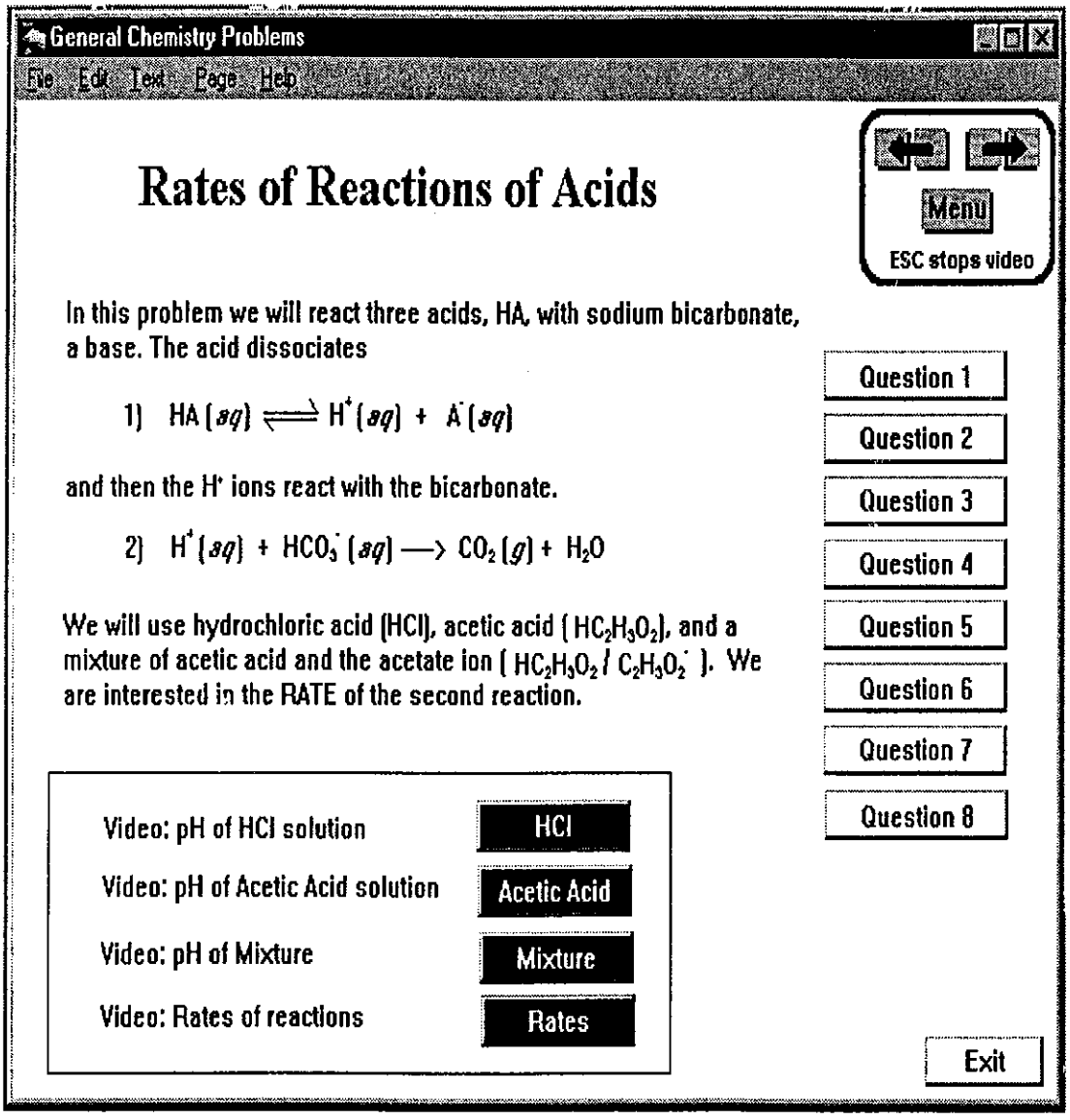
Computers in Chemical Education Newsletter Fall 1997



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Committee On Computers in Chemical Education
Don Rosenthal Chair

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Submissions: General articles should be sent to editor Brian Pankuch at the above address. We would appreciate both 1) printed copy (hardcopy) and 2) a readable file on a Macintosh or IBM compatible 3 1/2" diskette. We have fewer problems with 3 1/2 " diskettes. Email submissions are frequently lost, and formatting and special characters are changed.
Submission deadlines: Fall issue - Sept. 25; Spring issue - March 15.

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ALL NEW AND RENEWAL SUBSCRIPTIONS: PLEASE SEND REMITTANCE TO:
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Cover: **Multimedia Problems in General Chemistry** David Whisnant

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FROM THE CHAIR

Donald Rosenthal, Chair CCCE
(Committee on Computers in Chemical Education)
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A. ROLE OF THE COMMITTEE

The CCCE seeks to publicize and promote the use of computers in chemical education.

B. ON-LINE MEETINGS AND SYMPOSIA

An on-line Conference entitled "General Papers in Chemistry and Chemical Education" was held during the summer of 1997. The papers and discussion are available on the Conference Web Site (http://www.wam.umd.edu/~toh/ChemConf97.html). Another on-line conference is scheduled for January 16 to May 1, 1998. See the article elsewhere in this Newsletter for information about the schedule, web site and Listserv and the titles and abstracts of the papers. Preliminary planning is just beginning for a 1999 on-line conference.

C. SYMPOSIA AT NATIONAL MEETINGS

In recent years there have been a variety of symposia on computers in chemical education at National Meetings. The following symposia are being organized by members of our committee for future national meetings:
Dallas: March 29 to April 2, 1998
Integrating Computational Chemistry and Molecular Modeling into the Chemistry Curriculum
Harry Pence - pencehe@oneonta.edu
15th BCCE: August 9 to 13, 1998
Integrating Computers into the Undergraduate Curriculum Harry Pence - pencehe@oneonta.edu
Boston: August 23 to 28, 1998
Using Symbolic Mathematics Software To Teach and Learn Chemistry
Theresa Zielinski - tjz@niagara.edu
Anaheim: March 21 to 25, 1999
Distance Education via the World Wide Web
Theresa Zielinski - tjz@niagara.edu

D. ON-LINE INTERCOLLEGIATE COURSES

The CCCE sponsored and helped organize an intercollegiate course entitled "Environmental and Industrial Chemistry" during the Spring semester of 1996. See http://dirac.py.iup.edu/college/chemistry/chem-course/webpage.html and http://people.clarkson.edu/~rosen2/frame.htm for information about this course.

Another course also entitled "Environmental and Industrial Chemistry" will be held during the Spring semester of 1998. See the article in this issue and the course Web site http://www.py.iup.edu/college/chemistry/chem-course/olcc2.htm for information about this course.

A third course entitled "Pharmaceuticals, Their Discovery, Regulation and Manufacture" will be held during the fall semester of 1998. See the article elsewhere in this Newsletter.

E. NATIONAL COMPUTER WORKSHOPS

Three day National Computer Workshops were held before the 1996 BCCE at Clemson.

Four workshops are scheduled from August 7 to August 9, 1998 just before the BCCE at the University of Waterloo in Canada. See the article elsewhere in this Newsletter for details.

F. CCE NEWSLETTER

The publication of this Newsletter represents a major activity of the Committee on Computers in Chemical Education.

G. A BOOK ON COMPUTERS IN CHEMISTRY

During and after the 1993 on-line Conference there was on-line discussion of "What Chemists Need to Know About Computing". Theresa J. Zielinski and Mary L. Swift subsequently organized a symposium with this title at the 1994 Fall ACS Meeting. Partly as a result of these activities, they have just published a book "Using Computers in Chemistry and Chemical Education" (ISBN 0-8412-3465-5 385 pages - 1997 - American Chemical Society, Washington, DC). Theresa Zielinski wrote about the book in the Spring 1996 issue of this Newsletter.

H. OPEN MEETING AT BCCE MEETINGS

In recent years, the CCCE has held open meetings at the Biennial Meetings. These are well attended and provide an opportunity for interaction between Committee members and those attending. A meeting was held at Clemson and another meeting is planned for the 1998 BCCE at the University of Waterloo.

I. WE ALWAYS NEED IDEAS AND SUGGESTIONS

The success of the Committee depends upon the Committee's interaction with you and other chemical educators. Please send your ideas and suggestions and attend the meeting at the 1998 BCCE.

Using the World Wide Web

Brian Pankuch, Editor
Pankuch@hawk.ucc.edu

I'm back at Princeton for awhile and one of the areas of interaction is a chemistry course, Chemistry of the Environment, taught by Professor Thomas Spiro. The text is Chemistry of the Environment by Tom Spiro and William Stigliani (Prentice Hall, NJ, ISBN 0-02-415261-7). It is an excellent text, comprehensive and very well written. It is not written specifically for using computers or the Web, and does not assume you are going to use anything except ordinary lectures. I recommend it highly if you teach in the area or as a readable source for student projects.

The course is of interest because Professor Spiro is experimenting using the World Wide Web in interesting ways. The course meets for two seventy five minute periods and one hour of preceptorial problem solving and discussion. Students are assigned most of the problems from the text which are collected and graded, and gone over as needed during the problem solving hour. Problems, which tend to be mathematical, are not usually discussed during lecture.

During a lecture an assistant is present usually to see to getting the internet connection up and running-projected on a large screen. We are in the Woodrow Wilson building just across a beautiful courtyard from Frick Hall, the chemistry building. The reason we are here instead of Frick is that Frick doesn't have appropriate sized multimedia equipped lecture halls at the moment (massive renovations are ongoing). We have the usual hang-ups of slow internet connections and access to connector plugs locked up with no key readily available. Unlike my college Tom has assistants to do the chasing when things go awry.

