

MACTLAC

MIDWESTERN ASSOCIATION OF CHEMISTRY TEACHERS IN LIBERAL ARTS COLLEGES



2009 Annual Meeting Report
The 57th Meeting of MACTLAC
Integration of Research Into Teaching: Improving Learning Through Research
Hope College, Holland, MI
October 16-17, 2009

General Session 1, Friday Afternoon, 1:00 PM

Dr. Michael Seymour opened the 2009 Annual Meeting by welcoming the 98 MACTLAC participants to Hope College. After a few opening remarks and announcements, Dr. Seymour then introduced Dr. Jim Boelkins, Hope College Provost, who then welcomed everyone and described a bit of the role that science plays at the College. After Dr. Boelkins' comments, Dr. Seymour introduced the speaker for the first plenary session, Dr. Lorna Hernandez-Jarvis. After the plenary address, Indiana and Michigan participants met to elect new state representatives.

Plenary Address

How to CURE Apathy to Science: The Impact of Research Experiences in the Classroom

Dr. Lorna Hernandez-Jarvis
Department of Psychology, Hope College
Holland, MI

Dr. Hernandez-Jarvis described the results of an on-going four year research project designed to implement and assess the learning benefits of classroom undergraduate research research experiences (CURE). Dr. Hernandez-Jarvis began by discussing the project's research method, its implementation, and its piloting. After collecting and reviewing the data from over 800 students across several peer institutions, Dr. Hernandez-Jarvis described the project's results, which showed student learning gains in course elements and course benefits, as well as student attitudes towards science and their learning styles. Dr. Hernandez-Jarvis then discussed how the project is now being expanded to include new courses and to create a community of scholars and mentors, as well as some of the problems and their solutions discovered during the project's pilot and review of its initial data.

General Session 2, Friday Evening, 8:00 PM

Plenary Address

A Stimulus Package for Understanding and Retention

Dr. Nancy Konigsberg Kerner

Department of Chemistry, University of Michigan

Ann Arbor, MI

Dr. Kerner described a solution applied at the University of Michigan to the problem of low student science major understanding and retention. The solution described by Dr. Kerner involves the use of real world science applications in an inquiry-based learning classroom setting, integrated with good learner feedback. Dr. Kerner discussed what makes for good inquiry-based learning: explore a problem (collect data), invent (organize and analyze the data), and apply (apply results to new problems). Dr. Kerner then described how inquiry-based learning that incorporated a real world science application in the University of Michigan's general chemistry course increased chemistry student retention. Dr. Kerner concluded her presentation by describing how good course instructor training is required for this model to work.

General Session 3, Saturday Morning, 8:30 AM

Plenary Address

*The Center for Authentic Science Practice in Education:
an Undergraduate Research Collaborative in Chemistry*

Dr. Donald Wink

Department of Chemistry, University of Illinois at Chicago

Chicago, IL

Dr. Wink described CASPiE (the Center of Authentic Science Practice in Education), which is a collaborative group of colleges and universities, whose goal is to introduce authentic research experiences into freshman and sophomore course labs in order to increase student retention in the sciences. Dr. Wink began by discussing the typical structure of a CASPiE designed module: student reading, student design and execution of experiments to answer a question that comes from the reading, and student presentation of their conclusions. Each module is designed to last between five and seven weeks and requires peer-led team learning, but can be done by first and second year students under typical lab constraints. Dr. Wink then described several example modules, and their evaluation. Dr. Wink concluded his presentation by describing the CASPiE web site, which can be found at www.caspie.org, as well as future Center for Workshops in the Chemical Sciences (CWCS) workshops. CWCS workshop information can be found on-line at chemistry.gsu.edu/CWCS.

MACTLAC Business Meeting

1. President Michael Ross called the meeting to order at 9:36 AM. He remarked on the networking advantages of MACTLAC meetings. He complimented Michael Seymour his organization of the Hope meeting.

2. Secretary-Treasurer's Mark Sinton presented the 2008 Treasurer's Report, noting the general downward trend of the Association's finances. A motion was made and seconded to accept the report as presented. The motion passed.

Year	2006	2007	2008
Beginning Assets			
Checking	\$7,091.60	\$5,992.71	\$5,416.19
Savings	\$0.00	\$0.00	\$0.00
Total Beginning Assets	\$7,091.60	\$5,992.71	\$5,416.19
Income			
Dues	\$919.00	\$482.00	\$370.00
Annual Meeting	\$3,555.00	\$3,397.00	\$3,075.00
Interest	\$46.88	\$146.04	\$1.79
Total Income	\$4,520.88	\$4,025.04	\$3,446.79
Expenses			
Postage, copying, website	\$135.80	\$321.98	\$51.70
Annual Meeting	\$4,423.19	\$4,261.34	\$4,358.20
Placement, Archives	\$1,060.78	\$18.24	\$0.00
Total Expenses	\$5,619.77	\$4,601.56	\$4,409.90
Ending Assets	\$5,992.71	\$5,416.19	\$4,453.08
Assets Change	-\$1,098.89	-\$576.52	-\$963.11

3. Mark Sinton presented the Archivist's Report for Tracy Thompson, who was unable to attend due to illness. A motion was made and seconded to accept the report as presented. The motion passed. Mark noted that Tracy would like to be replaced as Archivist, and asked that if anyone was interested in the position, to contact him or another Executive Council member. Until the Association finds a new permanent Archivist, John Zimmerman has agreed to serve as interim Archivist for 2 years.

No additional work has been completed in the preservation of archive material this year. The balance on the \$1000 archive fund started in Fall 2005, account # 1151501023970, remains the same as last year at \$375.87. John Zimmerman has put together photos from the 2008 meeting. The approximate cost of this is \$25 dollars. He will inform you of the exact cost at the 2009 meeting.

