IOWA

Division of Student Life

QUANTITATIVE DATA ANALYSIS

Quantitative data is defined as numerical information that can be measured and analyzed statistically. This type of data is often used to identify trends, patterns, and relationships between variables. This document provides an overview of quantitative data analysis, an important aspect of student affairs assessment.

Examples of Quantitative Data

- Surveys and questionnaires:
  - Likert scales
  - Multiple-choice questions
  - Rating scales
- Institutional data (i.e. GPA, retention rates, graduation rates).
- Numerical data from observations (i.e. scores, tallies)

Step 1: Organize and Clean the Data

The easiest way to organize your data, if you are not using an online survey instrument that organizes it for you, is to compile the data in a spreadsheet program like Excel or SPSS.

When you have Likert scale responses (i.e. Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree), assign a numerical value to each response. Here is an example:

- Strongly disagree (1)
- Disagree (2)
- Neither agree nor disagree (3)
- Agree (4)
- Strongly agree (5)

This will allow you to organize the data in a table and do further analysis such as descriptive statistics.

Example:

Here is an example using the Likert scale mentioned above. You are aiming to assess to what extent University of Iowa students agree with specific statements about their experiences with a mentoring program. See below how this data can be organized in a spreadsheet or table.

Classification 1 = First Year 2 = Second Year 3 = Third Year 4 = Fourth Year	Sex 1 = Male 2 = Female	To what extent do you feel like you belonged in the mentoring program? Strongly disagree (1) Disagree (2) Neither agree nor disagree (3) Agree (4) Strongly agree (5)	To what extent do you feel like you built connections with faculty/staff during the program? Strongly disagree (1) Disagree (2) Neither agree nor disagree (3) Agree (4) Strongly agree (5)	To what extent do you feel satisfied with the mentoring program? Strongly disagree (1) Disagree (2) Neither agree nor disagree (3) Agree (4) Strongly agree (5)
1	2	3	4	4
3	2	4	5	4
2	1	2	3	2
4	1	3	2	4

Step 2: Review The Data

Make a quick pass over the data and examine what initial trends you might see.

Step 3: Choose an Analysis Strategy

Choosing the right analysis strategy is an important step in quantitative data analysis. The strategy you select should align with your assessment question and the type of data you have collected. Below are definitions of common quantitative analysis strategies and examples to show how each can be applied.

Descriptive statistics: Summarizes and describes the main features of a dataset. These statistics provide an overview of the data without making predictions or drawing conclusions beyond the data itself.

Here is a table summarizing the main types of descriptive statistics:

| Strategy	Definition	Example
Frequency Distribution	Counts how often a response or value appears Summarizes the data by showing the count or percentage of occurrences for each value Helps identify patterns and trends in the data	3 students agreed they were satisfied with the mentoring program. or 75% of student respondents agreed they were satisfied with the mentoring program.
Measures of Central Tendency	**Mean**: arithmetic average **Median**: middle value in an ordered dataset **Mode**: most frequently occurring value	The mean satisfaction score was 3.5 on a 5-point scale. The median satisfaction score was 3. The mode satisfaction score was 4.
Measures of Variability	Describe how spread out the values in a dataset are **Range**: difference between the highest and lowest value **Variance**: average squared deviation from the mean **Standard deviation**: square root of the variance, shows how much values deviate from the mean on average	You may use this method to examine whether student satisfaction scores are clustered around the mean or if they are widely spread out. i.e. 1, 1, 1, 1, 2, 2, 2, 2, 2 (less variability) vs. 1, 2, 2, 3, 4, 4, 5, 5, 5, 5 (more variability)

Inferential Statistics: Involves making predictions or inferences about a population based on a sample of data. This can also include examining factors such as differences (e.g., participants vs. non-participants, gender differences), changes over time (e.g., pre/post data), and whether expectations were met (e.g., did students achieve expected learning outcomes).

Here is a table summarizing the main types of inferential statistics:

Strategy	Example
Hypothesis Testing: This can be used to determine if there are significant differences in student satisfaction between different residence halls or programs.	Testing whether a new student orientation program has significantly improved student retention rates compared to previous years.
Regression Analysis: Useful for predicting student outcomes based on various factors.	Analyzing how high school GPA and extracurricular involvement predict college success or graduation rates.
Analysis of Variance (ANOVA): This helps compare the means of three or more groups.	Comparing the academic performance of students across different majors or departments to see if there are significant differences.
Chi-Square Tests: These are used to examine the relationship between categorical variables.	Assessing whether there is a significant association between student participation in campus activities and their overall satisfaction with campus life.
Confidence Intervals: These provide a range within which you can expect a population parameter to fall.	Estimating the average amount of time students spend on engaging in student organization activities per week with a certain level of confidence.

Example:

For our example using the Likert scale, frequency distribution is likely the best strategy to analyze the data since the aim of the assessment is to examine to what extent students agree with specific statements about their experience participating in the mentoring program. Using percentages and frequency statements such as the ones outlined in the table above and bar chart as highlighted below are simple and effective ways to report this data.

