

CHEMISTRY

IGNATIAN PEDAGOGY IN CHEM 435, MEDICINAL CHEMISTRY: THE GLOBAL AIDS CRISIS

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In majors level science courses, the vast amount of information to be covered leaves little time to explore issues of ethics and morality dealing with the subject matter. Very often, students taking these courses are doing so with an eye toward medical school, dental school or graduate programs in that particular area. Thus, while issues of ethics and morality are important to these students, the focus of the course must be quite specific, and narrowly defined, as this information is often required for standardized entrance exams. As a result, the possibility for incorporating Jesuit identity into CHEM 435-Medicinal Chemistry was seen as an exciting challenge.

The primary goal of CHEM 435 is to provide students with an introduction to the role of chemistry in the drug discovery and development process. Students receive extensive exposure to methods of drug discovery, synthesis, structure activity relationships and mechanism of action of several classes of drugs. The text for the course, *The Organic Chemistry of Drug Design and Drug Action*,¹ approaches these topics from the perspective of the organic chemist. The students who choose to take this course are ones who usually pursue advanced degrees in the medical, pharmaceutical or dental field. This class also appeals to students who plan to study chemistry in graduate school. During the semester of this course, the class was made up of 8 students, whose interests were similar to the description above.

In addition to the science of organic/medicinal chemistry, a significant portion of the course provides exposure to the manner in which business is conducted in the pharmaceutical industry. Since drug discovery processes are constantly being evaluated in terms of their efficiency, utility and ability to provide increased profits, it is important to educate students on these issues during this course. Understanding the manner in which the pharmaceutical companies do business then leads us to consider ethical issues which surround the industry. One such issue under consideration is the HIV/AIDS epidemic sweeping the world.

At the end of 2005, an estimated 38.6 million people are living with HIV/AIDS. This is in addition to the 25 million people that have died of AIDS since 1981. Tragically, 2.3 million of those currently infected are children under the age of 15. While AIDS is a problem in the United States, the extent of the tragedy is nothing compared to the crisis occurring in Sub-Saharan Africa, where 24.5 million people are currently living with the disease. In fact, 6.1% of the entire population (aged 15-49) of Sub-Saharan Africa is currently infected with the disease. The suffering is greater still, as more than 12 million children in Africa have been orphaned by the disease. Directly related to CHEM 435 is the concern that of the millions living with AIDS in Africa, only 1 in 5 are currently receiving treatment.²

While the numbers mentioned above are astounding, the AIDS crisis in Africa is not unknown to the general college population. However, in order to truly grasp the magnitude of this crisis, more people need to be educated about this tragedy. Given that time would be spent this semester studying the AIDS virus, and the mechanism by which the disease can be combated with medicines, this seemed like an excellent opportunity to provide education to the larger Xavier community, showcasing the extent of this tragedy.

Dr. Carl Fichtenbaum, Director of the Infectious Diseases Center at the University of Cincinnati, was invited to the Xavier campus to provide his perspective on the disease. In addition to his infectious disease duties, he is also an avid volunteer at Aids Volunteers of Cincinnati (AVOC). Those who came to hear Dr. Fichtenbaum speak included the students enrolled in the course as well as around 30 other science majors who will likely pursue a career in medicine. Dr. Fichtenbaum educated these students on the magnitude of the AIDS crisis through facts, figures, statistics and his own personal experiences in treating the disease. The audience seemed touched by his message as Dr. Fichtenbaum inspired the audience, challenging them to view these victims as more than just a statistic. While society often vilifies AIDS victims, he stressed that these were people just like them, who happened to be victims of circumstance, be it a tragic accident, or a single ill-timed mistake which resulted in their infection.

The impact of Dr. Fichtenbaum's presentation was immediately evident. Seeking his opinions on what needs to be done to slow the spread of the disease, both in the US and worldwide, the audience stuck around well after the end of the presentation to ask further questions. One of the students in attendance mentioned later, that, because of the presentation, he was giving serious consideration to studying this field of medicine. Toward that end, he has begun making efforts to shadow Dr. Fichtenbaum prior to applying to medical school. Another student has decided to spend her required volunteer time at AVOC during the next academic year.

Another opportunity this course had to raise awareness of the tragedy on the Xavier campus came by way of the presence of Fr. Terry Charlton, S.J. on campus. Fr. Charlton was on campus to speak with Justice Club, a group of socially aware students, committed to the Ignatian spirit of service. As this event had been previously planned by the leaders of Justice Club, the role of the medicinal chemistry class was to publicize the event. The medicinal chemistry students spent a significant amount of time advertising the event through banners, flyers, email and other means of connecting with the student body. Additionally, to increase attendance at the event, the class provided incentives in the form of refreshments, sandwiches and cookies from a popular campus deli. Based on the numbers in attendance, the message reached people, as over 70 students were in attendance at the meeting. Logan Hall, one of the larger lecture halls on campus, was filled to capacity with attendees.

