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Intelligent Redesign: A Collaborative Approach to “Scientific Thinking”

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As a multi-section Core Curriculum course required for all undergraduates of AUC, Scientific Thinking (SCI120) provides unique insight on a variety of issues faced throughout the liberal arts educational system. Scientific Thinking, part of the "Core of the Core," is a course that many students may not choose to take. While AUC is known here and abroad as the region's premier English-language institution of higher learning, many students enter without a full appreciation for how or why that elite status depends on the liberal arts component of the education that is being offered. The instructors for this course are a mixed group of full time and adjunct faculty, loosely affiliated with backgrounds in various natural sciences, history of science, philosophy of science, mathematics, and social science. Making the most effective use of their talents and expertise, while providing a common experience relevant to the interests of all students, has been a consistent challenge throughout the history and development of Scientific Thinking.

Beginning in the Fall semester of 2004, a major redesign of the course was spearheaded by the former Dean of the School of Sciences and Engineering, Dr Fadel Assabghy, with the introduction of the General Lecture Series. This marked the first real step toward providing a common experience for all students enrolled in Scientific Thinking, across all sections. In previous semesters, students met exclusively within their individual sections which were taught by instructors left entirely to their own discretion in constructing a course syllabus and in selecting supplemental material to cover a range of topics including *History of Science*, *Scientific Method*, *Science and Society*, *Science and Politics*, *Science and Ethics*, and *Science and Religion*. Consequently, it was often the case that instructors, in absence of any formal structure, created for their students the specialty course which they may have preferred to teach, had they been given a unique course ID from their respective departments. While an understandably desirable situation for the instructors, the 400+ students divided among 14 sections were left for better or worse to share very little in their SCI120 experience.

In contrast, the General Lectures Series provides a common framework of topics for all sections to follow. Modeled in part on a similar program at Columbia University, the weekly General Lectures, attended by all sections, are presented by our most distinguished lecturers and invited experts in their fields. The foundation of the course material is thus laid in the General Lectures, and these themes and concepts are built upon in greater detail within the individual sections.

The order of topics within the series, as originally introduced, remained essentially unaltered for the next several years, revealing over time several issues with the underlying approach of the course. Much of the first half of the semester was dominated by a history of science, with a specific focus on the history of cosmology. While the purpose of this may have been to illustrate such important concepts as the development of the scientific method, paradigm shifts, and falsification, it seemed to also have an unintended effect by aggravating a feeling of alienation from the material already felt by a number of the students upon enrolling in this required course. By the time the students were presented with material with which they could directly relate to themselves and to their personal realities, many had already dismissed the course as being entirely irrelevant. Rather than gaining an appreciation for the process of science and critical thinking, or for the reliable evidence they allow us to gather and the advances that will continue to be made in our understanding of the natural world, many students were understandably left with a strong sense that science is nothing more than a series of mistakes and falsified ideas. It was with this in mind that the structure of the course was recently reexamined and ultimately redesigned in a collaborative effort led by then-Coordinator, Dr. Kathryn Lawrence.

The results of the redesign have been significant for a number of reasons involving both the students and the faculty. The vast majority of the content and material presented in class remains unchanged, however the structure and organization have been dramatically altered. The concepts of science and scientific thinking are now first related to the self and later extend outward into the natural world and to the more abstract. This is in contrast to the previous thematic organization of “Big to Small” (i.e. cosmos to atoms), in which the relevant self was lost without focus somewhere in the middle. This new approach allows students to make immediate personal connections with the presented material and increases the level of active engagement required in order to understand and appreciate the more abstract concepts that are eventually presented when addressing two seemingly straightforward questions: “Who are we?” and “Where are we?”

Several of the topics covered, such as global climate change, evolution, and the “Big Bang”, elicit strong emotional response in the students, but by keeping the overall focus on the self, it is easier for all students, including those who would prefer not to be taking the course or those who remain intellectually hostile towards the material, to express themselves and to incorporate logic, rationalism, and empiricism into their thinking. The topics simply become the vehicles to introduce and reinforce these concepts, and the students' passion provides them with more reason to assess their positions empirically, and to construct more rational arguments based on reliable evidence. These students are ultimately in the better position to appreciate the processes by which science moves forward.

On the faculty side, the collaborative nature of the redesign has also allowed for more personal investment in the course. While electronic wikis have been utilized by Scientific Thinking instructors for several years, serving passively as shared repositories of course material, links, and other resources, the redesign presented an opportunity to take greater advantage of the interactive technology, in which users actively commented and advised on changes to the developing course outline. Additionally, weekly instructors' workshops have been implemented as a means to introduce and review proposed new material, and provide a person-to-person accountability check on the methods and materials utilized by the various instructors: by presenting and defending these methods to the other instructors, the ongoing refinement of the course is allowed to continue as a truly collaborative effort. Although instructors retain a high level of classroom autonomy, the awareness of the precise differences between the sections increases the cohesion of the course, providing a more uniform experience for all students.

Much like science, itself, Scientific Thinking will continue to develop and progress as a course at AUC. By keeping it dynamic and collaborative, the instructors are fostering the best possible environment for that to occur.

Share with us your experiences by contributing to the New Chalk Talk series, or by simply sending comments/suggestions to bcanfield@aucegypt.edu, aellozy@aucegypt.edu