

Scientific Reasoning

Definition of the Competency

Students will understand the nature of the scientific enterprise, including but not limited to: significance, confidence interval, hypothesis testing, confirmation bias, conflict of interest, outliers, random and non-random sampling, reliability, validity, inference, and tolerance for ambiguity.

Standards of the Competency

Students will:

- Distinguish and explain proper use of these terms and concepts.
- Identify dependent and independent variables.
- Identify pseudoscientific experiments.
- Perform basic hypothesis tests.
- Interpret the results of the hypothesis tests.

Methodology

A panel of 10 faculty members designed a multiple-choice scientific reasoning assessment to evaluate the standards above. The assessment was piloted during spring 2003 and 2004 final exams in a 200-level Psychology course and 100-level Biology courses along with the quantitative reasoning assessment. The Director of Assessment and Evaluation scored the assessments and summarized the assessment results. We expected to see at least 60% of the students answering each item correctly.

Summary

The assessment results indicate that an average of 85% of students across courses correctly answered 50% of the items, demonstrating competency in the proper use of terms and concepts and in hypothesis testing. The least number of correct responses concerned items on identifying dependent and independent variables, significance, and interpretation of hypothesis testing results (45% demonstrated competency). However, 62% of students in 200-level psychology showed competency in identifying dependent and independent variables and significance.

Because this instrument was given to students in our general education curriculum, it is an indicator of competency demonstrated by CNU students regardless of major field of study. Most students taking 100- and 200-level courses at CNU have not yet been exposed to statistics or research coursework.

CNU will implement a new general education curriculum in Fall 2006. This assessment will be forwarded to the Liberal Learning Council for use in designing the curricula for the Natural World and Formal and Informal Reasoning areas of inquiry.