4. Placement Officer Larry Ferren presented the Placement Officer's report. A motion to accept the report as presented as made. The motion was seconded and passed. He also described the mission of the placement: getting people wanting positions in MACTLAC schools in jobs at MACTLAC schools.

In 2009, 11 applicants used the Placement Service, and 25 positions were listed with the Placement Service. Of all the positions advertised, all 25 were MACTLAC Colleges. All the positions advertised were either located by way of advertisements placed with the Placement Service, C & E News, the Internet, or electronic notices forwarded to me by various sources. The 25 MACTLAC positions were advertised only to those who had e-mail capabilities. Of the 25 MACTLAC positions listed, 10.3% were Inorganic Chemistry, 41.4% were Organic Chemistry, 13.8% were Analytical Chemistry, 13.8% were Physical Chemistry, and 20.7 % were Biochemistry.

All MACTLAC schools with positions open had their advertisements forwarded to Craig Bieler who placed them on the MACTLAC web page. I do not know how many people accessed the employment information by referring to the MACTLAC web page on the Internet, but the MACTLAC website has had 990 visitors in the last 11 months.

Applicants were of several groups -- graduate students, new Ph.D.'s, post-doctorates, and visiting professors, but the largest group would be graduate students. This past year **four** new candidates came into the Placement Service, and **five** candidates had their names removed from the service. I am aware of one candidate and possibly more than one that was removed from the list that secured positions in MACTLAC schools. Presently, (October 2, 2009) **six** candidates are in the Placement Service looking for employment.

This year no schools requested resumes or information related to qualified candidates from the Placement service. Electronic mail was sent to the e-mail candidates as positions were found.

I really need to contact some of the graduate schools this coming year through their placement offices to let them know that MACTLAC Placement service exists and that it can put those who are interested in teaching at Liberal Arts Colleges in touch with positions that are available in the five state area.

5. President Michael Ross presented John and Betty Moore with certificates designating their status as Honorary members. All members present thanked John and Betty for all of their work with MACTLAC throughout the years. The President then presented Ron Amel with a certificate designating his status as an Emeritus member. Michael Ross also mentioned the names of four other members receiving Emeritus status not attendance at Hope College: Peter Hansen, Stephen Taylor, James Vogel, and Warren Zemke.
6. President Michael Ross described a proposal from the Executive Council to the membership to increase the Association's dues and registration fees in order to reverse the downward trend of the Association's finances. The proposal from the Executive Council would raise the annual dues from \$2 per year to \$5 per year, raise the annual meeting registration fee from \$15 to \$25 for members, and from \$25 to \$30 for nonmembers. The late registration meeting fee would also increase from \$25 to \$30. Fees for Honorary members, Emeritus members, and graduate students would remain unchanged. A brief discussion ensued concerning whether the dues and fee increases would cover the decrease in the Association's assets. A motion was made and seconded to accept the dues and fee increases outlined above. The motion passed.
7. Michael Ross introduced the new State Representatives for Indiana and Michigan: Kent Renkema will continue as the Indiana State Representative, and Michael Seymour will be the new Michigan State Representative.
8. President Michael Ross opened the floor for nomination for 2010 President-Elect. Larry Ferren was nominated by Brian Johnson. There being no other nomination, Michael closed the nominations, and Larry was elected President-Elect by acclamation.
9. A motion to have the Secretary-Treasurer send letters of thanks to the following individuals and organizations was then made. The motion was seconded and passed.

Out going officers: President Michael Ross

Outgoing state representatives: Mark Nassbaum

Host organizer: Michael Seymour

Host institution: Hope College

10. Olga Rinco invited the Association to Luther College, Iowa, for the 2010 Annual Meeting. The theme for the 2010 meeting will be "Chemistry on the Fringe", and will focus on how extreme chemistry can be incorporated into our classrooms. Michael Seymour passed the MACTLAC meeting sign onto Olga. The President then mentioned possible future meeting sites: Alverno in 2011 (central), Albion in 2012 (east), and Westminster in 2013 (west).

11. John Moore, retiring editor of the Journal of Chemical Education presented free one-year subscriptions to all first year teachers in attendance.
12. President Michael Ross completed his duties as the Association's President by handing the meeting over to the President-Elect, Claude Mertzenich.
13. Claude Mertzenich began his duties as the Association's President by asking if there was any other business. Mark Sinton then made an announcement concerning journals that an Emeritus member wants to give away. Anyone interested should contact Mark for more information. Hope's lab manager briefly described NAOSMM: the National Association of Scientific Materials Managers. NAOSMM members receive a Sigma-Aldrich discount and a flat shopping rate for non-hazardous materials. Membership dues are \$50 per year. Other vendors also have discount contracts with NAOSMM as well. Brad Sturgeon announced that Richard Keift from Monmouth College passed away earlier this year.
14. There being no other business, the meeting adjourned at 10:12 AM.

Respectfully submitted
Mark Sinton
Secretary-Treasurer

Discussion Groups

ChemEd Digital Library

Friday, October 16, 2009

2:45-3:45 PM

John Moore, University of Wisconsin-Madison, Session Leader

John Moore began the session by going over the contents of the bag that the JCE handed out to participants: temporary JCE subscription, temporary JCE software, mouse pad, etc. John then reviewed various chemistry websites. He started with the NSDL website, focusing on the other pathways that may be of interest to the participants or colleagues of participants at their home institutions, specifically biology, physics, and math. John talked about the ChemCollective out of Carnegie Mellon, but did not do any demonstrations from this website. John also highlighted the ACS education resources, which contains mostly K-12 resources instead of college resources. These materials are good for doing outreach.