Tom starts the lecture with paper handouts, puts the main topics for today's lecture on the chalk board, then goes to our course web page and finds the first discussion question for today. The discussion questions for the entire semester are listed on the web page so students can work ahead if they want. Each student is required to post their contribution to the discussion question 24 hours before the class meets to discuss questions. Students can't read or copy each others responses until after the deadline, responses before the deadline count toward the final grade, no credit afterward.

We started by having three minutes to read the response and discuss it with the person to our left. Since most responses were a page long and somewhat blurry and hard to read because of the web page being projected this did not lead to much discussion. We have switched to 5-10 minutes to read and discuss with a partner, and sharper overheads of the responses to read. Tom then asks the spokesperson for a given pair their reaction to the response. Discussion usually ensues with others making comments. When discussion lags another pair are asked for their reaction. After a few weeks discussions are longer and more animated, generating more questions and interactions.

As important points are made Tom fills in the outline on the chalk board he started with. We generally have two of the discussion questions during a 75 minute period, mixed with Toms expertise as appropriate. Links to web sites with additional information are provided with the discussion questions. Additional links are made real time for pertinent information during lecture. For instance while discussing the type of radiation and dangers from exposure to radioactive materials we went to a Hiroshima site in Japan that had many facts about the explosion and its' long term effects.

A few students are including graphs, images, and web addresses they have researched in their responses. Some of the addresses are hot linked (you can just click and go there), and the students will soon be including more references.

At the moment you have to click on each students' name to see their response, wait while Netscape finds it. If you don't find a student with a response you are sent to another page which then requires several time wasting steps to look at the next response. Rather cumbersome if you want to look at a number of them. We hope to have a digest form so you can see all the responses at once in alphabetical order. This would be one download from the net instead of about 60 for each student response.

The students are not sure what is expected of them in an interactive chemistry course. Professor Spiro patiently explains his expectations and is amenable to changing details to accommodate participants.

Thirty percent of the final course grade will be based on semester group projects. Groups are 4-5 students and each group creates a web page on a topic of interest which will update and clarify environmental chemistry themes. The group page is to be based on the textbook,

and to develop its topics further, bringing in new material and filling in gaps in the coverage. The groups are balanced with a facilitator in charge of meetings and communications. Another is Web coordinator, pulling together ideas for Web design. Each member is expected to develop subtopics from the literature, the Web, and interviews with experts. Each member also hands in a one page evaluation of what they contributed to the project.

The projects are varied: alternative auto fuels, clean air, clean water, hydroelectricity, industrial ecology, nutrient overload in water, ocean energy-using tides temperature differentials, renewable energy technologies, and renewables applied to autos. Students have been asked to be innovative, to aim for a project that couldn't just be printed out. To include different paths or viewpoints to help a user understand the many faceted questions and partial answers in this area. To use this new technology to present the scientific data in novel ways, animations visits to other interesting sites, etc.

As we're just starting some groups seem enthusiastic about using web and being innovators. Others see a lot of work in an area they are not familiar with. Princeton Office of Computing and Information Technology have a lot of well organized material -how to design a web page, hotlinks to get the software needed, how to put your web page up.

A symposium will be held at the end of the semester for final Web presentations. The projects may be linked with a new museum of science and invention to be opened during the summer of '98.

There is a sense of questioning and the feeling that here are people who will try to find new solutions and may be good enough to find something interesting. I hope so. Its fun to interact with great students.

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I recently started using a Power Mac 8600/300. As usual with Macs I plugged it in , connected my 20" monitor and was up and running. It came with OS 7.6 loaded but the CD for loading OS 8 was simple and fast. I wanted to be sure I had the correct drivers, etc. for all the equipment I was likely to need. So I got together and connected an HP scanner, an external 6x CD (it comes with an internal 24x CD), an external 100 MEG Iomega Zip drive, an external 230 MEG Iomega drive, an external 1.5 G Syquest SyJet drive, Global Village modem, and finally an Apple laser printer.

I had purchased an additional 64 MEG of RAM and 2 MEG of video RAM. The 8600 unfolds like luggage and the area for RAM was very accesible. Shutting off the machine, but leaving it plugged in I grounded myself by touching the power supply, and followed the directions in the manual and installed both in a couple of minutes. The 8600 now has over 100 MEG (RAM Doubler works if I need 200 to 300 MEG) and can paint millions of colors on a 20" screen.

Amazingly enough everything worked! Well, I did have to try the Zip twice but compared to week of frustration I had connecting a Zip to a Windows machine it was a breeze. I did acomplete transfer from my old 500 MEG hard drive using the external 1.5 G Syquest SyJet drive (same size box but stores 15 x as much as the Zip drive and much faster). Fast and painless.

I decided to due a clean install of Microsoft Office, Codewarrior, and Macromedia Studio and several other large pieces of software that were not originally in power Mac version. No problems and I was getting confident so despite knowing people were having difficulties with Conflict Catcher I decided to install it in case Apple had fixed the problem. Not a good call, in fact a real mess. So many things were messed up I decided to do a new install of OS 8. This went smoothly and all was right with the world. Norton utilities seems to work fine. I've also head tht Now Utilities has problems, now I think I'll do without till I get the update.

Speaking of utilities you may want to try Auto Menus, download at Night Light's Web Page: http://www.nlsoftware.com, or write at Night Light Software, P.O. Box 1511, Mountain View, CA 94042-1511. It is a helpful $15 shareware program that causes menus to pop open and stay open as you pass the mouse over the menu. See Fig 1, all these menus stay open till you click the mouse once. It is particularly useful for hierarchal menus. This may not sound like much but the decrease in clicking my mouse has caused the increasing pain in my mouse hand and arm to go away almost completely.

A new feature in OS 8 allows you to spring open nested folders and explore each. Similar results to Auto Menus except you don't see all the folders you have open and you have to keep your finger down on the mouse button. Figure 2 shows the same Naviga-

tor folder as above, most of the other folders are obscured but you can go back to any intermediate folder.

Frequently when I would make a projector in Macromedia Director (this is a portable form of a animation which doesn't require Director) I could go and have lunch and it would still be chugging when I got back. I tried making a projector on the new Mac and nothing appeared to happen, tried again to make sure and again nothing.Checked my hard disk and found my two projectors, and they work. That's fast.

Working with diskettes you could fall asleep. Well, it is faster than my old sytem but everything else, even downloading from CD's, is so very fast this seems really slow. Does it hang and crash? Not typically while

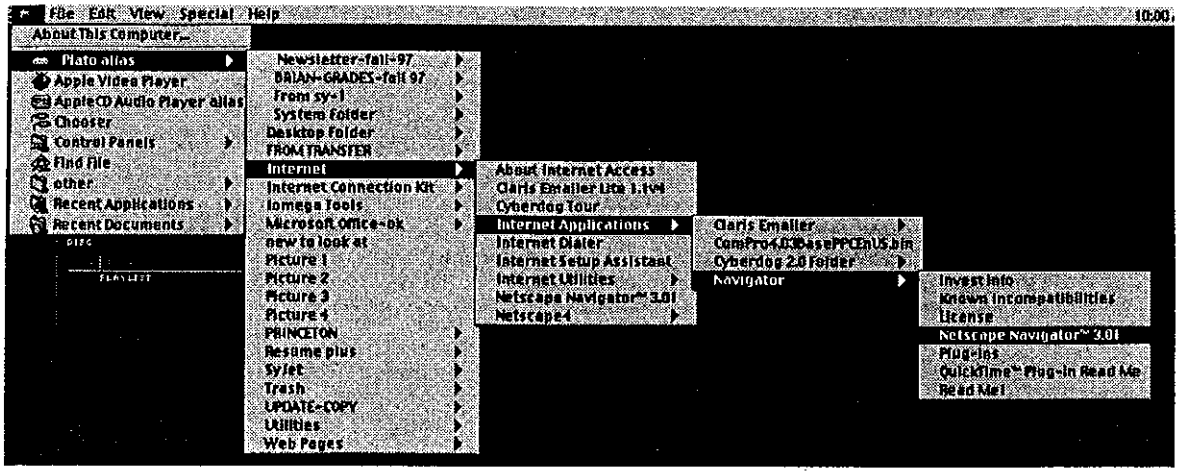

Fig 1. Auto menus opening a series of hierarchal all these menus stay open till you click the mouse once. It is particularly useful for hierarchal menus.

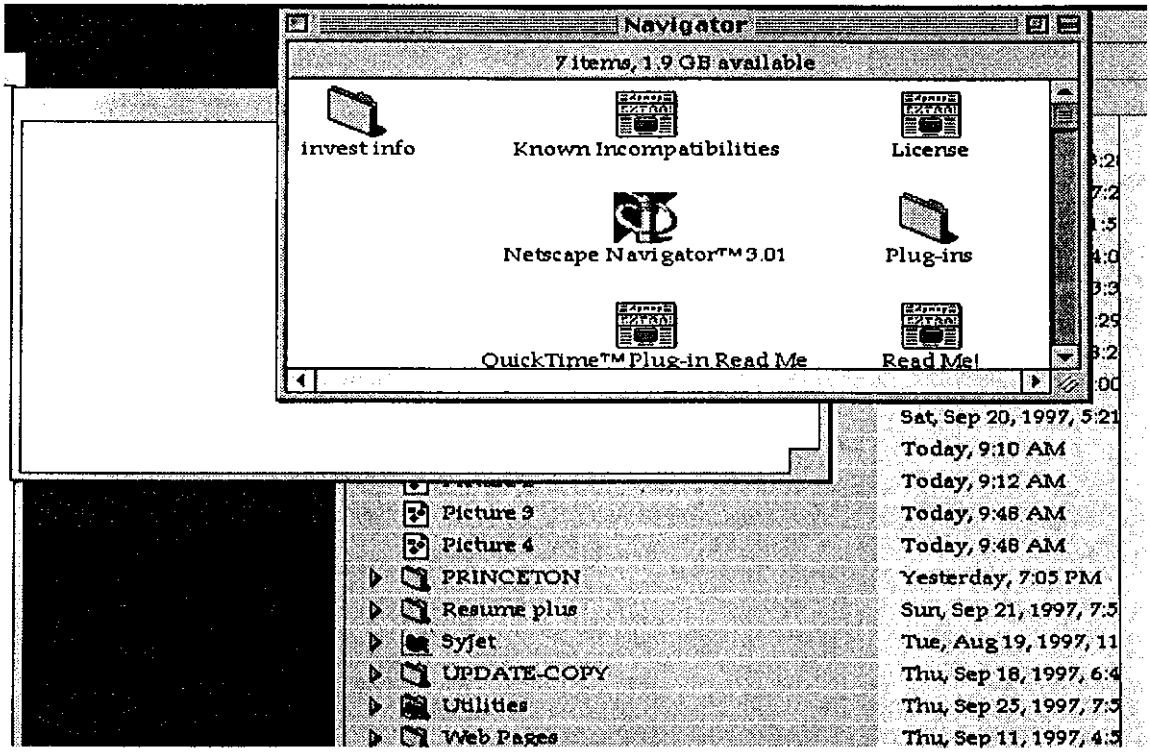

Fig 2. A new feature in OS 8 allows you to spring open nested folders and explore each.

