



Step 6: Telling the Data Story / Analysis

Once data is collected, it is the job of the researcher to tell the data story...

That is essentially what data analysis is!

Creating a meaningful story out of the collected data is the goal

Throughout the research process a lot of data will be collected. Reporting all of the data individually would be too long, non-engaging, and probably not tell the readers very much about what was learned in the research process.

Readers do not want pages of stats and quotes; they want to know what it all means!

The researcher's job is to systematically review the data, and find what important factors emerge, and then share that story. The most appropriate form of analysis will be dependent on the design of the study.

- Qualitative data analysis is the interpretation of words and text
- Quantitative data analysis is the interpretation of numerical data

Qualitative Data Analysis

Qualitative data analysis can be applied to data collected from interviews, focus groups, surveys, photovoice or participant observation.

Qualitative data analysis takes raw data and presents it in words, symbols, pictures etc., based on themes or comparisons, or to tell a story.

Approaches to Qualitative Analysis

- Content Analysis
- Thematic Analysis
- Comparative Analysis
- The Narrative

Quantitative Data Analysis

Quantitative data analysis is typically applied to data collected using a survey format. The analysis of this data takes raw data and presents it in a manner that answers the research question(s). Quantitative data is typically presented in the forms of charts, tables or

graphs, often with accompanying text to explain the significance of the presented numerical data.

Approaches to Quantitative Analysis

- Frequency Distributions
- Measures of Central Tendency
- Bivariate Relations

Resources for CBE Professionals

[Accountability Services](#) has developed an Online Tutorial in [Desire to Learn](#) (D2L) for professionals working in the Calgary Board of Education called "Delving into Data."

- The tutorial is largely based on "Data Wise" (Burdett, City & Murnane, 2005) and provides access to resources, on-line tutorials and suggested strategies for data interpretation, analysis and school development planning.
- The tutorial is far broader than just understanding and communicating provincial testing reports but does include data collection templates in Excel and tutorials in PowerPoint to assist with this as well.

If you are a CBE Professional and would like to sign up for this tutorial please contact [Diane Nowlan](#) at [Accountability Services](#).

Telling the Qualitative Story: Content Analysis

Perhaps the most common method of qualitative analysis is content analysis.

Using this method the researcher systematically works through each transcript assigning codes, which may be numbers or words, to specific characteristics within the text.

The researcher may already have a list of categories or they may read through each transcript and let the categories emerge from the data. This approach is very useful when analyzing data from interviews, focus groups, photovoice or surveys.

How to conduct Content Analysis

In content analysis the researcher codes the collected data. The codes could be predetermined issues that the study is examining.

For example, if the study was exploring the effects of a new technology on teachers' classroom instruction, the researcher may analysis the data, looking for instances that the data mentions.

Examples:

- Challenges of the technology
- Advantages of the technology
- Improvements for the future.

The researcher would then take these predetermined categories and see what the data from various participants says about each of these areas. The research would then synthesize these findings.

Telling the Qualitative Story: Thematic Analysis

In this type of data analysis the themes emerge from the data and are not imposed by the researcher. The data collection and analysis take place simultaneously. Even background reading can form part of the analysis process, especially if it can help to explain an emerging theme.

This approach is very useful when analyzing data from interviews, focus groups, photovoice or surveys.

How to conduct Thematic Analysis

The researcher would examine the data collected from various participants and would identify themes (and label them as codes or categories) as they emerge when examining the data. As the same themes continue to emerge the researcher groups the data together.

The major difference between content analysis and thematic analysis is that in thematic analysis, the categories are not predetermined but rather emerge as the researcher reviews the data. The themes/categories are not set, and the number of themes is not predetermined. As many new themes as the researcher identifies can be included.

Telling the Qualitative Story: Comparative Analysis

Using this method, data from different people/groups are compared and contrasted and the process continues until the researcher is satisfied that no new issues are arising.

Comparative and thematic analysis are often used in the same project, with the researcher moving backwards and forwards between transcripts, memos, notes and the research literature, and comparing for various groups. This approach is very useful when analyzing data from interviews, focus groups, photovoice or surveys.

How to conduct Comparative Analysis

In this process the researcher compares and contrasts collected data to see what similarities and differences emerge.

There are different ways that this approach could be applied:

1. Separating groups (e.g. by gender, age, location etc), and comparing and contrasting the results.
2. Contrasting different data collection methods. For example, if a survey and a focus group were used, what were the similarities and differences that emerged?
3. Compare and contrast from an ideal case. An ideal case is one that meets all the desired or expected outcomes. Comparative analysis can compare actual results from the ideal case.

The researcher will report the similarities and difference found in the analysis process.

Example:

The process may show vastly different results for males and females. Or, it may show that a particular program is more effective with a particular age group, or work better in a specific location etc.

Telling the Qualitative Story: The Narrative

The narrative approach to data analysis is a non-theoretical description. The researcher removes themselves from the process and presents the details of a study in chronological order.