John asked Justin Shorb to talk about ChemPaths. Justin talked about the history of the ChemPaths and that John Moore's textbook is now available online as an older version. The textbook is on a wiki. ChemPaths is a gateway to the textbook, but keeps it more consistent since wiki's can change frequently. It also allows easy navigation through the textbook. He also highlighted the pilot studies that are taking place using this website. John Moore's class is using this textbook this semester, for instance. Justin also highlighted the interactive nature of the

textbook with videos, navigation, related pages, tutorial pages, transparency overlays, and Jmol (3D interactive molecules). John asked participants if they were interested in potentially contributing to ChemPRIME, the wiki version of the textbook that is using exemplars to teach chemistry concepts.

John introduced Nikki Burman to talk about her Stereochemistry tutorial. Nikki told participants how to find the tutorial, on the collections page of the ChemEd DL. She wanted to make a tutorial that would include vocabulary, etc., but also provide multiple examples in a non-linear fashion. The non-linear fashion makes it easy to get to the content you want. There are also 2D and 3D (Jmol) molecules to help students grasp the concepts of stereochemistry. The website allows students to choose which 2D visualization they use for the rest of the tutorial, which gives students the chance to individualize their learning.

John introduced Joanne Stewart who came to present IONiC/VIPeR. Joanne teaches at Hope, and IONiC is a partner of ChemEd DL. Members are all from small liberal arts colleges around the country that develop materials to teach general chemistry and ionic chemistry. They also want to test these materials in the classroom. VIPeR is a repository of learning objects, it is also a social networking site. She gave an overview of the website. The social networking allows for lots of interactivity in the development of learning objects.

John introduced Xavier Prat-Resina. Xavier talked about the ChemEd DL homepage. He guided participants to the Molecules 360. He talked about the 130 or so 3D-Jmol molecules that can be found there. All the data on these 130 are quite accurate and reliable, good for teaching. He highlighted some of the features of Molecules 360 from electrostatic maps, vibrations to symmetry elements. Linda suggested taking snap shots and using them in tests. You can also view the IR. A visual database allows you to compare molecules, allowing your students to see trends. Lynn Diener highlighted Moodle courses that participants can use to learn more about the ChemEd DL.

Linda Fanis talked about making courses using resources from the ChemEd DL, JCE software, etc. She discussed the JCE software, a little history and the nature of the programs. She also talked about how she used JCE software in her class.

New ACS Guidelines

Friday, October 16, 2009

2:45-3:45 PM

Will Polik, Hope College, Session Leader

Will Polik introduced the session and asked the individuals attending to introduce themselves. Will indicated that this session will focus on possible new degree tracks that the ACS guidelines make possible.

Will began by giving a brief presentation regarding the development of the guidelines during the period 2005-08. Will was the chair of the Committee on Professional Training (CPT) during much of this time. Activities of the CPT include surveys on chemical education, resource development, and administration of the approval program for undergraduate chemistry programs. Of the

approximately 13,000 bachelor degrees in chemistry, about 35% earn ACS-certified degrees. And of the nearly 650 approved programs, 337 are at bachelor-degree granting institutions. He also gave the rationale for the new guidelines, including the observations that chemistry is changing and education is changing, and hence the guidelines must change to maintain utility and relevance. There was a public comment period in 2005, proposed revisions for comment in 2006, draft guidelines for further public comment in 2007, and the new guidelines were released in 2008.

Will then presented an overview of the new guidelines. One new feature of these guidelines is the requirement for computational chemistry software. Also, the curriculum section now contains “foundation” and “in-depth” courses, and department-defined degree tracks replace ACS-defined option degrees. There is also a new emphasis on student skills and a call for the development of those skills to be assessed. This new emphasis stems from concerns expressed by industry during the revision process about the preparedness of chemistry graduates to function as successful professionals. Regular self-evaluation to improve effectiveness is also a new requirement.

The new guidelines are intended to create more flexibility for elective courses. After general chemistry (0, 1, or 2 semesters, depending on student preparedness), 5 foundation semester courses are required, to be followed by 4 in-depth semester courses. Thus counting general chemistry, the course requirement remains at 11 semester courses. The laboratory requirement is 400 lab hours after general chemistry.

The guidelines allow for degree tracks to be developed by individual departments. A degree tracks a cohesive set of courses in chemistry, a chemistry subdiscipline, or a chemistry related multi-disciplinary area. Faculty can develop degree tracks to target emerging areas, or to utilize faculty or local expertise, or to match the departmental mission and/or student interests.

Will presented several possibilities, such as “straight” chemistry, biochemistry, or synthesis. The chemistry track might be the same as the old guidelines for the ACS chemistry degree and include organic II, p-chem. II, instrumental analysis, and an advanced elective as the in-depth courses. The biochemistry track might contain biochemistry II, organic II, molecular biology, and an advanced elective for the in-depth courses. A synthesis track might include analytical, biochemistry, 2 semester of integrated synthesis, and p-chem as foundation courses, followed by 4 in-depth course that emphasize synthesis. Other possible tracks given as examples were materials, forensic chemistry, and art conservation.

Will’s presentation was followed by a Q&A period in which the following questions were asked: 1) Must the in-depth courses be taught by chemistry faculty? No. 2) Do integrated foundation courses have to have an equal balance of the subdisciplines? Not precisely equal, but adequate coverage of the 5 foundation areas needs to be documented. 3) Why isn’t biology a cognate requirement? Good question, and the answer is probably historic since biochemistry is a recent addition. Furthermore, the institution can make biology a cognate requirement if they wish. There was some variation within the group as to whether biology is required or not. 4) Can a molecular biologist be counted as the 4th chemistry faculty member? Maybe if that person is a part of the core group looking after the biochemistry degree track; the institution would have to make the case. Keep in mind that teaching

the required chemistry courses within the teaching contact load limit will require a minimum of 4 full-time faculty members devoted to teaching chemistry. 5) Can the second organic course count as an in-depth course? Yes, definitely.