I'm doing the usual with stable programs. But testing new software is still an invitation to crashes.

I'm usingNetscape Communicator 4.03 and it makes most communication including three mail accounts fairly straight forward. It has a page Composer you can use for (guess what) composing homepages. You can drag and drop links, text, pictures and animations and I guess anything else. Move things around add subtract and when you're done press a button and it is sent to the address you specify as your homepage. A click on a menu bar and you can FTP or Telnet wherever you please.

PHARMACEUTICALS, THEIR DISCOVERY, REGULATION AND MANUFACTURE
A Fall 1998 On-Line Course

Aline M. Harrison
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York PA 17405
Phone: 717-846-7788
FAX: 717-849-1619
E-mail: aharriso@ycp.edu

This on-line course is intended for college students who have had at least one year of organic chemistry.

Because of the breadth of the topic, groups are encourage to specialize in one of the three areas and obtain an overview of the other areas during the course. Papers from individuals active in the pharmaceutical industry or government will be supplemented by content taken from web sites. Both human and non-human pharmaceuticals will be included. The course will be of interest to those planning to pursue careers in human or veterinary medicine, the pharmaceutical industry or government regulation.

The format of the course will be similar to that of previous on-line courses. (http://people.clarkson.edu/~rosen2/frame.htm). Each instructor will be responsible for grading and organizing activities at his or her school.

Faculty interested in obtaining additional information may contact me by e-mail or phone.

B. J. Pinchbeck's Homework Helper - A Useful and Interesting Website
http://tristate.pgh.net/~pinch13.html

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I was somewhat skeptical when I read the opening sentences on this World Wide Website:

"My name is B. J. (Bruce, Jr.) but my friends call me Beege. I am 10 years old and live in New Brighton, Pennsylvania. My dad and I use the Internet to help with homework and to research information on the Net."

This site briefly describes and provides links to more than 380 sites! The site is nicely organized into the following sections:

SEARCHING A TOPIC - Some Excellent Search Engines
(26 sites)
Recently, I have been accessing this section to initiate my searches.

REFERENCE SECTION (85 sites)
Dictionaries, Encyclopedias, Roget's Thesaurus, Virtual Reference Desk, On Line Calculator, Scientific and other famous Quotations, Conversion Tables, Telephone Directories, Toll Free Numbers, E-mail addresses and much more
Some links to chemistry materials:
- Study Web - link to Science and then to Chemistry
- World Wide Web Virtual Library - link to Chemistry
- Education Index (by subject) - link to Chemistry
- Martindale's Reference Desk - link to Chemistry Center
- Chemistry Encyclopedia

NEWS AND CURRENT EVENTS (28 sites)
Many newspapers, magazines and other news sources

MATH AND SCIENCE (104 sites)
A host of math, biology, medical, chemistry, physics and general science sites - Of particular interest to chemists include Eric's Treasure

Trove of Chemistry, General Chemistry Glossary, Analytical Chemistry Basics, Chemistry Tutor Page, Chem101, Hyperchemistry on the Web, General Organic and Biochemistry, BioChemNet, Organic Chemistry and CHEMystery
Some specific links to chemistry:
Frank Potter's Science Gems- Physical Science I - link to Physical Science Part III
Eric's Treasure Trove of Chemistry
General Chemistry Glossary
Analytical Chemistry Basics
Chemistry Tutor Page
Chem101
Hyperchemistry on the Web
General Organic and Biochemistry
BioChemNet
Organic Chemistry
CHEMystery

SOCIAL STUDIES (16 sites)
Maps, travel and information about countries and regions of the U. S.

ENGLISH (47 sites)
Grammar, punctuation, style, vocabulary and literature

HISTORY (44 sites)
U.S. and World History

FOREIGN LANGUAGES (15 sites)
Dictionaries, travel and language learning sites

MUSIC AND ART (14 sites)
Music education and sound - art history and pictures

PLAYTIME (9 sites)
The Looney Bin shows you how to take good notes in class and study for exams.

Many of the over 380 links provide additional links to other sites. By using this site you can eliminate the need to establish bookmarks or easily build a personal library of bookmarks.

ON-LINE CONFERENCE
January 16 to May 1, 1998

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The Division of Chemical Education is sponsoring this Conference. The abstracts and papers will be available on the World Wide Web (http://www.wam.umd.edu/~toh/ChemConf98.html).

Discussion will occur on the CHEMCONF Listserv. To register send the message:
SUBSCRIBE CHEMCONF JANE DOE
(where JANE DOE is your name)
To: LISTSERV@UMDD.UMD.EDU

One week will be devoted to the discussion of each paper. Short questions will be sent on Friday and discussion will occur from Monday through Thursday. The discussion schedule, titles and authors of the twelve papers are listed below.

The Conference is being organized by the Division's Committee on Computers in Chemical Education. Thomas O'Haver (University of Maryland, College Park MD - to2@umail.umd.edu) and Donald Rosenthal (Clarkson University, Potsdam NY 13699, rosen1@clvm.clarkson.edu) are co-chairs.

1. January 16 to 22, 1998
FROM PRE-SCHOOL TO DEATH:
Life-Long Learning and the ACS Education Division
Sylvia Ware, Education Division, American Chemical Society, Washington DC 20036
saw97@wash24.acs.org

The ACS Education Division programs, which address all levels of education from the youngest to the oldest of learners, cover four types of activities: materials development; professional development; student groups; and science education policy. The Division attempts to provide services and products which are not otherwise readily available; and is also involved in the dissemination of information about other innovations in chemical education. Our curriculum projects all emphasize the importance of context to facilitate student learning. We use the students' "need-to-know" the science as the framework for the instructional design. Our professional development programs recognize the importance of life-long learning for all involved in chemistry, whether as teachers or researchers. Our student programs are targeted to gifted high school students, economically disadvantaged high school students, and college

students majoring in the chemical sciences.

2. January 23 to 29, 1998
DO I REALLY NEED TO KNOW THIS STUFF:
A Dialogue Between Student and Teacher
Julie A. Grundman and Paul B. Kelter, Department of Chemistry, University of Nebraska, Lincoln NE 68588-0304
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How much math is really necessary in a freshman general chemistry class? In this paper, we explore the extent to which math should be included in general chemistry, with the student (Julie) supporting a math-rich chemistry class while her teacher (Paul) argues against it. The effects of including more rigorous mathematical topics in the curriculum are examined by looking at their impact on the students' understanding of chemical concepts and their preparedness for future college courses.

3. January 30 to February 5, 1998
SILICON COGNITION AND TEACHING
David W. Brooks, University of Nebraska, Lincoln NE 68588-0355
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Two different major changes affect teaching at the outset of the 21st century. Students work less and less efficiently as we approach 2100 AD. Why? What can we do about it? This problem seems best approached through the area currently called self-regulation.

This author is concerned with those students who are good self-regulators and who work hard and efficiently. What should they be learning? The end of the 20th century has seen the emergence of numerous tools that perform skills previously in the purview of experts. The hand-held calculator heralded the emergence of silicon technology as a main factor for humankind — especially for those of us who were too slow to see the potential of computers even as we used them in the late fifties and sixties.

This paper will deal with two issues. First, it will focus on the apparent impact of silicon technology on student performance. Do kids brought up on hand-held calculators really know arithmetic today? Next, it will offer both instructional and curricular strategies for teaching which anticipate increasing dependence of carbonoid humans upon silicon cognition.

4. February 6 to 12, 1998
COLLABORATION: WHY PARTICIPATE IN AN UNNATURAL ACT?
John Clevenger, Truckee Meadows Community College, Reno NV 89512
clevenge@scs.unr.edu

Collaborative activities between faculty at two- and four-year institutions have been found to be an excellent method to facilitate articulation and transfer. However, collaboration has been defined as "An unnatural act, performed by non-consenting adults". Although this may be true, the potential rewards for our students and ourselves are great. Consideration of why we should participate in these "unnatural acts" and how to encourage them must address questions such as: "What if they don't want to?" and "What's in it for me?" Positive responses to the needs and reward structure for faculty in each institution is necessary. Mechanisms which establish collaborative research and scholarly activities between faculty primarily involved in research and those primarily involved in teaching are often missing in these discussions. This presentation will provide suggestions and examples for this type of collaboration. One of these is the Nevada Teaching Research - Enhancement Collaboration (TREC) Program.

