1 / VOL. 1, NO. 1
THE CHEMICAL EDUCATOR

ISSN 1430-4171
http://journals.springer-ny.com/chedr
10.1007/s00897960016a

Of Special Interest

Outstanding Student Affiliate Chapters Generate a Special Chemistry and Enhance Chemical Literacy

S. K. AIREE*, **RICHARD H. BLACK III** and **CHABLIS P. PATRICK**
The University of Tennessee at Martin
Martin, TN 38238, USA

Much literal chemistry is learned and by working on them as a group a special camaraderie results.

The chapter of the student affiliates of the American Chemical Society at the University of Tennessee at Martin has won three commendable and eighteen consecutive outstanding ratings, the most consecutive ratings of any student affiliate chapter, from the Society Committee on Education of the American Chemical Society. The activities of the chapter involve a great deal of pedagogic or “literal” chemistry, that is the members learn and communicate several aspects of chemistry from the chapter programs. In addition, a “special” chemistry or camaraderie results when members prepare for and participate in the various club projects and activities. This article briefly describes specific activities of UTM student affiliates that help to develop both the literal and the special chemistry among members. Finally, The High School Science Bowl, which is a most electrifying and rejuvenating activity, is described in greater detail for the information of other chemistry clubs.

ISSN 1430-4171
http://journals.springer-ny.com/chedr
S 1430-4171 (96) 01016-3

Introduction

The reason for the continuing success of the student affiliates of the American Chemical Society at the University of Tennessee at Martin is the two types of chemistry, a “literal” or pedagogic chemistry and a “special” chemistry or camaraderie, that evolve in chapter members as they get involved in our many activities. These activities include participating in ongoing outreach programs, working on professional projects, applying for Innovative Activity Grants (IAGs), conducting Community Interaction–Student Affiliate (CISA) projects, and acting as student mentors in the Student Mentor Interface Project (SMIP).

Our recent Student Mentor Interface Project clearly demonstrates the blending of literal and special chemistry among club members. It was awarded for organizing an undergraduate program at the Joint Regional Southeast–Southwest ACS meeting in Memphis. This program consisted of a College Chemistry Bowl, Chemagic demonstrations, a career seminar, poster sessions, and a social. These activities range from purely literal chemistry (the career seminar and poster sessions) to purely special chemistry (the social). In addition to this Student Mentor Interface Project award, the chapter has won sixteen Innovative Activity Grants for projects such as holding chemistry help sessions, acting as docents for museum science exhibits, and conducting a chemistry cooperative education survey. Additional Innovative Activity Grant projects are included in Table 1. Also, members can participate in several Community Interaction-Student Affiliate projects. These projects are targeted for the underserved and minorities and include activities such as the Chemistry for Kid College and Science Fair Clinics.

“Literal” and “Special” Chemistry

A good deal of time is required to organize a chemistry merit badge clinic for Boy Scouts, a science bowl for high schools, or a chemistry bowl for college students. It is during these times that the camaraderie, the special chemistry, develops among the organizers. They must act as a responsible and cohesive team to successfully implement these projects. On the other hand, questions asked of contestants at the bowls, performing and describing chemical demonstrations for visitors, and conducting clinics and help sessions assist members to acquire a better understanding of the subject matter; thus, the literal chemistry is developed.

When the club members sponsor Science Fair Clinics and exhibit the outstanding projects, they are able to see how a variety of research projects are conducted. Chemistry help

ISSN 1430-4171
http://journals.springer-ny.com/chedr
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sessions allow affiliates to work with underclassmen. Participation in Area Collegiate Chemistry Meetings provides an opportunity to present research, to network with peers and advisors from other colleges, and to hear and visit with distinguished scientists. In the last three years, an average of five UTM student affiliates attended each of the National ACS Meetings and presented research and activity posters. This is an unparalleled experience for students from a small campus in a small town with no graduate program, and it provides an opportunity to develop both knowledge and camaraderie.

The chapter arranges at least one plant tour every year. Members learn how companies move from bench top to pilot (or microscale) production, then to full (macroscale) production. They observe quality checks and materials testing being performed. The students see first hand how the real wheels of the chemical industry turn, and at the same time they experience the camaraderie of a the group visit.