Mentoring Program Responses by Class Status
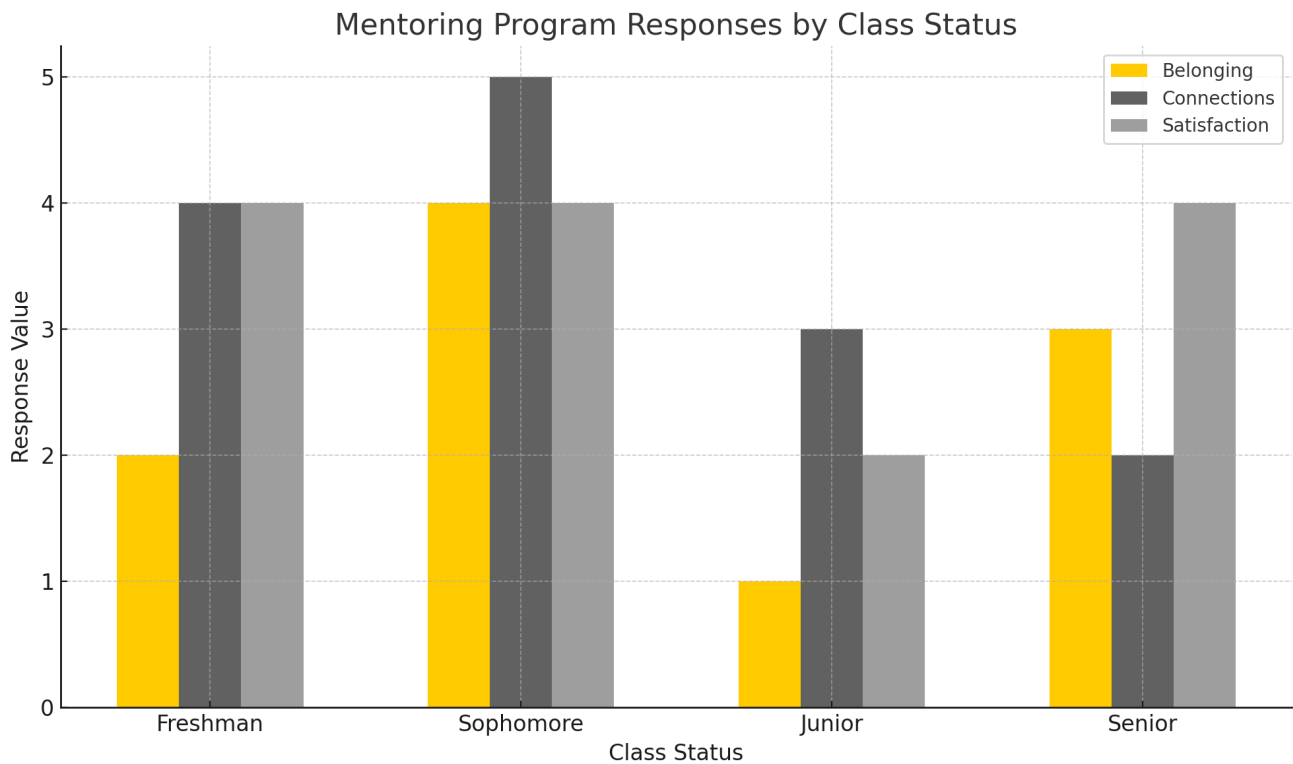
Step 4: Conduct Other Useful Calculations

Are there other measurement or comparison methods that would help you analyze your data and reach the answer to your assessment questions?

Example:

In the mentoring program example, is there a connection between the students' feeling of belonging and their satisfaction with the program?

Step 5: Take a Step Back and Examine Your Findings

After conducting your quantitative analysis, it's essential to pause and reflect on your findings. Taking a step back allows you to synthesize the data, identify meaningful trends, and consider the effect of your findings for improving policy and practice. This step is crucial for ensuring the validity and usefulness of your assessment results. It helps you understand the data's meaning and significance.

Consider the following questions:
- What do the data tell you about your assessment question? (What?)
- What are its implications for policy and/or practice? (So what?)
- What, if anything, will you change about the program or practice? (Now what?)

By taking the time to step back and examine your findings, you can ensure that your assessment efforts lead to meaningful improvements in student affairs programs, services, and outcomes.

Step 6: Compile Findings into a Report

Present the data from your assessment in a report that concisely summarizes key findings, insights, and recommendations from the assessment. Think about using visualizations to facilitate quick understanding and data-informed decision-making. The report ultimately serves as a snapshot of essential information, enabling stakeholders to learn the most significant findings and implications briefly.

Step 7: Implementing Your Findings

After you have examined your findings, the next step is to develop an action plan based on the insights gained.

- **Develop goals**: Based on the quantitative assessment findings, create specific goals for improving the program or service you studied.
- **Identify action steps**: Determine the concrete steps that need to be taken to achieve each goal.
- **Assign responsibilities**: Delegate responsibility for each action step to specific individuals or teams.
- **Allocate resources**: Identify and allocate the necessary resources (i.e. funding, personnel, training) to support the implementation of the action plan.
- **Implement the plan**: Put the action plan into action and monitor progress regularly.
- Communicate results: Share the assessment findings and action plan with stakeholders, including students, staff, and administrators.
- **Re-assess**: After implementing changes, reassess to determine if the changes made a difference. This helps you to close the loop and ensure continuous improvement.

By developing and implementing a well-defined action plan, you can ensure that your assessment efforts lead to meaningful improvements in student affairs programs, services, and outcomes. The final step of implementation ensures a continuous cycle of assessment and improvement.