There was some discussion on the gen chem situation at the institutions represented in the room. A recent survey of primarily liberal arts institutions across the country indicates that there is a trend toward requiring only one semester of general chem prior to organic I or some other foundation course, with the second semester being either optional or non-existent. This seems to be in response to the wide variation in preparedness of incoming chemistry students.

Current degree tracks at the attending institutions were also explored. Many have biochemistry majors that might be converted to degree tracks. One institution said that they were thinking about tracks in materials, forensics and environmental chemistry. Other tracks that seemed to be of potential interest by the group were: food chemistry, synthesis, medical chemistry, neurochemistry, and chemical education.

Safety, Chemical Hygiene, and More

Friday, October 16, 2009

2:45-3:45 PM

Harry Elston, Midwest Chemical Safety, LCC, Session Leader

Tod Gugino, Hope College, Session Leader

About a dozen people attended a session moderated by Harry Elston of Midwest Chemical Safety, LLC and Tod Gugino of Hope College. Harry gave a brief overview of current issues and then the discussion was opened up. Engaging questions and conversation on a number of topics ensued. A short list of the topics included: (1) A short summary of the recent death of researcher Sheri Sangji from UCLA and impact that will have on colleges and universities throughout the nation, (2) A summary of the new USEPA Subpart K hazardous waste regulation. Dr. Elston then opened the floor up in a session called, "Ask Dr. Safety" where free-form safety questions were asked and answered.

Interactions Between 2 and 4-Year Programs

Friday, October 16, 2009

2:45-3:45 PM

Tom Higgins, Harold Washington College, Session Leader

Jason Gillmore, Hope College, Session Leader

Introducing and Implementation of the new ACS Guidelines for Chemistry in 2-Year College Programs was discussed. 2-Year College guidelines are just guidelines and not a means for certification of a program like is the case with 4-year programs. ACS is considering making guidelines a certification for 2-Year colleges:

- Reasons for this include large increase in enrollment at 2-year schools
- Increase in underrepresented minority enrollment

Also:

- A student from a 2-year college with an associate's degree to a 4-year college is at least as likely or more likely to graduate than a incoming freshman
- Swirling is also becoming important-students bouncing back and forth between institutions to take college classes-between 2-year and 4-year colleges
- Students on academic probation can be told to finish what they can at a 2-year college before returning to the 4-year college

Science and engineering graduates: 44% take at least one class towards their degree at a 2-year colleges service the following populations: 51% of Hispanic students S&E graduates, 45% of American Indian/Alaskan Natives S&E graduates, and 44% of black S&E graduates.

ACS Guidelines for 2-year Colleges have been in place since 1970:

- New Guidelines reflect changes in pedagogy, technology, accountability
- CPT made 2-year guidelines mirror 4-year college guidelines
- Include sections on transfer students, undergraduate research, student skills, etc.

How can the ACS promote the use of the 2YC Guidelines by 4YC's?

- Daniel Smith said the 4YC guidelines are not helpful because they only have 2 FTE in chemistry
- Issue with transfer students to Hope have been issues of transferring math and physics not necessarily due to chemistry
- Trouble with students transferring in is advising and becoming familiar with faculty for letter writing
- Interactions between Harold Washington and Hope are a little easier because the relationship is already in place and lends support to students transferring to Hope College
- Hope has had ~3-4 students graduate due to relationship

Harold Washington students work better with student faculty relationships instead of student graduate student relationships for college.

ACS exams have shown chemistry content understanding with research experiences
Harold Washington/Hope Program:

- Academic year program fall and spring semesters, 8-12 hrs. per week paid
 - students enroll in research courses
- Summer Program: 8-10 week, full time, stipend, travel and housing paid
- Students have greater learning gains if participate in the program and more than those who don't

-students want to become professional scientists instead of other options after doing research summer of research

2-YC students have diverse conflicts for where they can work and why they can leave their area:

-Students have large amount of reasons for why they can't leave the area of the college and are sometimes fearful to leave where their 2YC is

Working Weekends Between URC and Hope:

- 1) Peer community meetings are at the community colleges and 4YC faculty visit and talk to 2YC students
- 2) Students interested in doing summer research at 4YC get to travel to 4YC for an overnight to see what is at the 4YC to get over fear of leaving home to make transition to 4YC
- 3) Students do research at the 4YC for the summer
 - financing for summer research comes from many places

Collaboration works because many of the faculty from both 2YC and 4YC buy into program: 116 (161%) Participants, 105 (91%) finished academic year research, 63 did summer research, and 41 transferred to 4YC programs: 19 STEM, 7 health science, 1 film, and 14 unknown. Plans to attend Grad School: Pre-Academic Year Program 44%, Post-Academic Year Program 74%, Other data available for pre and post summer experiences, but is not as clear cut due to when data was collected. What we have learned from URC Collaboration:

- Mentoring is key
- Community is Important
- Veteran students must act as mentors
- Must pay attention to student transitions
 - personal touch is very important
- Need more partners in Chicago
- UGR encourages students to envision themselves as scientists

Meet the Speaker: Dr. Loran Hernandez-Jarvis

Friday, October 16, 2009

2:45-3:45 PM

Question: How will you publish your work?

Answer: CURE access is through Grinnell College, but groups can still join as individual or as departments. 40 institutions are now part of the project. Will also submit for publication in summer 2010.

Question: How is assessment done for project courses?

Answer: ACS certified exams are used for chemistry, but not for other disciplines. At Hope, many courses are taken in different sequences, so assessment of readiness is not yet clear.

Question: Are your data objective? What are your new methods for data collection?

Answer: CURE is working on new methods. Math is using a new method now, for example.

Question: Do students evaluate what the professor rated the class?

Answer: No, students do not evaluate in this way, but only look at learning.

Question: What about non-science major courses?

Answer: The CURE project was HHMI funded, so they were not included in the study initially. They are included now.

