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Of Special Interest

ACS Student Affiliates at University of Michigan Use Their Passion for Chemistry to Inspire the Community and Other Students

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Building from minimal interest in membership in previous years, we constructed a healthy, growing program.

Going from almost zero to more than sixty active members in less than a year, the University of Michigan American Chemical Society Student Affiliate chapter is a success story about revitalizing a struggling chapter. Innovative officer positions, increased delegation of authority, and courage to try new ideas generated this special chemistry. In order to encourage each member to be creative and reach his or her full chapter potential, the officers stressed, “Dream of an outstanding activity, and everyone will make it happen.” Strategically, this philosophy was reinforced by electing members who had spearheaded projects to the new officer positions. In the following article, we will present the events and philosophies that created the strong intra-Student Affiliate and inter-Student Affiliate/community chemical bonds.

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Introduction

Over the past academic year (1996–97), the University of Michigan American Chemical Society Student Affiliates (UM ACS SA) chapter has redefined itself along two basic guidelines: (1) the ACS SA exists to build "chemical bonds" between UM undergraduate students and the UM science faculty, the Ann Arbor public, and the general Michigan community; and (2) SA members can best translate their passion for chemistry to these communities when they are excited about science and enjoying themselves when bringing that excitement to others.

At UM, our efforts to rejuvenate our SA chapter reflected these ideas. Building from minimal interest in membership in previous years, we constructed a healthy, growing program. This rejuvenation succeeded because we always focused on having fun while learning chemistry—fun for the public participants in our projects, for the SA members, for the faculty, and for other UM students.

In this article we will outline our program and the incentives used to stimulate interest in and generate energy for the SA program. We have divided our activities into two categories: Intra-SA Chemical Bonds, and Inter-SA/Community Chemical Bonds. We believe strongly that this program can be modified for use by any interested chapter.[1]

Program Outline: Intra-SA Chemical Bonds

Most of our members report that they investigate joining the Student Affiliates because they are interested in finding and interacting with other science-oriented students. We always make sure to build and reinforce a group atmosphere: from small details like refreshments at the meetings to organizing a two-day road trip to Canada, we make the members feel important. Starting with our mass meeting in October, we asked members what *they* wanted the group to do throughout the year—our policy as officers was, "If you think of it, we can all make it happen!" All of the following events, organized at members' requests, were attended by both SA members and nonmembers.

"Zero to Sixty in One Year: A Membership Success Story." S. A. Blum, J. M. Irish, B. M. Eklov, R. A. Ihrie, and C. R. Perumalswami, University of Michigan, Chemistry Department, 48109.

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FIGURE 1. PHOTO OF SA CHAPTER HOME PAGE ON THE WORLD WIDE WEB.

Annual Trip for 1997: Toronto—"18 Students, Two Days, 600 Miles"

Our annual trip provides one of our biggest membership incentives by giving the group time at the end of the year to relax before finals. This year, for only $15 per person, our SA members headed to Toronto for two days to take in museums and the local scene. We visited the Ontario Science Center and the Royal Ontario Museum, enjoyed each other's company, and gathered new ideas for National Chemistry Week (NCW) and outreach activities. Pictures from the 1997 Toronto trip are on our web page under the "Events" section. With significant help from the UM Chemistry Department, the Student Affiliates and the UM Students of Biology, an active biology student group that shares much of the same group philosophy with the SA, we were able to plan this event jointly.

(Students of Biology URL: http://lsa.biology.umich.edu/~biostud)

Going On-line: http://www.umich.edu/~acssa

This year our SA chapter opened a home page on the World Wide Web (Figure 1) as a UM organization. Not only does it have information about our group and members, it

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is also interactive. Interested students can sign up for tutoring, annual trips to science centers, and email groups, using the web page forms we have created. The images on the web site provide a great way for nonmembers to see some of the activities that our chapter has done: from lighting up pickles for NCW to helping kids make (and play) with slime at an inreach and hosting Dr. Helen Free for a departmental seminar where she advocated public outreach. Each member who joins has his or her own section and picture. The page also offers links to regional and national ACS pages. Visit us at http://www.umich.edu/~acssa.

Innovative Officer Positions

Innovative officer positions, delegation of authority, and a willingness to consider members' new ideas were instrumental in forming this year's special chemistry. Instead of having only the traditional three officer positions (President, Vice President, Secretary/Treasurer), we created additional positions for our growing inreach and outreach activities, our new faculty lectures, and our fledgling tutoring program. Current officers stressed their desire to realize all Student Affiliates' ideas by encouraging each member to be creative and to help the chapter reach its full potential. Members who spearheaded projects were then elected to new officer positions inspired by and related to their proposed activity. This pulled more members into the excitement. Our inreach, outreach, and other SA activities increased dramatically, including more frequent events with speakers and more involvement with peer tutoring when one person felt empowered to create and responsible for their success. Current officer positions include two CoPresidents, Vice President, VP of Speakers, VP of Publicity, VP of Tutoring, Treasurer, Secretary, and Historian.

