ABSTRACT

How Do College Students Reason About Hypothesis Testing in Introductory Statistics Courses?

by

Birgit Christina Aquilonius

Many college students are required to take statistics courses for their majors. Hypothesis testing is often taught as the last part of such a course and in a sense becomes the goal of the course. Statistics instructors receive mixed messages about their students' understanding of hypothesis testing. The students in their classes sometimes say or do things that make instructors believe that students have good understanding of the topic. At other times, the same students make mistakes on tests and homework that make the instructor doubt their understanding. In this study, present technology allowed me to go one layer below what can be observed in the classroom. By videotaping students' statistical conversations and viewing them on DVDs, time after time, I was able to analyze students' reasoning at more depth and observe more closely what students understand and do not understand. Two statistics instructors and eight pairs of community college students were asked to solve hypothesis test problems and answer questions about their work.

Regarding sample and population students were able to reason competently in general terms. They knew why one takes samples and about the importance of
unbiased samples. They did not realize the mathematical character of random

sampling, but thought about randomness as equivalent to representativeness. In their reasoning they did not exhibit understanding of the qualitative difference between sample mean and population mean which is inherent in the theory of hypothesis testing.

Students' approach to p-values in hypothesis testing was procedural. They considered p-values as something that one compares to alpha-values in order to arrive at an answer. Students did not attach much meaning to p-values as an independent concept. Therefore it is not surprising that though their p-values gave them valid statistical conclusions, they often were puzzled over how to translate the statistical answer to an answer of the question asked in the problem. Their textbooks and instructors gave students scripts to help them formulate their answers. Those scripts were helpful to some students but did not always lead them to the right answer.