

Extraordinary Claims: An Innovative Approach to Engage Student Interest and Enhance Critical Thinking Skills in General Education Science Courses

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Most university degrees require completion of at least two general education science courses. Yet, 93% of American adults, including 78% of college graduates, remain scientifically illiterate. This suggests current core-curriculum science instruction fails the American public. Valuable resources are spent emphasizing soon forgotten vocabulary and seemingly disconnected facts of scientific disciplines. Tragically, the broader significance of those facts related to the nature and logic of scientific reasoning is routinely ignored. Students remain fundamentally unable to value and understand empiricism or apply critical thinking skills. Thus, they are susceptible to bogus, often harmful pseudoscientific claims. Clearly, new approaches to teaching science are sorely needed, approaches focusing less on “memorization” and more on “science as a way of knowing.” To meet this need, we developed, as the centerpiece of Sam Houston State’s QEP/SACS re-accreditation, the Foundations of Science (FoS) course. FoS engages students by focusing on extraordinary claims such as alien abductions, Bigfoot, alternative medicines, and the current pop-culture controversy regarding vaccinations. Students are empowered to evaluate such claims using logic and knowledge from multiple scientific disciplines. Our presentation introduces the rationale for the course, topics covered, and pedagogy, which includes case studies and cooperative learning in closely coordinated lab and lecture components. FoS effectiveness has been assessed using a Critical thinking Assessment Test (CAT) developed by Tennessee Tech University in conjunction with the National Science Foundation (<http://www.tntech.edu/cat/home/>) and an internally developed Foundations of Science Exam (FSE), both implemented in a pre- vs. post-course design using non-FoS general education science courses as the control. Results demonstrate highly significant improvements in students’ critical thinking skills (Fig. 1) and general science content scores (Fig. 2) associated with our new approach.

Keywords: case study teaching, critical thinking skills, extraordinary claims, science literacy

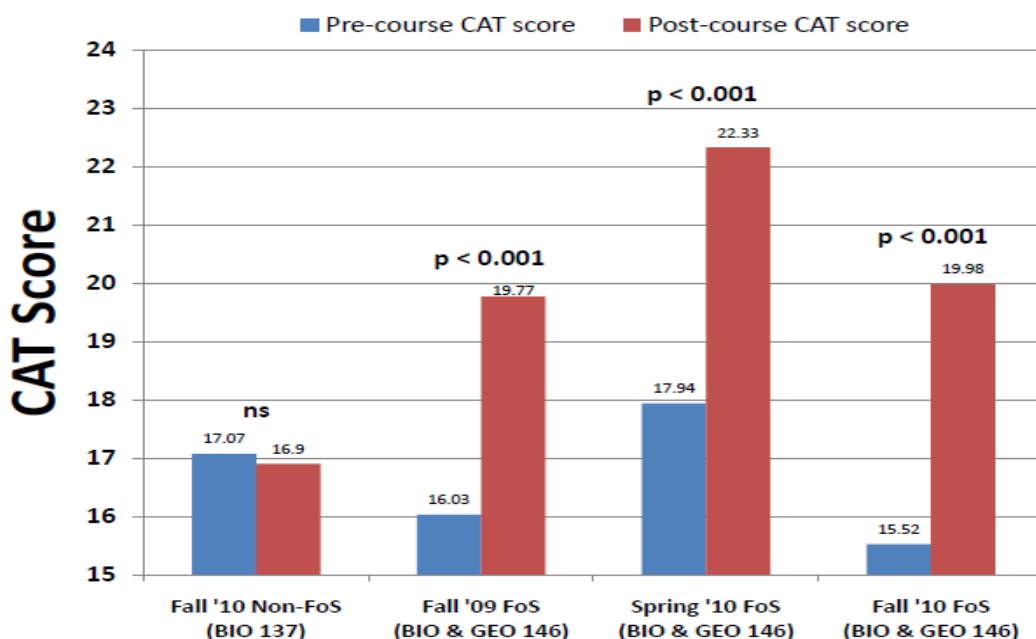


Figure 1. CAT score pre- vs. post-course. Students completing the FoS course display a significantly improved performance ($p < 0.001$), while those taking a non-FoS general education science course did not show significant improvement.

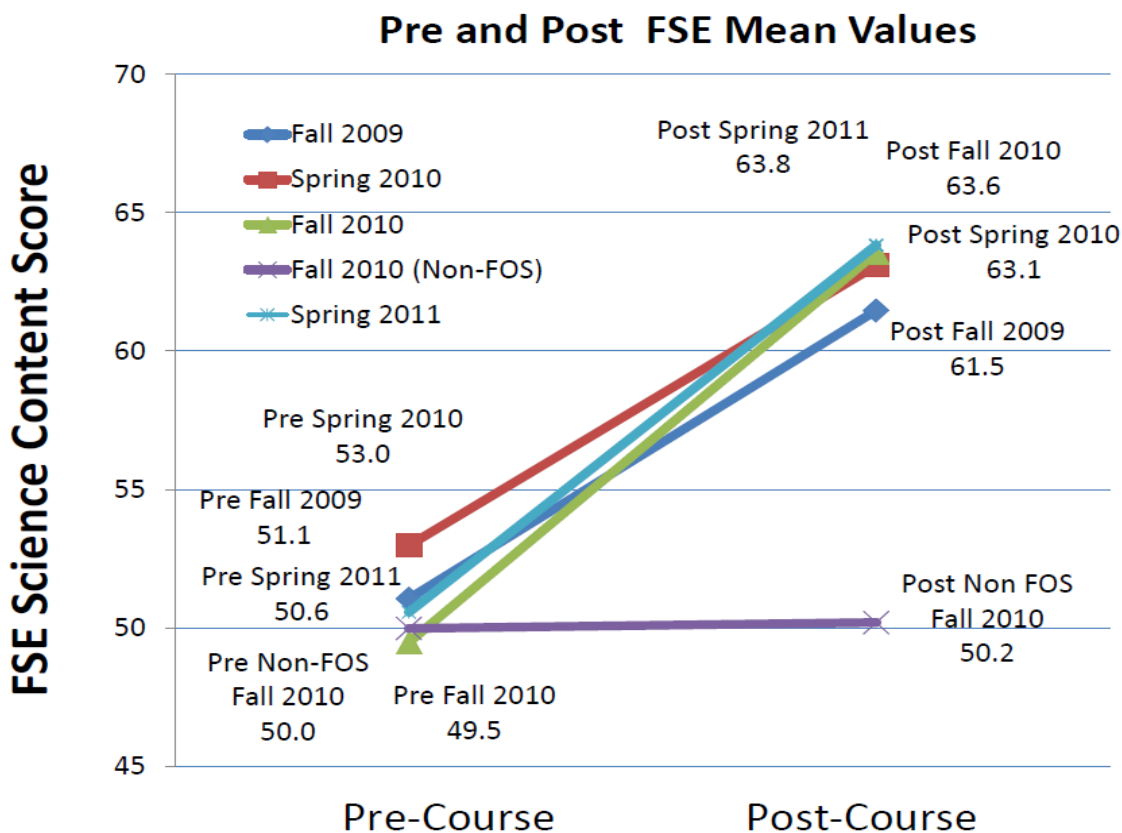


Figure 2. FSE science content pre- vs. post-course scores. Students completing the FoS course showed highly significant improvement ($p < 0.001$) in their understanding of basic scientific concepts, while students taking a non-FoS general education science course did not.

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