Dinner With Faculty Members (7 Students, 1 Professor)

We appreciate the importance of student-faculty interactions in drawing students to the Chemistry Department and building potential mentorship relationships. The SA chapter facilitates these interactions by taking our local faculty speakers to dinner after the meeting where his or her talk was the featured event.

Speakers

Dr. Bill Zoller: "Chernobyl: A Visit to the Reactor, Its Impact" (10 Students, 15 Faculty)

Dr. Bill Zoller (Department of Chemistry, University of Washington, Seattle) presented us with an informative, albeit alarming, lecture detailing his trips to

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Chernobyl. He also shared his thoughts as the first American chemist to examine the disaster. This speaker was arranged with considerable help from our faculty advisor, Dr. Neil Marsh (Department of Chemistry, UM) and Dr. Liz Hugel (BASF), current chair of our regional (Huron Valley) chapter of ACS.

Dr. Adon Gordus: "Detective Chemistry" - (15 Students)
Dr. Adon Gordus (http://www.umich.edu/~michchem/faculty/gordus), an analytical chemist at UM, discussed techniques to detect chemicals in everything from ancient artifacts to human hair. We learned that, through heavy metal content, scientists could differentiate between real and falsified Roman coins, paints, and tools. One of the other projects Dr. Gordus discussed hit us personally—the group was amazed to hear that in a study of our peers those eating meat in the dorms had a higher mercury content in their hair.

Dr. Charles Yocum: "The Biology/Chemistry Interface" (15 Students)
Because many undergraduate students share interests in chemistry and biology, Dr. Charles Yocum (http://www.umich.edu/~michchem/faculty/yocum) hosted a discussion of the biology/chemistry interface speaking from his unique perspective as a UM educator with a joint appointment shared between the biology and chemistry departments. This thought-provoking forum emphasized the importance of integrating science education in an increasingly compartmentalized world. The spirit of the talk was also reflected in the diversity of the audience, which contained a number of students from the pre-medical program and other areas of the university.

Dr. Helen Free: "Chemistry and Public Perception" (20 Students, 7 Faculty)
Our highlight speaker of the year was Dr. Helen Free, who was President of the ACS in 1993–1994. Her talk (Figure 2) on public outreach and community involvement drew several graduate students and faculty in addition to UM students. Dr. Free energized our group to take on the world! Dr. Hugel was once again invaluable in helping to arrange this event (pictures can be found on our web page under the "Events" section).

Student-Mentor Relationship With Faculty
Dr. Brian P. Coppola (http://www.umich.edu/~michchem/faculty/coppola), a dedicated faculty mentor, provided the Student Affiliates with an extraordinary opportunity: the chance to get to know faculty from UM and other universities, including Nobel

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FIGURE 2. PHOTOS TAKEN AT DR. HELEN FREE'S PRESENTATION.

Laureate Roald Hoffmann. Through his direction, several of our members participated in "Day 2-to-40: A Conference on Chemical Education". (Proceedings are forthcoming as a special issue of *The Chemical Educator*.) In the future we hope to work closely with more of the UM Chemistry faculty.

Program Outline: Inter-SA/Community Chemical Bonds

One of our greatest achievements has been getting our members caught up in a spirit of fun and creativity that we translate to the public. Dr. Helen Free's speech helped us solidify our ideas about community outreach. After her talk on changing public perceptions of science, we felt that we had another mission: we must express our love of chemistry in a way that nonscientists can feel. Her speech helped crystallize our ideas about our new outreach/inreach program, "There's Chemistry Between Us."

National Chemistry Week

The National Chemistry Week (NCW) activities (Figure 3) we organized gave our group momentum for the year. This first step in "There's Chemistry Between Us" targets UM students and staff. For last year's NCW we drew attention by performing liquid nitrogen demonstrations (always a crowd pleaser), stirring up some polyvinyl alcohol (PVA) slime, creating oscillating color change reactions with the school colors, and lighting up a pickle with 120 V of electricity. Examples of our liquid nitrogen experiments are: freezing racquet balls and then imploding them by throwing them onto the floor, smashing flowers and balloons, building a pressure-powered liquid nitrogen fountain with a partially closed test tube, and mixing a batch of vanilla ice cream. One particularly successful demonstration was a twist on a traditional campfire activity: liquid nitrogen frozen marshmallows. Student Affiliates submerged

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FIGURE 3. PHOTO'S TAKEN AT THE NATION CHEMISTRY WEEK ACTIVITIES.

marshmallows on plastic forks in liquid nitrogen until the marshmallows had frozen, removed them until all the liquid had evaporated, and then bit the crunchy treats, making sure they exhaled while biting so that their breath condensed impressively. Thirty or so marshmallows were given to audience members in order to get them involved. Because we did all this in the central atrium of the chemistry building outside the largest lecture hall on campus, hundreds of students passed by our tables as they moved between classes. Next year, we plan to do some of the demonstrations outside on the "Diag" (the park located in the center of campus). People especially remember the NCW demos, and they comment to SA members about how they loved these flashy examples of chemistry (pictures can be found on our web page under the "Events" section).