Fr. Charlton spoke about an ongoing project to reach out to AIDS affected children in Kibera Slums, Nairobi, Kenya. Thanks to a grant from the Chicago Province, Fr. Charlton and the Hands of Life Society founded St. Aloysius Gonzaga Secondary School, a school specifically for children orphaned by the AIDS virus. A video was shown documenting the mission of the high school. For most of the audience, there was a certain duality in the message delivered by the video. Principally, the video brought to life the destitution of the people living in Kibera Slums, providing a completely different view on extreme poverty. It allowed the students to experience the crisis, in a small, but

significant manner. Additionally, the video showed a different set of victims of the AIDS crisis, the children who have lost their families as a result of the disease. On the other hand, the talk revealed another, more positive side of the AIDS crisis. That is, the kindness of the human spirit can do great things in the face of such tragedy. There is optimism and hope at St. Aloysius that, through education, progress can be made to slow the spread of the disease, and provide much needed support to the students there. The talk struck a note with several in attendance, as evidenced by the discussion afterward, with the students inspired to wonder what the Xavier community could do to help.

After attending the two lectures, it was now the class's turn to provide some education on the AIDS crisis. The mechanism of drug action of some antiretroviral drugs had been discussed in lecture. These drugs have been especially successful in the United States at treating the disease, and extending the lives of those that are afflicted. However, the expense of these drugs has limited their widespread usage among those that cannot afford them. The blame for the high cost of these life-extending drugs has often been assigned to the pharmaceutical industry. Our class investigated the time, effort and money expended in bringing these drugs to market. The class then staged a public debate where the industry's role in curbing the AIDS epidemic was discussed. The class was divided into two groups of four, who, after doing extensive research, took affirmative and dissenting positions on the following statement: "The pharmaceutical industry is doing an acceptable job responding to the global AIDS crisis." The groups were chosen at random, so many of the students were forced to debate a side of the issue with which they disagreed. This allowed students to step "out of the box," examine their own beliefs, and enhance the educational process. Prior to the debate, the audience was asked to answer a question revealing which side of the argument they would support in the absence of new information. Following the debate, the floor was opened to questions, with the students maintaining their assigned roles as affirmatives or dissenters. At the end of the evening, the audience was polled as to which team made the more compelling arguments.

The debate was a very positive and educational experience for the students who participated, as well as the audience that attended. The brief, informal, and non-scientific polls provided interesting results. A majority (21/30) of students came in with the preconceived notion that the pharmaceutical industry is not meeting its social responsibility in responding to the AIDS crisis. In terms of which team made the more compelling argument, the numbers were more equal with 16 out of 29 believing the dissenters made the more compelling argument. Four students that came in as supporters of the pharmaceutical industry believed the dissenters made the more compelling argument, while nine initial dissenters believed the affirmative team won the debate. What does all of this mean? In terms of our resolving the issues of the debate, it likely means very little. These statistics do indicate something about the maturity of this group of Xavier students. As a result of their diligence, the debaters were able to convince people to change their stance on what is a controversial issue. Credit also goes to the audience, who had an open mind to the arguments of both sides, and were able to declare as a winner, a team which espoused beliefs different than their own. The consensus opinion was that whether or not the pharmaceutical industry is doing enough, more needs to be done in all areas and by all parties affected: businesses, governments, educators and the afflicted societies themselves. While the debate may have further clouded the issue in

terms of the majority opinion, it certainly provided the audience with new ways of thinking about the issue.

Incorporation of Ignatian pedagogy into an advanced science course turned out to be seamless, considering the initial trepidation with such a project. The students embraced the opportunity to view the material in a different manner, usually reserved for non-major science courses. Seeing the ethical and business implications of pharmaceutical research provided them with a new sense of perspective. The success of this extension to the medicinal chemistry class will result in it becoming a permanent portion of the course. Spending time on these topics did not take away from the other material in the curriculum, but rather, enhanced the educational experience of the class. Hopefully, other members of the Xavier community were positively impacted by the resources provided by the class. While the AIDS epidemic is something that will continue to plague our world, maybe now more future scientists and medical professionals will have a better understanding of the crisis as a whole.

¹ Richard B. Silverman, *The Organic Chemistry of Drug Design and Drug Action*, 2nd edition, Elsevier Academic Press, Burlington, MA, 2004.

² These and other statistics can be found at the website of AVERT, an international AIDS charity (<http://www.avert.org>).