to steep the tea?). Quantitative research can range from experiments with a control group to studies looking at retrospective data and suggesting causal relationships. Qualitative research is conducted in the presence of limited research on a particular topic, and descriptive narratives have the potential to provide detailed information regarding this particular area. Mixed methods research involves combining the quantitative and qualitative threads into data conversion and using those results to make meta-inferences about the research question. Research is hard work, but just like sipping coffee or tea at the end of a long day, it is rewarding and satisfying.

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Learning Outcome

After completing this learning activity, the learner will be able to define quantitative, qualitative, and mixed method research studies, and discuss their attributes.

Learner Engagement Activity

For more information on this topic, view the session "Reading and Understanding Research" presented by Tamara Kear in the ANNA Online Library (<https://library.annanurse.org/anna/sessions/4361/view>).

Evaluation Form (All questions must be answered to complete the learning activity. Longer answers to open-ended questions may be typed on a separate page.)

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Quantitative and Qualitative Research. Focusing on the Fundamentals: A Simplistic Differentiation Between. Qualitative and Quantitative Research. Shannon Rutberg. Christina D. Bouikidis. Research is categorized as quantitative or qualitative. in nature. Quantitative research employs the use of. numbers and accuracy, while qualitative research. focuses on lived experiences and human percep- tions (Polit & Beck, 2012). For qualitative research, the data is collected through focus groups, ethnography, case studies, literature review, structured and unstructured interviews, because of its descriptive nature. Hypothesis: The hypothesis designed for qualitative research is short and narrow, but in qualitative research, the design hypothesis is lengthy and broader. VariablesÂ The focus of quantitative research is on numeric values or numbers, but in qualitative research, the attention of researchers is on words, objects, ideas or pictures, etc. Research Oriented: Quantitative research is result oriented as it is based on numbers while the qualitative research is process-oriented. Research Problem: The problem in quantitative research is deductively reasoned or logical. Main Differences Between Qualitative Research and Quantitative Research. Key Terminology. These two forms of research differ with regard to the kinds of terms used throughout the entire exercise. The qualitative research uses terms like subjectivity, complexity, context, and understanding while the quantitative counterpart uses replicability, objectivity, measurements, and testing. Nature of Questions.Â Quantitative Research is based on the collection and study of numerical or quantifiable data about people or groups. It deals with things that can be measured and expressed in numerical terms. Aspects like gender, practices, professions, and opinions are a few examples of factors that are considered for quantitative studies.