5. February 13 to 19, 1998
FIRST, DO NO HARM . . .
The (Moral) Obligation of the Faculty
Brian P. Coppola, The University of Michigan, Ann Arbor MI 48109-1055
bcoppola@umich.edu

Higher education continues to evolve. Introductory courses enroll literally thousands of students, yet few of those students are thinking about taking on the subject professionally. Faculty have assumed greater roles as administrators and fund-raisers for themselves and the institution. Administrators shepherd multi-million (and billion) dollar organizations. This is a far cry from past centuries, where colleges were generally controlled by churches and primarily concerned with the development of moral character and citizenship. Intellectual communities have grown, and this growth has resulted in separation, isolation, and the inevitable

competition over resources. What about the state of education in all of this?

Like most large research universities, the undergraduate teaching program at Michigan has been neglected, undermined, exploited, or suffering, depending on the critic's perspective. Over the last decade, a number of significant undergraduate initiatives have improved the quality of the educational experience for Michigan's students. Many of the innovations have been drawn from the foundations of traditional liberal arts values and adapted to the strengths of the large University setting. In this article, I will outline some of the broadest philosophical underpinnings that have both emerged from and impacted the way in which we might think about the privilege that accompanies our Doctorates in the context of our positions in the professoriate.

6. February 20 to 26, 1998
STUDENTS' RESPONSE TO THE USE OF COMPUTER-MEDIATED COMMUNICA TION (CMC) FOR TEACHING CHEMISTRY
Rosamaria Fong, British Columbia Institute of Technology, Burnaby, British Columbia, CANADA
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This paper describes a Web-based study guide for teaching a post-secondary pre-entry Chemistry course. The purpose of the Web-based study guide is:
(1) to provide students 24-hour access to the course,
(2) to improve students' problem-solving skills in chemistry,
(3) to give students instant self-evaluation with interactive problem assignments, and
(4) to identify specific problem areas of chemistry that the students face.

The use of Web-based technology in teaching improves students' self-learning initiatives. Architectural framework of the Web-based study guide consists of using HTML frames to provide ease of navigation. Java-scripting is used to enhance interactivity during the students' studying process. Students' evaluation and response to using the Web-based study guide will also be presented.

7. February 27 to March 5, 1998
TEACHING FORENSIC ANALYTICAL CHEMIS TRY
Scott R. Goode (1), Stephen L. Morgan (1), William E. Brewer (2), and Stephen J. Lambert (3)
(1) University of South Carolina, Columbia SC 29208, Goode@sc.edu
(2) South Carolina Law Enforcement Division, Toxicology Department, Columbia SC 29210
(3) South Carolina Law Enforcement Division, Seroology Department, Columbia SC 29210

During the last school year, we taught Forensic Analytical Chemistry as an elective for juniors and seniors who successfully completed two semesters of General Chemistry, two semesters of Organic Chemistry, and one semester of Quantitative Analysis. Approximately 40 students enrolled for this course, taught by two scientists from the South Carolina Law Enforcement Division labs and two faculty at the University of South Carolina.

We will present the details of the course and the results of student evaluations and interviews. The syllabus follows:

I. Introduction to Forensic Science
II. Evidence Control
  A. Evidence Processing
  B. Chain-of-Custody
III. Drug Identification
  A. Spot Tests
  B. Confirmatory Methods
    1. Gas chromatography/mass spectrometry (GC/MS)
    2. Fourier transform infrared spectroscopy (FT-IR)
    3. High performance liquid chromatography (HPLC)
IV. Toxicology - DUI Issues
  A. Breath Testing
    1. UV-Visible Spectrophotometry
    2. Infrared Spectroscopy (IR)
    3. Electrochemical (screening)
  B. Blood Alcohol Analysis
    1. Headspace GC (HSGC)
    2. QA/QC
  C. Urine/Blood Drug Testing
    1. Immunoassays
    2. GC-MS
    3. HPLC
V. Toxicology-Death Investigation
  A. Cause and Manner (Forensic Pathology-Autopsy)
    1. Suicides
    2. Accidental
    3. Homicides
    4. Natural
  B. Volatile Analysis

1. Blood Alcohol Analysis (.1 ISGC)
2. Inhalant Abuse

C. Drug Screening
1. Fluorescence Polarization Immunoassays
2. Radioimmunoassays
3. EMIT
4. Toxilab (TLC)

D. Drug extraction methods
1. Acid/neutral drugs
2. Basic drugs
3. Solid phase vs. liquid

E. Drug confirmation/quantitation
1. GC-MS
2. HPLC
3. HPLC-MS

F. Interpretation of Results-Courtroom Testimony

VI. Trace Evidence

A. Hair Analysis
1. Microscopy

B. Fiber Analysis
1. Microscopy
2. Polarized Light Microscopy
3. Tensile Strength Analysis
4. FT-IR

C. Paint Analysis
1. Microscopy
2. FT-IR
3. Scanning Electron Microscopy (SEM)

D. Gunshot Residue
1. SEM
2. Atomic Absorption Spectrometry (AA)
3. ICP-MS
4. Chemical Tests (Distance Evaluation)

VII. Arson

A. Sample Handling

B. Analysis
1. GC
2. GC-MS

VIII. DNA/Serology

A. Crime Scene Processing
1. Types of Biological Evidence
2. Techniques of Evidence Collection/ Interpretation of Crime Scene
3. Potential Problems
a) Environmental Contamination
b) Mixed Samples

B. Forensic Serology - Theory and Technique
1. Species/Tissue Identification
2. Blood Grouping
3. Polymorphic Protein Markers
4. Semen Identification and Characterization

C. Forensic DNA Analysis-Theory and Technique
1. DNA Polymorphisms
2. Restriction Fragment Length Polymorphism Analysis of VNTR Loci
a) Multi-locus Analysis
b) Single-locus Analysis
c) Methods of Detection
3. Polymerase Chain Reaction Techniques
a) DQ-alpha and Polymarker
b) Amplified Fragment Length Polymorphisms (AMPFlps) and Short Tandem Repeats (STRS)
c) Mitochondrial DNA D-loop Sequencing
d) Mini-variable Repeat Sequencing Analysis
e) Future techniques: Mass Spectrometry, Mitochondrial Reverse Dot-blot Analysis, Digital Array

IX. Other Forensic Disciplines

A.Latent Fingerprints

B. Firearms

C. Polygraph

D. Forensic Art

E. Questioned Documents

8. March 6 to 12, 1998

I.O.N.S.- INNOVATIVE OPTIONS AND NEW SOLUTIONS: A CD-Rom Based Chemical Technology Curriculum Supplement

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Innovative Options and New Solutions is a student- based consulting company created for two-year chemical technology students. This hypothetical company is the basis of an NSF-supported curriculum development project that has Problem-based Learning as its centerpiece. This paper describes a CD-ROM that requires chemical technology students to solve concerns related to industry in the context of the general chemistry curriculum and the Voluntary Industry Standards.

9. March 13 to 19, 1998

PULLING OUT ALL THE STOPS: Applying Technology to Every Facet of Chemical Education

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A curriculum reform effort known as the 'MPC Project' has been underway at UNCW for five

years. The chemistry component of the project began with the development of hypermedia enhanced lectures and laboratories featuring on-line data acquisition and computer assisted data anlysis and reporting. More recently, efforts to incorporate the WWW and interactive software into the curriculum have also been undertaken. Research findings both here at UNCW and from other campuses have guided tour efforts, and have compelled us to conclude that a different model for chemical instruction should be implemented and tested. This paper will detail our work to date, and provide an overview of the new model for instruction in introductory chemistry that we hope to implement at UNCW in Fall, 1998.

10. March 20 to 26, 1998
ON-LINE EXERCISES AND PUBLIC DOMAIN DATABASES IN CHEMISTRY
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1. A wide variety of WWW-based materials have been developed and installed on our site. These range from lab data analysis through problem sets. The applications are all interactive and have enabled us to assign students individualized problem sets and to track their performance in some detail. These materials have been in use at our site during the past academic year in the courses "Introduction to College Chemistry" and "Quantitative Analysis". The approach appears to be practical and inexpensive in our investment of time. There is promise that this approach will lead to a genuinely practical method for tracking our students' progress in a mode of independent study. It further permits us to have an ongoing program of review and reinforcement not tied to a particular course.

2. Many databases contain chemical information which is in the public domain. Although there is growing media coverage of the confusion over the fair use doctrine and copyright as it will be applied to information on the Internet, little treatment is given to the distribution of information which is not copyrighted. This section of our presentation will discuss the breadth of this public domain information and methods of making it available to our students and to all Internet users.

11. April 10 to 16, 1998
HIGH SCHOOL STUDENT USE OF WORLD-WIDE-WEB-BASED HYPERMEDIA
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The course material (syllabus, competencies, class notes, laboratory experiments, etc.) for the Governor's School Chemistry have been formatted for use with web browsers, such as Netscape, and placed on the Virginia Tech chemistry web server as part of the Chemistry Hypermedia Project. Students in two RVGS Chemistry classes routinely accessed these materials during the 1995-96 and 1996-97 school years for pre-lab information and class notes, both of which have links to other material on the Tech web server. Specific examples of these applications, how they were part of the lesson plans, and a survey of student responses to use of the WWW for part of their instruction are covered in the paper. Samples of tutorials which have interactive practice sessions written in Javascript and were developed during the second year of the project are also included. This paper addresses the issue of the time involved in formatting the material for the web versus the effectiveness of using this medium as a way of presenting chemistry to high school students. The RVGS chemistry course material may be viewed on-line at http://www.chem.vt.edu/RVGS/RVGS-home.html.