The Education Division of the American Chemical Society annually solicits applications from student affiliate chapters for small grants to attempt innovative projects. These are the Innovative Activity Grants that we referred to above. The rules require that the innovative activities be projects that have hitherto not been undertaken. These projects focus on current topics and require submission of midterm and final reports. The UTM student affiliates have completed sixteen of these projects. It is a fun challenge to design, complete, and report on these projects. Much literal chemistry is learned and by working on them as a group a special camaraderie results. Additionally, the publicity associated with winning an Innovative Activity Grant award generates pride and confidence in the chapter.

Finally, the chapter succeeds because it adheres to the following rule for success. Plan activities, commit to them, complete them, and publicize them. The chapter publishes a newsletter, The Condenser, twice a year. So far, forty-four issues have been produced. Several of the student affiliates assume production responsibility. Copies of this newsletter and the chapter's annual reports are preserved in the university library archives. Later issues of The Condenser contain snapshots, news clippings, descriptions of recent and forthcoming activities, individual member news, the treasurer's report, and a participation roster.

Table 1 lists the varied activities in which the UTM Chapter has been involved.

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TABLE 1. UTM SAACS Chapter Activities

Years	IAG or Outreach Projects	Comments
Initiated 1978	Area Collegiate Chemistry Meetings	Students present research papers. Keynote speakers have included nine ACS presidents and two *Journal of Chemical Education editors* [1].
Initiated 1979	High school Science Bowls	Approximately 25–35 high schools attend each year [2]. The rules for this project are included as <Supporting Material>
Initiated 1979–80	Chemistry Help Session	Ten Help Sessions the first year, then 2–3 each year. Average attendance 40.
Initiated 1981–82	BSA Chemistry Merit Badge Clinics (initially an IAG project)	Three clinics first year, then one each year. More than 500 scouts from 15 troops have attended. Latest clinic (Feb. 24) attracted 55 scouts from 12 troops [3].
1982–83	Energy from Bio-gas (IAG)	Presentations, laboratory research, and tours of facilities where bio-gas was prepared and used. A resource booklet was prepared.
1983–84	Effect of Vitamins C & E on Glucose Determinations (IAG)	In vitro studies and an in vivo study-survey (using student affiliate volunteers) were conducted [4].
1984–85	Cooperative Education Survey and Exhibit (IAG)	Alumni & employers surveyed. The results along with other resource material were exhibited at the university museum.
Initiated 1985–86	Docents for Museum Science Projects	Served as volunteers for the science exhibits at the university museum. Sponsored the regional winners' Science Fair projects at the museum.
Initiated 1986	Outstanding Science Fair Projects Exhibit	Sponsor an extended display of the winning projects from the Regional Science Fair. Each winner gets a plaque and a $50 bond. A Summaries Booklet is prepared each year.

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TABLE 1. Continued.

Years	IAG or Outreach Projects	Comments
1986–87	Chemical Aspects of Paper and Film Preservation	Literature survey and demonstration presented at the Area Collegiate Chemistry Meeting. A resource booklet was prepared.
1987–88	Study of Indoor Pollutants Radon, Asbestos and HCHO	Conducted experimental surveys, gave presentations, and reported the results at the Area Collegiate Chemistry Meeting.
1988–89	Polymers: Chemistry, Ecology and Economics	Demonstrations presented and a display prepared.
1989–90	An Outreach of the ACS Project: Doing Chemistry	Presented programs using a Macintosh with video-disc player at an ACS local section meeting and at a workshop [5].
1990–91	A Focus on Lipids: LDL, HDL and Cholesterol	Several presentations were sponsored and a set of resource literature was compiled.
1991–92	Radionuclides in Medicine and Research	Sponsored two presentations, a tour, and a museum exhibit. Two displays of the Chart of the Nuclides were framed and affiliates participated in a training course at Oak Ridge.
1992–93	Chemistry and Forensic Science	Sponsored two lectures and a crime lab tour. Administered crime lab component of the Science Olympiad. A resource booklet was prepared.
1993–94	Chemistry with Impregnated Silica Beads	Laboratory work performed and results used for presentations at the Tennessee Academy of Science, ACS Student Affiliate meetings, and Boy Scout clinics
1994	Outreach: Focus on the Underserved (CISA)	Community Interaction-Student Affiliates grant from ACS. Involve minorities in chemistry through such activities as Kid College, Science Fair "Nuts-and-Bolts" Clinic, etc.

