

Summary of Scientific Process Assessment, FCSC 101

At the end of the Fall 2011 semester, a new assessment was adopted from the University of California (Berkeley) and subsequently revised to measure the learning goals set for Foundations of Scientific process class (FCSC-101). This novel assessment instrument has been developed by Dr. Joby Jacob and Dr. Vinh Pham, two adjunct faculty teaching at NYIT, with support as well as input from Dean Yu. Specifically, the assessment was designed with intention to focus on measuring students' comprehension of the scientific process in the course, as the previously administered assessments tended to focus on discipline specific content instead. Since its original implementation, the new assessment has undergone a few rounds of revisions.

Students were given the revised assessment at the beginning and at the end of the Spring 2012 semester. The idea was to measure student growth in understanding of the scientific process. Based on the results and analysis of the assessment results, Drs. Pham and Jacob issued the following report:

“Students are not grasping what theories, laws and hypotheses are or how they differ (in their scope). They do not understand that all scientific knowledge is tentative. They are also leaving class with a cartoon version of what a scientist is, an individual who works de jure alone in a lab, a logical robot who is never influenced by his/her culture, in search of that one last experiment which can prove the truth. Based on these results, we feel that students are leaving the class without a proper grasp of the scientific process and this might be symptomatic of too much content”.

In light of this assessment and upon initiative of Dean Yu, over the course of the summer 2012, Dr. Nicholas Bloom, Dr. Ana Petrovic, Dr. Eleni Nikitopoulos, Dr. Vihn Pham, Dr. Joby Jacob, Dr. Ana Lucia Fuentes, Dr. Francine Glazer and Dr. Yuko Oda, worked on addressing these issues in a so-called “Summer Institute”. The idea of the Summer Institute was to address the findings from the assessment.

Previously in the FCSC curriculum, the scientific process was addressed prominently in the first five lectures of the class and in the remainder of the semester, its relevance and universality was not necessarily obvious to students. Furthermore, due to the pace of the lectures, students had not enough time to discuss and reflect in class with each other the mechanisms and value of the scientific process. As a result of the Summer Institute, the class now incorporates an increased emphasis on the scientific process, which insures that students see it as a “backbone” topic of the course. The revised curriculum also features increased historical examples of the scientific process at work as well as student led discussion of the mechanisms of the process. The framing question for the design of the lectures was “How does the content contributed to an understanding of the scientific process?”. On the other hand, content which did not add specifically to the understanding of the scientific process was dropped. The

goal ultimately, is that these assessment driven curricular reformations help students develop some content knowledge, but more importantly that they leave NYIT with a lifelong appreciation of how science actually works.

Sample Survey Questions

1. What is science?
 - a. Science is a collection of facts about nature. (F)
 - b. Science is absolute and unchanging. (F)
 - c. Science is a complete body of knowledge about nature. (F)
 - d. **Science is an ongoing process to better understand the natural world. (T)**

2. Which of the following is true regarding scientific knowledge and nature?
 - a. **Scientific knowledge is built on observations of nature. (T)**
 - b. If an observation is made correctly, its meaning is straightforward (F)
 - c. If an observation is made correctly, it is not subject to interpretation. (F)
 - d. Measurements in science can be made perfectly. (F)