12. April 17 to 23, 1998
USING THE WORLD WIDE WEB TO PROVIDE TEACHING ON DEMAND IN THE PHYSICAL CHEMISTRY LABORATORY
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A WWW site has been developed which provides students with prelab information such as an overview of the theory of the experiment, the procedures, and prelab questions. The site makes use of MPEG movies to show the proce dures the students will use in the lab and also makes use of JAVA script for the problems gien to students. The site is used in the recitation section of the Physical Chemistry laboratory in order to allow students carrying out different experiments to have concurrent access to the information they need for that week's lab.

Multimedia Problems in General Chemistry
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Textbook problems are an important part of a General Chemistry course because they give students an opportunity to practice using the concepts they have learned in lecture. They have the disadvantage of being text-based without much reference to things students have observed in laboratory or lecture demonstrations. They also usually are classified according to the sections of the text to which they correspond. This is useful for beginners, but reinforces the compartmentalization that is one of the weaknesses of the traditional General Chemistry course.

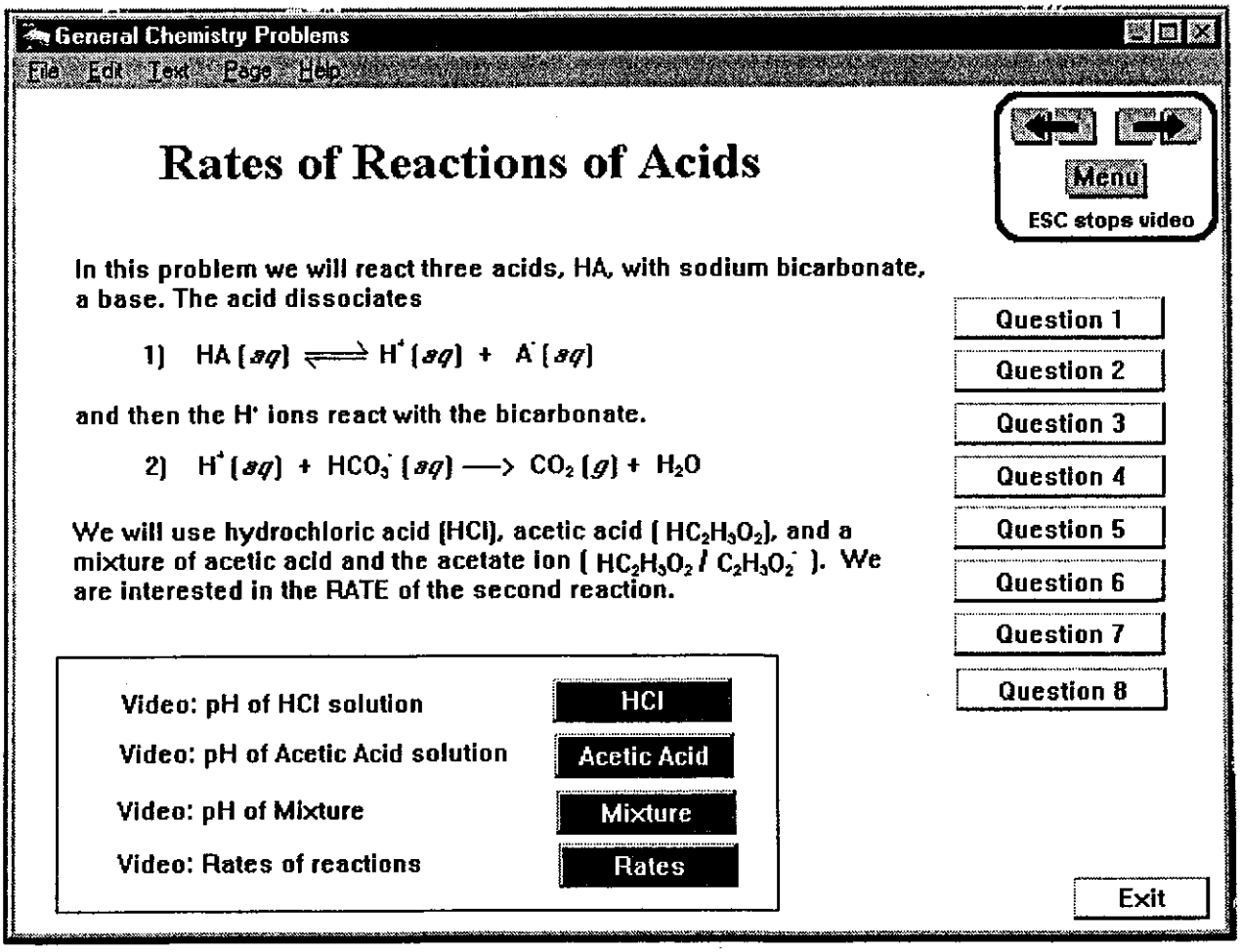
For the last two years, in cooperation with John Moore and others at the University of Wisconsin, I have been developing multimedia problems to supplement textbook problems for the General Chemistry course. These problems, written for Intel-based PCs using ToolBook 4.0 and Quicktime video, draw on the large number of chemical demonstration videos available through the Journal of Chemical Education: Software1. The problems are based on observations that students make in videos of the demonstrations. They draw on concepts from different sections of the course and emphasize conceptual rather than numerical problem-solving. We furnish the problems and video files on CD-ROMs for the students to work on out of class. At the present, answers are not furnished with the problems. We have used these problems in several ways.

1. During the course, the students could work the problems, just as they would problems out of the textbook. They then are responsible for the problems on examinations.

2. At the end of the course, different students could be asked to write an essay on different problems, answering the questions in detail.

3. The problems could be assigned as extra credit for the course, with written answers turned in for credit.

As an example, one of the problems deals with



the influence of pH on the rates of reactions of different acid solutions with sodium bicarbonate. The questions in the problem are based on the concepts of pH, buffer solutions, strong and weak acids, rate laws, strong and weak electrolytes, and the microscopic interpretation of acid dissociation. The problem screen looks like the accompanying figure.

The students work through the eight questions using the video buttons to see video clips when needed. The first question describes three solutions — hydrochloric acid, acetic acid, and an acetic acid/acetate buffer. The first three videos show the measurement of the pH of these three solutions using pH paper. The students are asked if the relative pH values they observe agree with what they expect and to explain their answer. In Question2, as a follow-up the students are asked to calculate the pH of the buffer and to compare the results of the calculation with their observations.

In question 4, the students are asked to think about the rate law for the second reaction, H+ (aq) + HCO3- (aq) —> CO2 (g) + H2O. How would they expect the rate of the reaction to vary with [H+]? For which of the three acid solutions in this problem would they expect the reaction with bicarbonate ion to be highest? They then observe the fourth video, which shows the reactions with the three acids. The relative rates of reaction can be determined from the rate at which CO2 bubbles come and go in the test tube.

The questions also sometimes ask about a microscopic representation of what the stuents have seen. Question 6 shows four different representations of the HCl molecules in solution — one undissociated, two partially dissociated, and one completely dissociated2. The students are asked which picture best illustrates that HCl is a strong acid and why they think so.

Finally in Question 8, the students observe videos of the measurement of the electrical conductivity of three unknown solutions (one is water, one HCl, and one acetic acid) using a light-bulb probe. They are asked to think about the relative number of ions in each solution and to decide which solution corresponds to which unknown in the videos.

At the present we have finished twenty three of these problems on topics ranging from the drinking bird toy to the paramagnetism of solids, the phlogiston theory of combustion, and the electrolysis of water. Student reaction to the problems generally has been positive (with the exception of one situation in which the videos were incompatible with the computer network). The students seem to take them seriously. We are in the process of testing the problems further and hope to make them available to others later.

Acknowledgments

The author would like to thank John and Betty Moore for their hospitality and the NSF-sponsored Curriculum: New Traditions project for support during the development of these problems. He is grateful to JCE: Software for the video and Jerrold Jacobsen, Randy Wildman, Kelly Houston Jetzer, Trevor Peace, Bob Rittenhouse, and Tony Tautges for help with shooting new video.

1 ChemDemos I and II Laser Videodiscs, JCE: Software Special Issues, University of Wisconsin-Madison, Department of Chemistry, 1101 University Ave., Madison, WI 53706

2 Smith, K. J.; Metz, P. A. J. Chem. Educ. 1996, 73, 233.

Is There a Future for JCE Software?

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The title of this article may be surprising to readers who recall my article in last spring's newsletter (1) in which I reported many new developments at JCE Software. It comes from a question asked by a colleague visiting Journal House a few months ago. As he passed through my office, he asked if, with the comprehensive CDs developed by textbook publishers, there really was any reason to continue to publish the small programs that have been the staple of JCE Software issues. At the time I was a bit defensive. Upon reflection, I realize I should not have been.

It is obvious that JCE Software cannot compete with commercial publishing companies who can afford to hire teams of professional computer programmers and graphic artists to work with chemistry educators in developing instructional material. We do not have the resources, and frankly, it has never been our goal to provide a compressive chemistry curriculum on disk, CD, the Internet, or any other media. Our purpose has been and remains to make available innovative new

media for chemistry education. Our regular issues generally consist of modest projects developed by an individual or a small group of educators, designed to meet the specific needs they have encountered in their classrooms. These publications are useful to other educators and to students as they stand, but perhaps more important, they provide ideas and examples for others. Past publications are the ancestors and springboards of the current major efforts of commercial publishers on CD-ROM and the Internet. Some publishers have even purchased licenses to include JCE Software publications in their products.

It is important to encourage individual instructors to continue to experiment with and develop media for their students. In education, as in science, we cannot afford the attitude that it has all been done-that because you do not have the best tools or newest equipment, you cannot do important research and contribute to the field. New ideas developed from as many sources as possible and shared with the community are as vital to the health of chemistry education research as they are to laboratory research.