Question: At Hope, why are many of the areas low when comparing course integrated and intensive summer research experiences?

Answer: Courses change every year, so we are not clear why there is a drop. The project has not looked at upper level vs. introductory level courses. Summer research experiences showed huge impacts, but not every student has this opportunity, so that is the reason for the course integrated research experiences.

Question: What are the research requirements at other participant colleges?

Answer: The requirements vary at different colleges. Some don't have any requirement, but their students often end up doing research or internships.

Question: Are there research project courses?

Answers: Hope has one through the Psychology Department. There are also research type centered chemistry courses.

Discussion on Research: All agreed on the importance of writing a proposal, but students need some sort of background to do so. Students need to understand the literature, but this is typically not strong until their junior year in chemistry.

Question: Are there journal classes?

Answer: This would help, but it is hard to do until upper level courses have been completed.

Question: What is the use of literature in CURE courses?

Answer: Literature is used, and it reinforces concepts for students.

Question: What is your scaffolding/systems approach?

Answer: Can't do everything in one course, so bits and pieces here and there. You really need to look at integrated everything over four years.

Prospective Teachers Panel

Friday, October 16, 2009

2:45-3:45 PM

The panel opened with a discussion of what type of post-doc should be pursued. The discussion centered on whether you should diversity from your Ph.D. in your post-doc, and what you can take from your post-doc to a four year liberal arts college. Discussion then turned to the different types of liberal arts schools, how to read job postings and what to apply for, what types of research projects students do for senior papers, what kind of original research can be done at a liberal arts college, and how to find job postings.

General Chemistry

Friday, October 16, 2009

4:30-5:30 PM

Dennis Brinkman, Indiana Wesleyan University, Session Leader

The session began by listing the topics that people wanted to discuss. The attendees then voted for the topics that they were most interested in discussing. We then went from the topics that received the most votes on down. However, we were able to spend time on all topics. Below is a brief summation of the discussion on each topic, beginning with the most highly ranked ones.

1. Textbooks (Who is using a textbook that you like?) Those specifically mentioned included Tro (has nice online homework system -Mastering Chemistry); Umland (less theoretical); McMurry and Fay—Atoms First (has a more logical progression of ideas); Oxtoby.
2. What topics are critical to gen chem? equilibrium, electrochemistry, stoichiometry, acid-base chemistry, modern atomic theory, hybridization, kinetics, thermodynamics
3. What topics could we skip in general chemistry? electrochemistry, crystal packing, the chapter on organic chemistry, transition metal chemistry. Except for electrochemistry, there seemed to be a fairly strong consensus on these. Many do not do nuclear chemistry, although a couple did because of emphasis on the MCAT.
4. Techniques for under prepared students Give them study suggestions, have a placement exam/direct them to a course that is below general chemistry so that they can take general chemistry next year; have a course that they take along with general chemistry to give them extra practice; have a summer review tutorial; have supplemental peer tutoring; require students who are earning below a C to come to help sessions.
5. Student response systems (“clickers”). One school requires students to buy them (~\$50) but they use them in several classes over the years. Others do a similar thing with cards (students “vote” with them). Those who were using these systems felt that students paid more attention because (a few) points were at stake.
6. Research projects in general chemistry. At one school students research project choices (from a list of suggestions or based on their own interest) and then carry it out for three weeks. Another possibility mentioned was environmental sampling and analysis, some of which was by AA. In another case a problem is posed and students develop the procedure (make the

highest voltage battery). Still another possibility was a course titled "Introduction to Chemistry Research." This course used an out-of-print book by Jay Young (Practice in Thinking) which poses a series of one-sentence research problems for students to investigate.

7. Should we ban PDA's in class? Many said yes, as students were sometimes playing video games, checking email, etc. However, a one person noted that occasionally it can be useful to look something up on the internet, so it is possible they can be learning tools. A similar issue came up with non-programmable calculators. (They cannot be used on ACS exams.) Most students probably do not know how to "program" them, but there have been cases where students have put information in memory and then used it on an exam.

Organic Chemistry

Friday, October 16, 2009

4:30-5:30 PM

This session began is a brief discussion about what textbooks are used. McMurry was a popular choice, but many others are also used. The discussion then turned to textbook costs. Some use older editions, others use Pavia custom editions. OWL online is cheap, and others write their own labs. The order to topics covered was then discussed. Most follow whatever order their textbook used. There was a brief discussion about whether to cover NMR in the 1st semester or in the 2nd semester.

The discussion moved on to how ACS guidelines impact organic chemistry courses, in particular one-semester organic courses vs. two-semester organic sequences. One-semester courses have not be well received by students, as they view the one-semester courses too hard. Some medical schools are moving to requiring only one semester or organic chemistry. Nursing program organic chemistry requirements vary significantly: one vs. two semesters of organic chemistry vs. a one or two semester GOB type course.

On-line courses were then discussed. University of Illinois is doing 20 minute podcasts, but integration is the key.

The discussion then centered on work groups/group work. Some use 50 minute session where groups work on more difficult problems, which really seems to help student understanding. Most professors form the groups rather than let students form them. Some used peer leaders in their groups, and usually need between one and three per semester. Others used POGIL: mini-lecture followed by group work.

The session closed with a reminder for those using ACS exams to please submit their scores.

Physical Chemistry

Friday, October 16, 2009

4:30-5:30 PM

No report was submitted for this session.

Inorganic Chemistry
Friday, October 16, 2009
4:30-5:30 PM

No report was submitted for this session.