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TABLE 1. Continued.

Years	IAG or Outreach Projects	Comments
1994–95	Photochemistry of Riboflavin (B-2): Does Milk in Yellow Cartons have more B-2 Vitamin? (IAG)	Several milk samples received from the public and bought from stores were tested under various conditions. A report was presented at the 18th Annual Area Collegiate Chemistry Meeting.
1994–95	Outreach: Science Fair Clinic and "Kid College" (CISA)	As part this CISA project, Student Affiliates presented a Chemagic show for third graders, conducted a "Nuts-and-Bolts" Clinic for prospective Science Fair Participants, and presented a two-week Summer "Kid College" for junior-high students.
1995	Organizing the Undergraduate Program at the Joint Regional SE-SW ACS meeting (SMIP)	Organized the first-ever College Chemistry Bowl in conjunction with an ACS meeting; also, organized a demonstration program, poster session, social, and career seminar.
1995–96	A Focus on the Oxides of Nitrogen: Pollutant, Neurotransmitter and/or a Pedagogic Resource	Demonstrations, speakers, and research. There will be a presentation at an Undergraduate Research meeting, a resource booklet, and publicity about the NO Web pages.

Conclusion

We like to describe a successful student affiliate chapter as quantum mechanics does a wave function. The successful chapter makes waves and that gives it a sizable impact on campus. Waves, however, have peaks and valleys. The job of the advisor is to assure that the wave function remains continuous and that the amplitude does not get too large. We must ensure that the chapter members realize that they are students first, and that their studies must not suffer during the activity peaks. Still, the club needs enough momentum to move from a lull in activity to the top of the peak again. The club must be as the square of the wave function, always positive. It is gratifying for the current advisor to have

ISSN 1430-4171
http://journals.springer-ny.com/chedr
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FIGURE 1.

chartered this successful chapter and to have worked as its advisor for twenty-three years of his thirty-year teaching career. He believes emphatically that both the literal chemistry and the special chemistry gained from ACS student affiliate activities are important to a well-rounded education.

We have included two collages of selected photographs (Figure 1 and Figure 2). They are taken from the chapter newsletter and contain images from chapter activities during the Fall semester. Four pictures are from the student mentoring activity at the regional ACS meeting in Memphis, three are scenes from the High School Science Bowl, three show the UTM SAACS with visitors and speakers on campus, two are from the Chicago ACS national meeting, two are from the ACS local section meeting, one shows the IAG project demonstration of the effect of temperature on nitrogen dioxide and dinitrogen tetraoxide equilibrium, one is from a plant tour, and another shows some student affiliates with our display at Seniors Day for high school students.

The High School Science Bowl

The rules for the High School Science Bowl are available in the <Supporting Material>. Details concerning the operation of the bowl are given below.

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S 1430-4171 (96) 01016-3

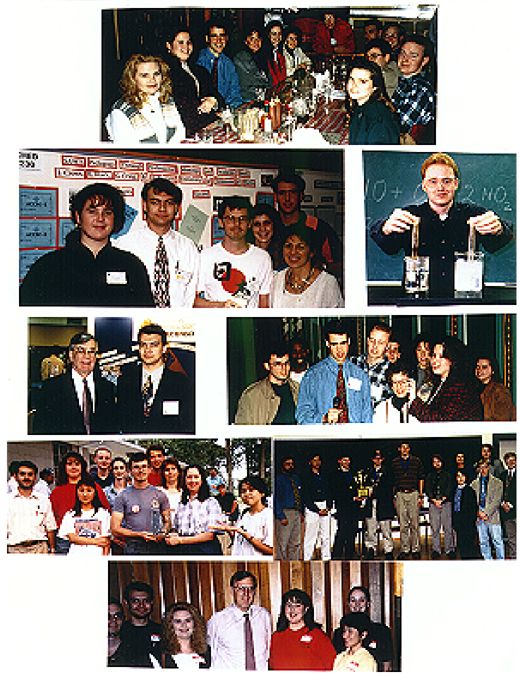

FIGURE 2.