A greater danger to the continued existence of JCE Software may come from authors and developers publishing their own materials on the Internet rather than submitting them for publication. While this direct route is certainly easier than publication in a peer-reviewed academic journal, it has some major drawbacks for both the author and the user. Because the material does not go through the peer review or editorial process, there are no checks on the accuracy of the product. John Moore's editorial in the September 1997 issue of the Journal of Chemical Education (2) explores the consequences, both positive and negative, of the freedom of Internet publication. In short, there are no guarantees that what the user gets is correct, and there is no input to the author to help make the publication better. Also, after all the long hours of work put into the development of the product, there is no "stamp of approval" that comes from publication in a recognized academic journal. Such credentials are generally necessary for retention and advancement in academic positions.

Is there a future for JCE Software? There is a need for such a publication.
Innovative media for chemistry education should be made available to everyone and the authors deserve professional recognition for their achievements. In order to survive, changes will be necessary. As submissions of traditional software decline, publication of special issues, video, and applications of past publications including multimedia presentations and HTML documents incorporating JCE Software video will increase. With the publication of the Chemistry Comes Alive! CD-ROM series (3) the video and animation developed with funding from Images of Chemistry (4) and from other sources, some of which has been published on the ChemDemos and ChemDemos II and Titration Techniques Videodiscs (5, 6, 7) will be widely available to educators in an easy-to-use digital format. As instructors find uses for this tremendous resource in their lectures, lessons, homework, examinations, etc., they are encouraged to share their ideas with others by submitting their work to JCE Software. These publications in turn may inspire the next generation of new media for chemistry education. With the continued willingness of the chemistry education community to both submit their work and purchase issues, JCE Software has the potential of a very long and exciting future.

Citations:

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Rethinking the Formal Laboratory Report For Physical Chemistry: Scientific Word and Scientific WorkPlace to the Rescue.

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Introduction:

It has been the tradition for chemistry majors in their junior or senior year to prepare and submit approximately ten formal five to ten page laboratory reports per semester as outlined in Shoemaker et. al. or Daniels et. al. This has been justified to help in understand ing the experiment, and to prepare the student for writing papers and reports in their future careers in academe and industry. Overall this procedure has worked well, but has added significantly to the workload of students and the teaching staff. To be effective, the effort by all is significant. We remember writing these reports as a major chore in our effort to get our undergraduate degree. Some of us may reflect back on surviving this ordeal with pride and still have copies of our formal physical chemistry laboratory reports in our files. Your professor may still have all of your reports on file. I still have selected student reports in my files from approximately 35 years of teaching physical chemistry. A few years ago three unrelated events encouraged me to rethink what I was doing and change my approach to physical chemistry laboratory reports.

1. Professor Martin Farrell of our Politics and Government Department won a copy of Scientific WorkPlace® and ScientificWord® (SWP) as an attendance prize at a professional convention and gave it to me. I have used this as my primary word processor for over five years and have upgraded it twice. The sticker price was over $500. I use it to prepare my notes, exams, solve problems, and prepare transparencies. I frequently complement the calculation capabilities of SWP with a spreadsheet.

2. The College instituted at about the same time writing as a required field of special importance. Students must take English 110 and a writing intensive course in another department, usually the department they major in. This is a common trend for liberal arts colleges such as Ripon. It serves to share the load and responsibility for emphasizing and teaching writing across the campus. The Chemistry Department chose to make our writing course a team-taught one-semester junior level integrated laboratory with formal reports. The physical laboratory was retained, but my responsibility for formal writing was changed significantly. The report load on the student was increased to near the breaking point.

3. I became increasingly aware of new trends in teaching and the need to improve, update, and change the physical chemistry course. Some of my early changes were cosmetic, for example, laboratory partners became laboratory teams.

Physical Chemistry laboratory reports at Ripon College 1996:

After three years of development, the current semester requirement for this year and the past year is that students carry out ten laboratory experiments in teams of two. Data reduction and at least preliminary calculations are carried out on all experiments during the lab period. Each student is responsible as the primary author for one to two experiments. The second team member serves as primary critic and secondary author. The instructor assists the student with learning how to use SWP. He reviews and makes suggestions for improvement on at least one draft. The reports are copied and distributed to the class. A soft binder is provided. When a series of reports are finished, a class symposium is held with the team making a presentation on their experiment. Formal reports are not prepared on the last few experiments in the semester, but the class data is shared and discussed. These experiments are usually high interest experiments, such as x-ray powder pattern experiments or quantum chemistry experiments using Spartan, Gaussian 94, or CAChe.

Hardware and Software:

We have licenses for three student versions and my original upgraded professional version of SWP. One of the student versions runs on a PowerMac®, and the others are operating under Windows 95® on a 486 and two Pentium® based machines. The difference in the student and professional version is not apparent and would become apparent only on long documents. The student version is available through your local bookstore from Brooks Cole Publishing for just over $100, and the professional version is available from TCI for around $500 (I have seen this one discounted). Three manuals are available: an introductory manual, a word processing manual, and a scientific calculation manual. The student edition does not come with complete manuals, but they may be purchased separately. We have moved documents between the IBM compatibles and the Macintosh with some problems. The program was written for the IBM compatibles and runs best on the Pentium based computers. The program is not difficult to use, but it has so much in it that I am still learning how

to use some of the wonderful features. I obtained funds from the Dean of Faculty to purchase some of the software for this project under a faculty development grant.

Scientific Word Processing:

Typing in a report is straightforward, but there are a few traps or pitfalls. The report is printed by TEX® program, and the screen image is essentially what you see, but the preview mode gives a clearer view of what the hard copy will be. A style is selected from a large number of styles including the format for a large number of American Physical Society and mathematical journals. The thesis style of my undergraduate (NDSU) and graduate (MIT) institutions are included. The selected style forces the document into a definite format. You may design your own style. Pull down menus and tool bars are many and powerful. The printing and preview programs fail if you do not have paragraph ends or fail to include text under a section heading. Students are initially frustrated that the program will not let you, without special effort, for example, to put two spaces between sentences. (They accept my explanation that all the word processing programs I have used since 1990 automatically insert the second space.)

Text and mathematical objects (equations) are treated differently. Text is in black and equations are in red on the screen. The speller does not check mathematical objects. Equations are easy to enter and appear in typeset quality form. You may put subscripts on subscripts as physical chemists love to do. We use Windows to bring in graphical objects such as drawings and spectra. The equation editor is easier to use and much more powerful than the equation editors in WordPerfect or Word.

Scientific Mathematics:

The authors of a report on an experiment receive data from the other teams doing the experiment and incorporate these results into their report. This gives the class a more complete understanding of the experiment and associated errors. SWP has the full power of Maple® available. Students use this power to perform calculations and to make tables and graphs. The ability to integrate, find roots, solve differential equations, and solve simultaneous equations is rarely used in preparing reports, but the students become aware of the power of Maple® and use these capabilities to solve more difficult problems. The current version has an interface that allows you to use Mathematica®. When I initially decided to try this change, I also investigated the improved text handling capabilities of the latest versions of MathCad® and Maple® and found them to be inadequate.

Conclusion:

I wish I had made this change years ago. Students are learning more about writing formal reports. The quality of reports is significantly greater. Students are much more enthusiastic about the writing aspects of the course. The direction and amount of effort by students and me has changed and improved. The drudgery of writing a report every week has been lost. This year I am going to give an hour examination on the laboratory to increase the understanding of the experiments.

Acknowledgments:
I thank my students, Professor Martin Farrell, the Office of the Dean of Faculty, and the Department for assistance in this effort.

Endnotes

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8. **If you wish to see a sample report, please send me a request.**

Environmental and Industrial Chemistry.

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Once again the Committee on Computers in Chemical Education is planning an undergraduate on-line chemistry course for the Spring semester of 1998. This course will once again focus on "Environmental and Industrial Chemistry." The committee felt that there was sufficient interest to repeat this course. However, courses on other subjects are being planned as well. The on-line activities will be scheduled for February 2nd to April 24th, 1998.

In this course as before, the Internet will be used for discussions among students (student Listserv), faculty (faculty Listserv), and experts: on campus, across the nation, and around the world. However, this course will make much more extensive use of the World Wide Web than the last offering.

Process Related Goals of the Environmental and Industrial Chemistry Course.

1. to provide an electronic forum which permits students easy, significant interaction with professionals (scientists, governmental officials, and potential employers),

2. to provide a context in which students will interact locally and at a distance to do brain-storming, data-gathering and problem-solving in order to deal with the modern use of chemical materials.

3. to provide an opportunity for students to research, develop, and synthesize complex ideas, and to build interrelationships between concepts and issues though intelligent technical discourse.

4. to provide the incentive for investigation of the physical and chemical properties of a specific commercial chemical product.

5. to provide guidance for students in accessing and interpreting electronic and printed documents describing chemistry of industry and the environment written by corporate, governmental, and/or academic authors.

Responsibilities of Participants

Students will participate in collaborative learning assignments where they can practice division of labor, teamwork, and individual responsibility. The electronic medium will be used by the students to seek insight into concepts they have difficulty with as well as to respond to difficult concepts posed by colleagues (their peers).

The instructors will interact with the students at their own sites, guiding library work, prompting questions, etc., while the students will write to each other as colleagues. Students will be encouraged to interact with each other and perform library investigation before they question the authors of the works. Student collaborative groups will be facilitated to pose higher order questions to the experts.

While some schools may wish to have their own independent assignment schedule, faculty participants will be encouraged to collaborate. We anticipate that an essential core of faculty will respond to the documents and each other in order to formulate critical thinking questions, classroom activities, and writing assignments to be made available for adoption by any or all of the other participants. Faculty/expert facilitators will select and review Industry Sectors, and nominate them for study, from the USEPA Industry Sector Notebook Reports (described below).

It is the responsibility of each participating institution to register students and to provide college credit for the course. The role of the OLCC organizing committee and the CCCE is limited to assistance in organizing and administering electronic aspects of the course. No credit will be given and no fees will be assessed by the American Chemical Society. It is suggested that 3 semester hours of student credit would be appropriate in most cases for full participation in this project.