Analytical/Instrumental Chemistry

Friday, October 16, 2009
4:30-5:30 PM

Michael Ross, College of St. Benedict/St. John's University, Session Leader

- Discussed ACS guidelines as related to analytical courses:
Some schools have combined some instrumental techniques (e.g., UV-Vis, HPLC, AA) with the wet chemical methods in the first semester course, in which case many students don't take Instrumental Analysis unless they need it for ACS certification. Hope College no longer has an Instrumental Analysis course, although they do offer an optional 1-credit spectroscopy course. They are considering restoring the Instrumental Analysis course, or a course on separations.
- The limited number of instruments available limits the number of students that can use the same instrumental technique at the same time. Thus, many schools rotate the lab experiments. However, rotation means that the experiments won't generally correlate with lecture, and that the instructor will need to explain how to use multiple instruments during the first few weeks.
- Some schools use a project approach for the Instrumental Analysis course; e.g., Michael Ross described 4 projects he uses: 1) building a simple colorimeter with LEDs; 2) analyzing a cold medication via HPLC and UV-Vis; 3) measuring Pb and Cu content on a printed circuit board via AA and Voltammetry; 4) GC-MS determination of atrazine in a complex aqueous solution. Students work in small groups, have multiple weeks per project, and submit a group report.
- The project approach is good for allowing students to take the time to "play" with instruments and learn from their mistakes.
- Michael Ross also noted that his Instrumental Analysis class meets 2x weekly, both in lab, with very little lecture (more of an explanation and discussion of the instruments).
- Francis Crean noted that her class compares AA and EDTA titration for calcium and magnesium determinations in first-semester analytical, then compares with ICP for the same analytes in Instrumental Analysis.
- Francis suggested the possibility of a four-quarter approach for the two semesters of analytical: 1) titrations/wet chemistry; 2) spectroscopy; 3) electrochemistry; and 4) separations
- The group agreed that it is good to include some basic electronics in the Instrumental Analysis course.
- There was also consensus that the first semester analytical course should emphasize understanding of equilibrium, statistics, acid-base, light absorption, electrochemistry, redox,

etc. In other words, fundamental understanding of these processes is at least as important as knowing how to use them to solve analytical problems.

Biochemistry

Friday, October 16, 2009

4:30-5:30 PM

Joshua Rausch, Elmhurst College, Session Leader

Joshua Rausch started the session by talking briefly about wanting to look into the topic of looking at molecular modeling software for biochemistry. He mentioned that he uses a modeling program called RASTOP 2.2. It is free software that he can give to the student. He can put a copy on the web along with some pdf files and let students download and look at them. He also showed how he uses balloons to demonstrate the quaternary structure of proteins. He used a black marker to put charges on the surfaces of two balloons and then showed how the two surfaces could interact. He then used his thumb to deform the balloons as they came together to demonstrate how the shapes of the balloons could change. This helped explain the induced fit theory for enzyme substrate interactions.

The question was asked if anyone uses Darling models. No one responded positively. The discussion seemed to go in the direction that students do not see what we see as instructors. Students have a hard time going from ball and stick models to ribbon models to wire models. They have trouble understanding the backbone concept. The question was asked if there was any way that we could help them make that transition. Some programs like Rasmol can tell where a selected atom is on the overall molecular structure.

Some novel ideas were exchanged about models. One school had students wear shirts each bearing a different amino acid and would then move the students around to represent different arrangements of the amino acids in a protein. Another school did a coloring exercise in which amino acids of a similar type were colored the same color in the chain. The chain was then moved around so all amino acids of the same type were placed close to one another.

A list of proteins that were deemed “interesting to look at” was compiled. The list is as follows:

Hemoglobin-due to the alpha helices

Alpha-hemolysin-due to the large amount of beta pleated sheet

Pilin-has a good hydrophobic tail to see

Ribozyme

Lysozyme with the NAG inhibitor

The group decided to make a list of molecular modeling programs that are out there that could be used.

Rastop 2.2-Free and assessable to class

Rasmol

Pymol

Jmol

Weblab Viewer- Must get license

Swisspdb Viewer (Express view is new name)-higher level program but possible-no easy way to save
-have to export to a Povray file)

The question was asked how much do viewers permeate our classes. Most of us just introduce the viewers, show a few images and leave it up to the students, or we do nothing. One of the problems is that most of the images are protein-based. There are some other files of small organic molecules and a few files of nucleic acids but none of carbohydrates and none of lipids. Also, most texts have some pictures of proteins and while they are not the same as the three dimensional molecules, they are less trouble and less time-consuming. Many people teaching a one-semester course do not have time to put molecular modeling into the course.

This led into a discussion of what goes into the first semester of biochemistry vs. what goes into the second semester of biochemistry. Many of the programs place the biomolecules and beginning metabolism through the electron transport chain and some carbohydrate and lipid metabolism in the first semester course. Some left nucleic acids out of the biomolecules since that topic is treated by molecular biology or in some second semester courses. Second semester courses tend to do more advanced metabolism, control and regulation, nucleic acid metabolism, trafficking of molecules, and translation.

The question was asked as to how many schools give the ACS standardized exam. Three of the eleven schools represented give that exam. The exam was discussed in some detail.

The question was asked as to what is your favorite enzyme that you use for kinetics. The following enzymes were listed:

2 votes for Lysozyme

Tyrosinase

Chymotrypsin using GpNA as substrate

Lactate Dehydrogenase

Yeast Catalase

Alpha amylase

Alkaline phosphatase

The question was asked, "What is your favorite protein to purify?"

Milk proteins

Beta-lactoglobulin

His-GFP

Lysozyme from chicken egg

Catalase from Yeast

The question was asked if many of us still have our students pour their own gels. Some did, but many have gone to purchasing them. Several who do are getting frustrating results. One person is still doing it with satisfactory results.

The question was asked if anyone is doing fluorescence experiments with proteins. Mark Sinton tries to do a fluorescence tag with the catalase if he gets enough time to try it but getting enough time is a problem. Joshua Rausch has an experiment in which he adds urea to a protein to denature it and observes the unfolding and change in fluorescence due to exposure of trp.