In this tradition, the data is explained by using the words or experiences of the participants. The narrative has the ability to capture a high degree of complexity and to convey deeper understanding of how particular events or factors impact each other.

- The **strength** of the narrative is in its great detail; the limitation of this approach is that it is so specific that it is difficult to generalize to other situations.
- The **challenge** of the narrative is that it is critiqued for not actually analyzing the data, but rather just presenting the findings.

This approach could be used when detailing how a new program was implemented, how students reacted to a new technology in their class. It is most effective for analyzing data collected in interviews or through observation.

How to Conduct a Narrative Analysis

From transcribed interviews or from observation notes the researcher would piece together a complete overview (story) of a situation.

Example:

From a classroom observation the research would compile a story (a typical day, etc.) that provides detailed insights into the desired topic (e.g. the use of a new technology).

Telling the Quantitative Story: Frequency Distributions

The simplest form of quantitative data analysis is a frequency distribution. It shows the number of people who answered a question in a particular way, or received a particular score, participated in a particular activity etc.

Frequency distributions can be used to describe nominal, ordinal, interval and ratio level data.

Levels of Measurement

Nominal

Measures indicate only if there is a difference between categories

Examples:

- Age, Religion
- Male/Female/Other

Ordinal

A level of measurement that identifies a difference among categories of a variable and allows the category to be ranked ordered.

Example: How often do you attend tutoring sessions?

- Never
- Once a semester
- Once a month
- Weekly

Interval

Measures differences in categories, allows variables to be ranked AND can measure the difference between the categories. There is no true 0 in this measurement.

Examples

- Celsius
- IQ test

Ratio

This is highest, most precise level of measurement for which variables attributes can be rank ordered and the distance between variables can be precisely measured. A true 0 exists.

Examples

- Age
- Cost/Money

When to use Frequency Distributions?

This type of data analysis is typically used when analyzing survey data. The researcher can present the information from many surveys in one easy to understand table, graph or set of numbers that represent the findings of the survey.

Frequency distributions allow the researcher to highlight significant findings numerically. Frequency distributions can present attitudes, behaviors, opinions and knowledge of participants. Frequency distributions allow this information to be highlighted and presented effectively for large numbers of people.

Telling the Quantitative Story: Measures of Central Tendency

If you want to summarize the data collected in one single number, often referred to as the average, measures of central tendency is how this is accomplished.

The **mode** is the most frequently occurring number/answer. The mode can be used with numerical, ordinal and ratio level data.

The **median** is the middle most answer of all respondents. It is also known as the 50th percentile. This number is found by organizing all the data from lowest and highest, and calculating the middle (divide the total number of cases in half), and counting to the middle point. The middle number is the median. The median can be used with numerical, ordinal and ratio level data.

The **mean** is the mathematical average, and is the most commonly used measure of central tendency. Although the mean is the most commonly used measure, it is important to note that outlying answers can significantly alter the mean, whereas the median and mode measurements are less affected. The mean can only be used with interval and ratio level data.

Telling the Quantitative Story: Bivariate Relationships

Bivariate statistics allow you to consider two variables together and describe the relationship between them. Bivariate statistics can show if there is a relationship between two variables or not.

Example: What impact does attendance at an exam review session have on students' grades?

To answer this question, grades of students who participate in an after school review session, would be compared to grades of students that did not attend the session.

Outcome 1:

Students who attended session have higher grades than students who did not attend. It could be inferred that attending the session positively impacts students' grades.

Outcome 2:

There is no major difference in grades between students who did and did not attend the review session.

We could conclude that the session did not have a major impact student grades, and therefore there is no relationship between attendance and grades.

This would be a simple bivariate relationship. What must be considered when using bivariate statistics is the difference between correlation and causation?

Critical Thinking Needed!

Causal relationships are typically a linear effect. A causes B, and B causes C etc. This is a simple way to understand statistics. If students who attended an exam review session have higher grades, the session obviously had a positive effect. If students who attended the session have lower grades than those who did not then the session did not have a positive effect.

This is when it is very important for a research to apply critical thinking to the pure statistics. A researcher must determine if the relationship is indeed causal or if a spurious factor is the actual reason. A spurious factor can occur when a relationship appears to causal, but in reality is not because of a hidden, unmeasured or unseen factor that is the actual reason something has or has not occurred.

With this critical analysis again examine the test scores of students who attended an exam review session and those who did not.

Critical Thinking: What if...

If students who attended scored higher, was that because of the exam review session, or could it be because stronger students are more likely than those with challenges to attend the session?

What if students who attended the session did not perform as well on the test as those who did not attend? Does this mean that the session was not helpful? Or, did students who needed more help attend the session, while students already comfortable with the material did not attend. The session may still have positively effected the test scores of those who attended, but perhaps not in comparison to those already comfortable with the material.

It is important to critically examine what statistics mean, and to examine what, if any spurious relationships may exist when using statistical data to illustrate relationships.

Helpful Web Links

[Data Analysis Online Learning Program](#)