It will be the responsibility of each local faculty member to assign grades to the individual, local students. In addition to the student Listserv there will be a faculty Listserv to allow free communication among the various faculty members involved, as well as between faculty and authors of papers. It is intended that web conferencing software will also be used to supplement the Listserves.

Content specific Goals of the Environmental and Industrial Chemistry Course.

1. to develop greater insight into the application of chemical science to environmental concerns.

2. to explore a subset of 50 industrial chemicals in production in 18 industrial sectors and perform life cycle analysis of their benefits to society and their impact on the environment.

For example, How is the chemical obtained? What is it used for? How much energy is used to make it? Is it easily disposed of? Why do we need so much of it? How do we get more of it? And, what opportunities for pollution and pollution prevention exist in the production, use, and disposal of these chemicals?

A theme of "chemistry behind pollution prevention" has been selected. The core documents have been compiled by the United States Environmental Protection Agency, Research and Development Headquarters, for the Office of Enforcement and Compliance.

A separate notebook has been developed by the EPA Office of Compliance covering 18 selected major industrial groups focusing on key indicators that holistically present air, water, and land pollutant release data. These notebooks have been thoroughly reviewed by experts both inside and outside the EPA. The notebooks range from 84 to 164 pages and include bibliographic references and a description of research methodology.

Each sector-specific notebook brings you comprehensive, well-researched details gathered for the first time in a single source and includes:

- A comprehensive environmental profile
- Industrial process information
- Pollution prevention techniques
- Pollutant release data
- Regulatory requirements
- Compliance/enforcement history
- Innovative programs
- Contact names

Industrial sector notebooks are available for the following sectors:

- Dry Cleaning Industry
- Electronics and Computer Industry
- Wood Furniture and Fixtures Industry
- Inorganic Chemical Industry
- Iron and Steel Industry
- Lumber and Wood Products Industry
- Fabricated Metal Products Industry
- Federal Facilities (PDF)
- Metal Mining Industry
- Motor Vehicle Assembly Industry
- Nonferrous Metals Industry
- Non-Fuel, Non-Metal Mining Industry
- Organic Chemical Industry
- Petroleum Refining Industry
- Printing Industry
- Pulp and Paper Industry
- Rubber and Plastic Industry
- Stone, Clay, Glass and Concrete Industry
- Transportation Equipment Cleaning Industry

For further information about an on-line course like this, see the WebPages for OLCC-I at:

http://www.py.iup.edu/college/chemistry/chem-course/webpage.html

and additional information and evaluations of OLCC-I at:

http://www.clarkson.edu/~rosen2/olcc.html

For more information contact one of the organizing committee members.

The Organizing Committee for OLCC-II

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Those interested in participating during the spring '98 semester should complete and submit the pre-registration/interest form at:
http://www.py.iup.edu/college/chemistry/chem-course/olcc2.htm

by December 5, 1997. All registered schools will be contacted and asked to reconfirm their participation between December 5, 1997 and January 16, 1998. Late registrations will be accepted, but registration by December 5, 1997 is preferred. A list of participating students will be due by January 31, 1998.

EVALUATION OF CHEMCONF '97 BY CONFERENCE PARTICIPANTS

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An Information and Evaluation Form was distributed to all registrants of the 1997 summer on-line Conference entitled "General Papers in Chemistry and Chemical Education". (The papers and discussion are available on the Conference Web Site (http://www.wam.umd.edu/~toh/ChemConf97.html)). 63 forms were filled out and returned. This represents eight to nine percent of the 700 to 800 registrants. This article contains a summary of the responses.

STATISTICS

To obtain a better understanding of the degree of participation a number of questions were asked.

Question 6: How many of the 11 papers did you read?
Average = 7.5 SD Average = 0.42
SD Average is the standard deviation of the mean
31 % of respondents read all eleven papers
1.6 % (one person) read none of the papers!
3.1 % read one paper

Question 7A: How many papers did you look at?
Average = 9.2 SD Average = 0.33
57 % looked at all eleven papers
1.6 % (one person) looked at one paper

Question 7B: What percentage of the papers you looked at did you read?
Average = 79 SD Average = 3.2
45 % read 100 %

Question 8: Total Time Spent Reading Papers (in hours)
Average = 5.6 SD Average = 0.53
3.4 % spent 20 hours (the maximum time spent)
5.1 % spent 1 hour (the minimum time spent)

Question 9: Average number of times participant accessed the discussion each day
Average = 2.3 SD Average = 0.24
1.7 % accessed the discussion 10 times/day
16.9 % accessed the discussion 2 times/day
3.4 % accessed the discussion 0.5 times/day

Question 10A: Total amount of time devoted to the discussion (in hours)
Average = 13 SD Average = 1.3
1.9 % devoted 50 hours (the maximum time)
3.7 % devoted 0.5 hours (the minimum time)

Question 10B: What percentage of the discussion did you read for the papers which you looked at?
Average = 80 SD Average = 2.9
30.5 % read 100 %
3.4 % read 20 % (the minimum)

Question 11: Total time devoted to the conference (in hours)
Average = 22.5 SD Average = 1.9
3.5 % devoted 60 hours (the maximum)
1.7 % devoted 2 hours (the minimum)

EVALUATION
Evaluation scale 1 to 5 - 1 is Poor, 3 is Average and 5 is Excellent

Question 12: Overall evaluation of papers
Average = 3.8 SD Average = 0.082
10 % Indicated the papers were 5 (Excellent)
60 % Indicated the papers were 4
25 % Indicated the papers were 3
1.7 % Indicated the papers were 2 (minimum)

Question 13: Overall evaluation of the discussion
Average = 3.5 SD Average = 0.084
4.9 % Indicated the discussion was 5
41 % Indicated the discussion was 4
42.6 % Indicated the discussion was 3
3.3 % Indicated the discussion was 2 (minimum)

Question 14: Overall evaluation of the Conference
Average = 4.0 SD Average = 0.092
1.7 % Gave a 6!
16.7 % Gave a 5
56.7 % Gave a 4
20.0 % Gave a 3
1.7 % Gave a 2

COMMENTS

For the most part these comments are unedited. A few comments were omitted - often because the meaning wasn't clear. Some respondents did not include answers to every question. Each comment is numbered and those comments having the same number were sent in by the same person.

Question 15: What Did You Like Most About the Computer Conference?

1. Advantages of a meeting without the time and expense of travel
2. The papers covered a variety of topics - multimedia presentations, use of spreadsheets, testing procedures, etc.
3. The chance to attend a conference even without travel money
4. The papers showing use of new digital electronic media in teaching, presentations, and inter-faculty communication
5. The concise and thoughtful discussions and questions
6. The papers addressed timely issues and the discussion uncovered several new perspectives.
7. Ability to discuss papers with the authors
8. Web access to papers and freedom to pick and choose among topics
9. The free exchange of ideas
10. Combined papers and discussion, and immedi ate feedback
11. Wide variety of ideas - very well organized and run
12. I could access the papers and discussion at any free time I had during the day. Travel was not necessary.
15. Several good ideas presented and good discussions took place. I enjoyed getting a sense of what is going on at other institutions with respect to pedagogy and administration.
16. I liked the informality as well as the self-paced nature. I could get to it when it was convenient. The level of discussion was often quite high. I also like some of the digressions.
17. I "meet" colleagues and "speak" with them while at "home".
18. Van Bramer paper
19. Topics covered by papers I read
20. The wide range of authors and "attendees" made for an interesting mix.
21. Easy access to lots of very exciting and new educational projects - some new ideas in formating of chemical curriculum (e.g. SI)
22. It was interesting to see other comments from people not at my institution. It was one method of learning what is out there and what others are doing. I spent a fair amount of time just lurking. This was my first on-line conference.
23. I was one of the 700+ "lurkers" in the conference. As I am a graduate student I haven't had an opportunity to teach lecture courses and don't feel my knowledge and experience base is sufficient to make any "real" contributions to the discussions. However, I very much enjoyed the OPPORTU-NITY to gain insights from people who are in the field of chemical education and are pioneering new ways of teaching. I obtained a lot of information from the conference and am looking forward to applying that knowledge when I teach students. Most of my educational experience has been via the standard lecture format. I was pleased to learn about the success and possibility of other approaches in chemistry.
24. Asynchronous access to papers and discussion
25. Good way of exchanging ideas nationally and internationally at nearly no cost
26. Being able to participate without leaving

town
27. The ease with which I could come or go as I chose
28. A great opportunity to exchange ideas about teaching chemistry
29. Access to the on-line sites and an opportunity to play with multimedia (e.g. in Paper 1)
30. Reading the papers
31. Wide variety of topics - ability to "attend" everything and participate when free
32. It's a chance to "listen in" and share ideas with others doing things I am interested in. The format is convenient. I was able to print copies of two or three papers and take them with me during my travels.
33. Lively discussion and timely responses
34. The sharing of ideas in the discussion gave me an opportunity to see how those at the university level address some of the same concerns that I have at the high school level. I also got some valuable hints about how I might improve my teaching and more impor tantly the understanding of my students.
35. The new ideas and viewpoints which were generated - The Conference is great if you do not have the time or money to attend an on site conference.
36. Some of the ideas presented in the papers were very interesting.
38. The convenience of participating from my office
39. New ideas
40. It gave a feeling of being connected to the rest of the world which is hard to duplicate in any other way.
42. Flexibility, in all respects
43. I think the topics covered were relevant to current teaching needs.
45. Discussion of actual classroom experi ences with newer teaching methods
46. Contact with a large group of colleagues
47. The experience
48. Good dialog, no need to travel
49. I liked the flexibility of paying as much or as little attention to the papers as I wanted and yet having a variety of topics available.
50. Ease of access and a variety of perspectives
51. Some quite vibrant discussion
52. Good ideas and time to consider and formulate ideas
53. Remote access - the discussion of virtual office hours and news groups
54. The ability to participate without money/time constraints - the discussions about computers in undergraduate education and visualization in the classroom
55. Being able to participate
56. It allowed me to "lurk" and read the papers at my own pace. I am a high school teacher working on an MS in grad school this summer, so free time has been at a premium.
57. Reading things on my own time when my schedule allowed instead of "right away"
58. the experience
59. I especially liked Mary Swift's and Theresa Zielinski's paper and other information about what chemistry majors should be able to do with computer technology.
60. The ability to proceed at my own pace - easy access to discussion of all papers since there were no time conflicts that result from simultaneous presentations in live conferences - no direct cost, this makes the information available to someone like me who is working outside the field
61. The mode of delivery (over the Internet) allows the Conference to fit into my busy schedule. I also liked the opportunity to link to references and resources on the WWW where I am constantly looking for materials and ideas for my classes.
62. the experience
63. The ability to read the papers

Question 16: What Did You Like Least About the Computer Conference?