The question was asked if there are any concepts that we teach that we would like to ask the group about. The concept of binding was brought up. It was mentioned that Boyer's text has an experiment on the binding of avidin. It was also mentioned that the Balu text also has an experiment on the binding of avidin, but that that particular experiment in the Balu text does not work. One person in the group mentioned an experiment in which bilirubin was binding with Bovine Serum Albumin to give a fluorescence.

Rolf Myhrman asked what fraction of the experiments in our labs are molecular biology experiments. Most of the people in the group seemed to stay away from molecular biology experiments, but a couple seemed to do some including PCR and agarose gels.

Texts were discussed. Lehninger and Stryer seemed to be the two major texts discussed initially. We then got into a discussion of Tom Goyné's use of clinical studies. He described how each case is presented with symptoms and lab test results. Students then work in pairs and then give a Power Point presentation on the case. Tom uses the book, S.J. Higgins et al, "Biochemistry for the Medicinal Sciences an Integrated Case Approach", Prentice Hall, 1994 to find the cases. He supplements it with the Devlin text as well.

Rolf asked what our schools are using for Organic software.

Spartan
ChemOffice

VIPeR/Inorganic Electronic Resources

Saturday, October 17, 2009

11:00 AM-12:00 PM

No report was submitted for this session.

New ACS Guidelines

Saturday, October 17, 2009

11:00 AM-12:00 PM

This session was a repeat of the session held on Friday, so see the notes above from that session.

Meet the Speaker: Dr. Nancy Konigsberg Kerner & Dr. Donald Wink

Saturday, October 17, 2009

11:00 AM-12:00 PM

It was asked: Who will pay for CASPiE labs after NSF money is gone?

- Don replied that the staff person in the instrument center is on the grant and they are deciding how much to pay for samples when grant is gone, right now the samples are free
- The peer leaders for the CASPiE project are paid now out of the university budget- who will be supervising them is in question

For the CASPiE project: last spring, 1 out of 3 organic labs did CASPiE labs, this fall all of the organic sections are doing CASPiE labs. In general chemistry, there are multiple sections doing CASPiE labs.

Meetings and workshops related to CASPiE

June 2009-CWCS-CASPiE

July 2009-CWCS-Working with Chemistry

Nancy said that at U of M there are 700 research topics for undergrads to choose from in a published booklet and an independent office assigns the research topics to students

General Chemistry Lecture at U of M also uses IBL within the lecture

- Nancy welcomes and is given feedback often about the labs-including corrections to the lab manual
- Nancy was interested early on in IBL being brought into labs and to fight against the norm to incorporate it and other learning styles into the labs
- Nancy is trying to incorporate technology in the IBL labs

Programs similar to CASPiE

RWEL-module labs with 30 students at a time, based in Ohio universities

NPURC-Univ. of South Dakota-primarily undergrad institutions at multiple schools

Univ. of Texas at Austin-Pilot facility-they bring in faculty from all disciplines particularly biology to use 60 person lab and faculty rotate in and out to teach special topics

Hope College with Harold Washington College-bring community college students into research opportunities at 4 year colleges

Nancy remarked that any lab can be made inquiry based-use a lab that works really well in a traditional way and then convert it to IBL

- Have students think about what works and what won't work and have students collect data where they have to identify outliers

Nancy integrates chemistry with other disciplines in prelab lecture, and Don has created and taught an integrated math and chemistry course

-Don mentioned that Melanie Cooper from Clemson along with someone else that he could not remember the name is writing a biological chemistry book for general chemistry

Don also developed a course for chemical professionals-students that will use chemistry in their profession-where he used different scenarios where these students will use chemistry

LearnLab Environments

Saturday, October 17, 2009

11:00 AM-12:00 PM

Rob Frans, Steelcase Laboratory Solutions, Session Leader

Brent Renkema, Steelcase Laboratory Solutions, Session Leader

The presenters began the session by asking the participants about the room we were in and how effective it was for interactions between instructor/student and student/student. The room was set up in a traditional manner with rows of tables and chairs facing the front. General consensus was it was not that great.

Rob Frans then identified several different ways in which a room can be designed to encourage and support different types of teaching and learning styles. Steelcase has carried out research in effective design through detailed analysis of video taken of classes taught in different settings. By observing the different interactions and learning styles, the room can be optimized to provide an optimum learning environment.

It was interesting to consider the different ways in which the physical environment can improve and support the learning process. It was clear that Rob Frans was well versed in this area and could provide valuable input to anyone who was in the process of looking at the design or remodel of teaching or laboratory space. The link to the website is: www.laboratorysolutions.com/.

Digital Interface Experiments

Saturday, October 17, 2009

11:00 AM-12:00 PM

Michael Collins, Viterbo University, Session Leader

Michael Collins began the session by asking participants what digital lab interface systems they use. Michael started with Labworks, and now uses MicroLab mostly in general chemistry. Uses with gowmac gc, freezing point depression, conductance and many other applications. Ruth Nalliah uses Vernier lab quests in nursing chem. Also used in freshman majors chemistry. Sometimes in quant and instrumental. Has tried absorption spectrum. Mike Ross uses Vernier in analytical chemistry (simple pH titration) to show students that sometimes you can get better precision the old fashioned way! Lou Stysma and Craig Luehr use Vernier with computer and labquest. Often used in two semester nursing program. Diode array spectrophotometers used pretty well. A little in General and Analytical chemistry. Interested in MicroLab. Gail Vojta and Mark Sinton don't yet use digital interface experiments. Mark Granger wanted ideas for the High School chemistry course he teaches.

Willa Harper uses Vernier used extensively. Mark Neusbaum uses Pasco. Tom Kuntzleman uses MicroLab in pchem, analytical, and genchem. Also in research.

