

Critical Issues for Helping Students Perform Inference Successfully

1. Which inference method to choose
 - Estimating or testing a claim
 - Means, proportions, relationships between categorical/quantitative variables
2. The different purposes of random selection and random assignment
 - Random selection in sampling settings allows for generalizability
 - Random assignment in experiments allows cause-and-effect conclusions
 - Both permit the use of probability distributions as models in inference
3. How technology can be used as a tool for aiding inferential thinking
 - Simulation to understand sampling distributions
 - Calculations for inference methods
4. Different inferential thinking for hypothesis tests in experiments and sampling
 - Experiments: is there a treatment effect, or could the difference we observe be due to the chance involved in the random assignment?
 - Sampling: could the difference we observe be due to chance variation in the sampling process?
5. Conditions for using each inference method, and why they are important
 - Random sampling/random assignment
 - Normality
 - Independence (of measurements/samples)
6. Distinguishing between samples, populations, and sampling distributions.
7. Communicating effectively.
 - Using notation and statistical terminology correctly
 - Stating technically correct conclusions in context

Choosing the correct inference method

- a. t test
- b. t interval
- c. two-sample t test
- d. two-sample t interval
- e. one proportion z test
- f. one proportion z interval
- g. two proportion z test
- h. two proportion z interval
- i. chi-square test for goodness-of-fit
- j. chi-square test for association/independence
- k. chi-square test for homogeneity
- l. linear regression t interval for slope
- m. linear regression t test for slope

- _____ 1. Which brand of AA batteries last longer—Duracell or Eveready?
- _____ 2. According to a recent survey, a typical teenager has 38 contacts stored in his/her cellphone. Is this true at your school?
- _____ 3. What percent of students at your school have a MySpace page?
- _____ 4. Is there a relationship between the age of a student's car and the mileage reading on the odometer at a large university?
- _____ 5. Is there a relationship between students' favorite academic subject and preferred type of music at a large high school?
- _____ 6. Who is more likely to own an iPod—middle school girls or middle school boys?
- _____ 7. How long do teens typically spend brushing their teeth?
- _____ 8. Are the colors equally distributed in Fruit Loops?
- _____ 9. Which brand of razor gives a closer shave? To answer this question, researchers recruited 25 men to shave one side of their face with Razor A and the other side with Razor B.
- _____ 10. How much more effective is exercise and drug treatment than drug treatment alone at reducing the incidence of heart attacks among men aged 65 and older?

Which inference method?

