Student Affairs Assessment Newsletter

Eastern Illinois University

Introduction to Statistics

Statistics is the mathematical science involved in the application of quantitative principles to the collection, analysis, and presentation of numerical data. Using statistics involves taking data from some population, which one then draws conclusions from in order to make better informed decisions. The population which a person may draw from could be a community, organization, department, or even a small subset of students. There are various types of quantitative models, each of which are suited for specific data collection methods.

Under the umbrella of statistics, there are several key definitions:

1. **Response Rate or Sample Size**: The number of people who respond to a survey, or number of entries in a database set. Commonly written as "n=x" where "x" is the response rate or sample size

2. **Confidence Level**: The probability that the value of a parameter falls within a specified range of values. For assessment, 95% confidence is most often used.

3. **Levels of Measurement:**

   - Nominal: Data listed by group with no order to them.
     Ex) gender, class, year

   - Ordinal: Data listed by category that have a specific order.
     Ex) satisfaction scales, agreement scales

   - Interval or Continuous: Data that has order to it and the distance or difference between each of the variables can be determined
     Ex) SAT or ACT score, number of drinks consumed

Source: Successful Assessment for Student Affairs: A How– To Guide, 2013

Types of Statistics

There are two major types of statistics, descriptive and inferential.

1. Descriptive statistics take a large amount of data, and present them in an abbreviated fashion. They highlight important characteristics of the data.
   Ex) Counts, Percentages, Means/ Averages, Standard deviation

2. Inferential statistics go further than descriptive to show relationships between groups, test for statistically significant differences, and are sometimes used for predictive modeling. They are less common in assessment results
   Ex) Chi-squares, Correlations, *t*-tests, Regression Analysis

More About Descriptive and Inferential Statistics

In assessment, there are four main types of descriptive statistics used:

1. **Measures of frequency**—These show often something occurs
   Ex) Count, percent, frequency

2. **Measures of central tendency**—These locate the distribution by various points
   Ex) Mean, median, mode

3. **Measure of dispersion or variation**—These identify the spread of scores by stating intervals
   Ex) Range, variance, standard deviation *(the difference between observed score and mean)*

4. **Measures of position**—Describes how scores fall in relationship to one another; relies on standardized scores
   Ex) Percentile ranks, quartile ranks

Inferential statistics can include:

1. **Correlation**— A correlation compares two ordinal or continuous variables to strength and direction in a relationship .
   Ex) There is a strong positive relationship between number of drinks consumed and engaging in risky sexual behavior

2. **Chi-square**—Determines if the statistically significant differences in proportions are different from the proportions you would expect to observe
   Ex) There is not a statistically significant difference between using the campus recreation center and retention

3. **t-test**—Determines if there are any statistically significant differences in the means between two variables
   Ex) There is a statistically significant difference between the pre-test and post-test scores on an agreement scale

4. **ANOVA**—Similar to a *t*-test, only an ANOVA allows for comparisons of mean differences between 3 or more variables
   Ex) Statistically significant differences were found between the number of times during the week students used the campus recreation center (0, 1-2, 3-4, 5-6, 7 or more) and satisfaction with facilities.

There are also two methods of data collection used in assessment. Between-subjects is when different groups of people participate in each condition, whereas within-subject is when the same group of people participate in each condition.

Another important point to watch for when you're assessing a group is practice and boredom effects.

- If a group performs differently in the second condition because of familiarity with the situation or measures being used, you have a practice effect.

- Similarly, if participants perform differently in a second condition because they are tired or bored from having completed the first condition, there is a boredom effect.

Join us for the November Student Affairs Assessment Coffees

Date: Tuesday, November 18
Time: 9 a.m.—10 a.m. .
Who: Anyone!
Where: 1895 Room, MLK, Jr. University Union

Why: To converse with student affairs faculty, staff, and others about general assessment topics as well as discuss or ask questions about your own survey creation or dispersion methods.