Michael Collins started students off asking how to use digital experiments to do more inquiry type experiments. He mentioned that when data acquisition time is shortened and simplified, the students and faculty can discuss and analyze results-much more time is spent on material. Mike Ross agreed that it does take students a long time to do a titration by hand, and the data acquisition interfaces allow the students to REPEAT data and compare separate runs. It allows you to talk about what the instrument is doing. The “black box” effect of having a digital data interface was discussed.

It was asked if general chemistry students can easily find their way through setting up experiments. Michael Collins mentioned putting a thermistor probe in aftershave and taking temperature versus time readings. This is done during the first lab period in General Chemistry at Viterbo. First titration is done with keyboard input. Mark wondered about how much do you have the computer do for the students versus have the students do themselves? Michael has the students do the point by point titration so that they learn more about what is going on. There was quite a bit of discussion about the tension between having the students do everything versus having the computer do everything. How do we make sure the students know what the computer is doing? Ruth mentioned with the new Vernier spectrophotometers, they have the color of each wavelength at each wavelength, which helps them conceptualize what is going on. She also wondered if anyone connects these interfaces to connect old instrumentation to get them to work. Everyone mentioned that Vernier, Pasco, and Microlab all allow the data to be exported into excel in order to do data analysis. Willa mentioned that if you use two sensors with Vernier/Pasco, you run into trouble. Tom mentioned that this is not a problem with MicroLab. Michael said MicroLab looks at current, voltage and time all simultaneously quite easy. Ruth said that the tech support at Vernier/Pasco is extremely helpful.

Michael asked what people do in upper level labs with digital interfaces. Responses:

1. Bomb calorimetry
2. kinetics/conductance: hydrolysis of ethyl acetate (second order).
3. cyclic voltammetry
4. coulometry
5. plank's constant
6. pH titrations
7. colorimetry
8. kinetics – oscillating chemical reactions
9. melting temperatures in organic.
10. Gas chromatograph.
11. Can anyone measure mass with time? We'd really like to be able to look at mass with digital interfaces.

Has anyone built their own Analog-Digital converters? Mark said he has tried to do some of this in instrumental lab.

Michael asked if anyone was using digital interfaces to do demonstrations. He said the digital display is quite nice to show students what is going on during chemical demonstrations. You can take buffer solution with universal indicator, add base/acid, for instance, or you can easily show pH on digital display on computer for all students to observe.

Vendors and Sponsors

The organizers of this year's meeting wish to express their thanks to the following vendors and sponsors:

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MACTLAC Weather Report

It has become somewhat of a tradition to mention something about the weather surrounding the MACTLAC meeting.

Friday's Weather

Friday saw a fine fall day in Holland, MI. The temperature ranged from a low of 37 °F (2.8 °C) to a high of 50 °F (10 °C). The sky started mostly cloudy, but became partly cloudy as the day progressed. The day had light winds (6 mph or 9.7 kph) out of the north north-east. The barometric pressure also remained steady all day around 30.08 inHg (764.0 mmHg). No precipitation was recorded for the day.

Saturday's Weather

Saturday saw a temperature range of 36°F (2.2°C) for the low to 52°F (11°C) for the high. The sky was partly cloudy all day, with a light (2 mph or 3 kph) out of the north. The barometric pressure again remained steady all day around 30.27 inHg (768.8 mmHg). As on Friday, no precipitation was recorded for the day.

MACTLAC News

Placement

MACTLAC's Placement Officer maintains two lists: 1) a list of faculty positions available within the MACTLAC member colleges, and 2) a list of candidates seeking positions with member colleges. Our goal is to ensure that candidates are in contact with the colleges having positions available. If you are currently recruiting new faculty, are looking for a teaching position at a Liberal Arts college, or have any other questions, please contact the Placement Officer. A copy of the list of available positions can also be found at www.mactlac.org.

Website

The address for the Association's website is www.mactlac.org. Feel free to visit this site to get information on our organization and the services that it offers. Be sure to check out the links page as there are some things on that page that may be of interest to you.

Listserv

Craig Bieler, the MACTLAC webmaster, has set up a Listserv for the member of MACTLAC to use for discussion of topics of mutual interest. To subscribe to the listserv, send an e-mail to imailsrv@mactlac.org with the phrase 'subscribe mactlacinfo (your full name)' in the body of the message. Place nothing in the subject line of your subscription message. To post comments to the

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Honorary and Emeritus Membership

Honorary membership is granted only by a unanimous vote of the Executive Council, and shall be reserved for those persons who have rendered extraordinary service to the Association or who have made noteworthy contributions to the improvement of chemistry teaching in member colleges. To be considered for honorary status, the candidate must be nominated by a colleague in a letter submitted to the Secretary-Treasurer at least one month prior to the Annual Meeting at which the letter is to be considered by the Executive Council. A second letter of support from another colleague should also be submitted at least two weeks before the Annual Meeting to the Secretary-Treasurer. These letters should attest to the criteria needed for honorary membership status.

Emeritus membership is reserved for any person who has been an active member of MACTLAC for 10 years and who has retired from teaching. An Emeritus member will be excused from further payment of dues and will be listed as an Emeritus member. Anyone seeking emeritus membership should request it, preferably by sending a letter to the Secretary-Treasurer of MACTLAC.

2010 Meeting

Our 2010 meeting will be held at Luther College in Decorah, Iowa, on October 15th and 16th. This year's theme is "Chemistry on the Fringe", and three presenters will speak to us on how Chemistry is applied in other fields of inquiry. Our meeting speakers and their topics will be: Dr. Mary Virginia Orna, from the College of New Rochelle, will discuss how chemistry is used in the field of art; Dr. Joseph Lambert, from Northwestern University (retired) and Trinity University, will discuss how chemistry is used in the field of archeology; and Dr. Laura Peterson, from Luther College will discuss how chemistry is used in the field of paleoclimatology. We hope to see as many of you as possible in Decorah this fall for an excellent meeting!