The faculty advisor obtains questions from colleagues for the written test and bowl games, and the student affiliates do everything else. This is an extremely labor intensive and responsible assignment for students.

To ensure smooth operation of the computer grading of the written test, we use #2 pencils to mark the answer sheets. Nine digit ID numbers code the year and the school for each student. These are placed on the form in lieu of social security numbers.

Two to three rehearsals are held prior to the day of the bowl. Students supervise the administration of the written test, walk the answer packets to the computer center, make a listing of the top grades and eight bowl teams. While the tests are being graded, a demonstration program is presented for half of the visitors, while the other half get photos made for hometown papers and school media. Then the demonstration and photo session groups are reversed. Several students are involved in preparing and presenting the demonstrations. They take turns appearing in the photograph with their alma-mater schools.

In the afternoon, the bowl games take place. Student affiliates serve as masters of ceremonies, time-keepers, score-keepers and master-of-ceremonies helpers. The question

ISSN 1430-4171
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being read by the master of ceremonies is projected on an overhead by another student to avoid any complaints about pronunciation or clarity. The initial four games are played in two different rooms to save time. There are three teams of student officials. They are composed of a master of ceremonies, a time-keeper, a score-keeper, a master-of-ceremonies helper, and a projectionist.

Quick Pro Deluxe Indicator & Lockout System boards are used for the bowl games. These were bought from Specialty Design Corporation, 713 North 19th Street, Bessemer, Alabama 35020.

The champion and runner-up teams are presented trophies. All members of the top four teams receive gold, silver or bronze medallions. The student with the top score from each school and the top ten overall scores are awarded calculators for prizes. Merit certificates are given to the top 10coordinators sign these certificates.

The event requires a great deal of coordination. In the morning, as it begins, there are about three hundred high-school students and their teachers. They tolerate no mistakes as the competition is intense. By the evening the winners have been decided. This event requires a large number of student affiliates. They work hard, assume a great deal of responsibility, learn a lot, and still have a great deal of fun.

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HIGH SCHOOL SCIENCE BOWL RULES

WRITTEN TEST

(1) A school may enter as many students as it wishes.

(2) The written test contains 25 objective questions from each of three categories: Biology, Chemistry, and General Science. Each school is provided the test scores, an analysis, and certificates for their students.

(3) The selection of the eight schools for the afternoon bowl based on a comparison of the average total score of the *two* highest scoring students from each school.

BOWL

(1) Each of the eight selected schools chooses a team of two to four students.

(2) The teams compete in pairs matched at random by draw.

(3) Each team designates one student as team captain.

(4) Each game is of twenty-minute duration, excluding any conferences with the judges, and contains as many segments as can be played in the time limit.

(5) A segment is composed of one "toss-up" question and a "category" question. The first team to answer the toss-up question receives points for that question and gains the right to choose a bonus question from one of the categories: Chemistry, Biology, or Physics. Toss-up questions are from Biology or Chemistry.

(6) If the first team answers the toss-up question incorrectly, the other team has an opportunity to answer the same question. If the other team cannot answer the question correctly either, then the question is discarded and a new toss-up question is read.

(7) Toss-up questions are worth five points. Team members *cannot* confer on these questions. Toss-up questions are read twice. As soon as the master of ceremonies has read the question the second time, the timekeeper begins the clock and a team has 15 seconds in which to buzz and fifteen more seconds after their buzzer to begin

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ISSN 1430-4171
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answering the question. If they do not answer within this time limit, time is called and the other team has an opportunity to answer the same question. The master of ceremonies asks if the other team wishes to hear the question read again. If they say “No”, timing begins at the word “No”. If they do wish to hear the question read again, the master of ceremonies does so and the timing begins as soon as the question has been read.

(8) CATEGORY questions are worth ten points. Team members *may confer* on these questions, but the captain of each team must give the final answer. A team has thirty seconds in which to answer. After the question has been read the second time, the timekeeper starts the clock. At the end of the time limit, if the team has not answered the question, time is called, the question will be discarded, and no points will be awarded for that question. If the team answers this question incorrectly, the other team *is not* given an opportunity to answer the question. If a category question has more than one part, the team must answer *all parts* correctly in order to receive the points.