Outreaches

Members also took the show on the road. Armed with pH paper, universal indicator, liquid nitrogen, and the makings for PVA slime, we visited two classrooms of local eighth graders and wowed them with an hour's worth of interactive chemistry. Activities included "Acidic or Basic? You Tell Me;" "Liquid Nitrogen;" and "Slime, an Introduction to Polymers." In the "Acidic or Basic" activity students were paired and given one household solution from a list of sodas, milk, cleaners, and juices. They learned how to test the acidity or basicity of their solution with pH paper. In order to reinforce the new ideas, the pairs of students informed their peers of the result of their experiments and, more importantly, explained how they came to that conclusion. The Student Affiliates stressed real-world applications of pH testing in medicine, industry, chemistry, and biology.

For the "Liquid Nitrogen" activity students submerged their own marshmallows and the Student Affiliate members smashed flowers.

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FIGURE 4. PHOTOS TAKEN AT INREACH ACTIVITIES.

During the “Slime” presentation, the students were shown plastic bags, forks, jars, and packaging peanuts—once again the effort was to show them that science is all around them. Then they mixed and colored their own PVA polymer.

Inreaches

We involve as many ACS SA members as possible in these community programs, yet success often depends on an individual who spearheads the activity with a particular vision for the program. A first-year student who joined ACS because of her positive experience during National Chemistry Week designed and coordinated one of this year’s biggest success stories: the “inreach” (Figure 4).

The SAs worked jointly with the UM Society of Physics Students to bring twenty sixth-graders to campus on a Saturday morning, so they could explore interactive science stations we had designed (24ac1897.pdf). The students split into groups of three and rotated through all seven stations throughout the morning and afternoon. At each bench the students were immersed in a hands-on science miniexperiment under the guidance of the two or three station leaders. At one location they used spectroscopes and gas discharge tubes to learn about different elements that can be

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found in lights. Then, they toured the chemistry building with spectroscopes in hand, observing the different types of lights and making predictions about their composition.

As is evident from the setup for this inreach, “There's Chemistry Between Us” has some specific goals involving the younger students:

- to inspire curiosity, wonder, and questions in a hand-on science environment.
- to show by example that students can attend college and succeed in science—the simple act of identifying and familiarizing younger students with “the college campus” and its buildings has a large impact. In addition it is clear that we are *not* faculty and rather students ourselves, closer in age and (probably) easier to identify with.
- to eliminate chemistry and science phobias by showing students that science is a tangible part of their everyday world.
- to develop SA members’ ties to the community by improving science’s public image and by building teamwork and teaching skills.

We met these goals head-on, and the feedback we have received indicates that area teachers would like to see more from our Student Affiliate Chapter. One teacher wrote:

> ... my 6th grade students came back very excited about all of their activities they participated in on Sat. Feb. 22, 1997. I was most impressed because they could draw out on the chalkboard the reasoning behind each experiment they did. The “trickle down” concept really worked as they became the teacher for the day and passed on their knowledge to their fellow students that couldn't go to Ann Arbor.
>
> I was also pleased that my not so "top" students seemed to excel in this environment. The UM students' enthusiasm helped I'm sure. They made it a valuable learning experience for all. Thanks so much.

A Community Resource Advisor mentioned how pleased he was that his students could see females successfully pursuing careers in the sciences and energetically holding Student Affiliate officer positions.

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Part of our program is to ask for feedback from the students as well, because it is their interest in science that we are attempting to increase. When asked what they liked best we received these responses:

> "I liked the nice college kids, the cool experiments, and that we got to take things home like goo, holograms, and pictures."
>
> "... the people who helped us."
>
> "I loved this trip and I loved how everyone was excited (including the college students)"
>
> "[The trip] helped me to understand things that I didn't understand."
>
> "The slime"
>
> "The separation of light"
>
> "I liked the chemistry"
>
> "We got to keep part of experiments and bring them home."

Our future ideas include initiating a program where high-school Advanced Placement Chemistry students spend an afternoon in one of the research laboratories of the chemistry building with SA members, and also expanding the outreach/inreach programs to work with other campus science groups like the Students of Biology.

Finally, we are keenly aware that we will graduate (sooner or later) and we want to create a structure that will survive us. Through Intra-SA bonds and Inter-SA/community bonds (especially high school outreach), we not only take the hands of our immediate successors, but imbue non-scientists with an appreciation of the field. Our Student Affiliate structure is such that our effects on our peers and on our community will continue to push outward after we have graduated.

Concluding Remarks

In the space of one year our group has reinvented the basic elements that draw in members and keep them involved. This has given us the stability to expand and include other UM student groups and a broader community. This resurrection of our SA chapter was possible because the leaders stayed close to our themes: "building bonds among students and within the community" and "having fun while learning

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chemistry.” We not only inspired our membership, but gained enough momentum to carry our love of chemistry to Ann Arbor and beyond.

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