

**Quality Enhancement Plan Executive Summary:
“Foundations of Science: Improving Scientific Reasoning Among Non-Science
Majors”**

The goal of the Quality Enhancement Plan (QEP) at Sam Houston State University (SHSU) is to improve critical thinking and scientific reasoning in our non-science majors. To accomplish this goal, a new General Education science course called *Foundations of Science* (FOS) was implemented in the fall of 2009. As of the spring 2010 semester, ten sections of the course have been offered with a total enrollment of approximately 560 students. This course emphasizes the practice of critical thinking, as embodied in the scientific method, and introduces basic scientific facts from a variety of scientific disciplines. The QEP’s focus on critical thinking is consistent with the universally recognized goal of higher education to enable students to critically evaluate information and make informed decisions on the basis of that reasoned evaluation.

The selection of the QEP topic was inspired by institutional research showing that many of the students in General Education science courses have not been performing at an appropriate level. In addition, there was a consensus among science faculty that our students do not sufficiently understand the nature of science and therefore are not developing their ability to think scientifically. Resultant data from an administration of a test of critical thinking (Critical Thinking Assessment Test [CAT]) and a locally developed instrument (Foundations of Science Exam [FSE]) reinforced the need for enhancing our students’ critical thinking and scientific reasoning skills. The rationale for the selection of the topic was further supported by external research indicating that a majority (>78%) of college graduates in the U.S. are scientifically illiterate.

The student learning outcomes for the QEP are to 1) demonstrate the ability to apply scientific terminology; 2) use scientific reasoning when evaluating claims; 3) avoid common logical fallacies; 4) demonstrate understanding of key concepts and theories from science; 5) apply scientific knowledge to an evaluation of claims; 6) distinguish science from pseudoscience; and 7) develop greater appreciation of the need for scientific literacy and critical thinking.

As of the fall 2009 semester, baseline data for student performance on the tests identified above have been obtained in non-FOS courses, as well as pre-test and post-test data from students in the FOS course. The post-test data for the FSE showed a marked improvement ($p < .0001$) in scores. The university is awaiting the formal results for the CAT, but informal results, using a modified scoring rubric, showed substantial improvement in scientific reasoning among students in the FOS courses. These tests will continue to be used to assess the QEP over the next four years.

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