2. Most of the responses were from college professors. Pre-college teachers (including myself) seemed to keep quiet.
3. It took too much time and extended over too long a time period.
4. The pace of the paper reading schedule was difficult to fit into a full-time employment situation.
5,8,9. The massive amount of e-mail
6. The high likelihood of misunderstanding that comes from on-line discussion. Comments cannot be clarified without a significant time lag and, even then, may be missed. This problem is unavoidable but might be reduced by establishing a better mechanism for tracking threads.
10. Too much mail at the beginning
11. Some papers carelessly written, a lot of downloading problems
12. I found it was very time consuming and lots of the information seemed almost redundant.
15. It lasted a bit too long - I ran out of steam about 3 weeks ago.
16. I am still printing hard copies of everything. I wish I was disciplined enough to read it directly off of the Web (to save paper,

printer toner, etc.). I sometimes found it difficult to keep up if I missed a day because of other commitments. Also, I joined the discussion late because I was out of town for the first two weeks; so I missed participation in discussion of some of the early papers.

17. There is no Chairman who manages the discussion as at usual conferences.
18. Separation of questions and discussion
19. Amount of time that would be necessary to ferret out all of the information
20. Frankly, there were too many papers and the conference went on too long.
21. Redundancies in some of the responses - lots of rehash - Discussion and responses by some of the participants clearly stated my position and I did not fill the bandwidth with "more of the same".
22. It took a while to get used to following the discussion threads. Obviously, the discussions are not as good as those in real life, but I found them useful.
23. The difficulty of accessing some of the sites - I did not make major efforts at this and I think this is due solely to high traffic on the web.
24. Retrieval of the papers - In one case I wasted hours trying to get a paper.
25. Paucity of interaction - on the other hand, I did think that a number of very passionate folks contributed way too much - it's not quite right to say that too much involvement is bad, because passion for ideas is important - maybe moderation is the key
26. Too long - same responders to every paper - I did not have enough time to devote to the Conference.
27. There seemed to be some confusion between short questions and general discus sion.
28. It was a bit too long, after the first seven papers, my interest dropped way down.
29. A lot to read - I often trashed without reading unless I was really interested in a paper.
30. The large volume of e-mail and the fact there was a lot of repetition in the discussion
32. My own slowness with the medium and the fact that I'm in my office and subject to the usual interruptions that occur in a day - Neither of these has anything to do with the confer ence itself.
33. Messages were from only a small fraction of the participants
34. Because my schedule did not allow me to be involved on a daily basis, it was some times difficult to follow discussions.
35. Finding time to read the e-mail, but that is part of the platform we are using - It is great to use this platform, participate in the conference and still take care of our other responsibilities, commitments and vacation plans.
36. The time required to read and participate fully in the conference
38. One of the papers was not of the same quality as the rest of the papers in the conference.
39. Too few participants in the discussion
40. Only two or three of the 11 papers were interesting to me. One paper appeared to be almost a duplicate of an earlier paper, and I had heard another given at an ACS meeting. Also, the discussion seemed to me to wander pretty far from the papers at times. I had the feeling that people were just using the conference as a forum for grinding their usual axes.
42. Please encourage authors to keep papers simple. Graphics greater than 10k (?) should be discouraged, especially if they have no content. The 600k PDF file was inexcusable. These comments are not meant to discourage legitimate use of technology. . . . I did get much out of this - lots of stimulating discussion. I shared some messages with colleagues, and had some private conversations with other participants. So overall, I feel it was worthwhile. The schedule seems rushed. I am looking forward to the more relaxed schedule you announced for the session beginning in January 1998. Maybe you can continue that for future summer sessions.
43. I could not devote enough time to keep current in the discussion, hence I did not participate as I would have liked.
45. Interjections from the organizer admonishing the audience to answer the questions posed by the authors and exhortations for lurkers to participate more actively; this would be very unusual at a traditional conference and surely each individual should be able to involve themselves as they choose
46. It moved very slowly.
47. Very time consuming - I would have liked to put in more time for each paper.
49. Some of the topics seemed a bit abstruce to me - for instance, discussions about simulations.
50. Repetition of some comments - the Conference was too long - by the end I was tired of it.
51. Rather low signal to noise ratio at times
52. I was out of town over a week and there was a huge pile-up of e-mail. I had to lurk mostly.
54. Dragged on too long

55. That it ended
56. The flood of "unsubscribes" mistakenly sent to ChemConf rather than the Listserv.
57. Much of the discussion was after regular semester classes had ended and I wasn't necessarily near my computer to participate as fully as I might have during the regular academic year. Some of us do not live especially close to our campuses.
58. We were still in classes when the conference started and it was difficult to keep up with the discussion. The volume of messages made using e-mail time consuming.
59. I was somewhat overwhelmed - Where will I ever get the time and expertise to do some of the things which were suggested.
61. Some irrelevant discussion that did not relate to the topic of the papers - It was somewhat tiresome to repeatedly hear the same opinions from the same participants.
63. Some of the discussion seemed to be very specific about some tiny concept in the paper.

Question 17: What Changes Could Be Made to Improve Computer Conferences? (Schedule, Papers, Short Question Sessions, Discussion Sessions, etc.)

1. Require all authors to be present and respond to questions immediately.
2. Timing is off a little - Some people are away on summer vacations.
3. Keep the schedule to a shorter time frame. If I had had teaching duties this summer, I would never have been able to access all the conference notes. It would be helpful to schedule all the discussion of a particular paper at the same time — I tended to get lost when discussions were mixed.
4. For me, increase the spacing between papers to last the full summer
5. The initial comments were voluminous, and lots of e-mail piled up. This is the nature of conferences like this, I think. Maybe we should space the first few papers farther apart, so there is time to deal with the volume.
6. In the interest of time and continuity, I would eliminate the Short Question sessions and add a day of discussion to the papers. The Short Question time turned into discussion anyway, and the time between reading the paper and discussing it seemed to reduce the interest in the topic. The overall length of the Conference should be reduced. Interest wanes after a couple of weeks and it's not quite fair to "later" authors to not have the animated discussions accorded "early" authors.
7. Chat room discussions might be an interesting approach, but overall not much need to be changed.
9. Short Question sessions and a break between each discussion period for at least a day
10. I didn't see much value in breaking things up into short questions and discussion - combine somehow.
11. Set higher and tighter standards for the papers
12. I enjoyed most of the papers that focused on something that was actually being done and the evaluation of it rather than those that emphasized an expression of philosophy about actual experimentation or methods.
15. Hard to say - maybe fewer papers
16. I don't think the short question session was that useful (probably because most of us didn't use it properly). It seemed to be much the same as the regular discussion of papers. I think I would prefer a slightly longer discussion time for each paper.
17. New topics for discussion - we all agree on the main goal of using computers in teaching - what about changing teaching - what may we omit in chemistry courses when we use computers? It would be interesting to discuss some definitions in chemistry - substance, heat, energy, reactions, etc.
18. Change the separation of short questions and discussion.
20. Fewer papers
21. Merge the short question - discussion sessions together. There was some confusion about where the responses belonged.
22. I suppose a better set of discussion guideline would help. Also, some information for complete novices would be useful (What is a Listserv, how it works, how discussions are carried out). I don't know if it is possible but some method of threading the discussion would help. I have seen threads used on WWW pages and perhaps this approach could be considered instead of a Listserv.
23. I enjoyed the discussion sessions more than the actual papers. I found the frank exchange of ideas by different people refreshing. I suggest making the discussion sessions a little longer.
24. Make papers available by more convenient means (perhaps e-mail for text, ftp for other parts).
25. That's a toughie - I do like the idea of a "Central Office" that looks at responses, but not from the standard "censorship" viewpoint - rather, as a way to make sure that the most

meaningful responses get posted in a reasonabl order. "Freedom of discussion" doesn't necessarily mean anarchy. That is, giving direction to discussion is a valid role of a discussion organizer - in fact, it is a paramount role. That may mean editing responses to guarantee that they have the most impact (not changing words - just slicing out the fat). Most responses are too long. They can be more concise and this is a valid function of the discussion leader.

27. Fewer papers in about the same amount of time - It seemed there was some burnout at the end.
28. The format seems to be working very well.
30. For those who don't wish to receive a large volume of e-mail, a summary of the main points made in the discussion would be helpful.
33. Develop means of stimulating more discussion
38. Schedule a group of papers (5 papers maxi mum, 3 to 4 might be better) on a common topic. The conference format seems to be satisfac tory otherwise.
40. I think you need to begin to exercise some selectivity with the papers and discussion. I don't know exactly how to manage this, but you might give it some thought.
43. The time frame for discussion should be expanded so that more people may participate as they are able.
45. The recesses seemed to have a large inhibitory effect - perhaps papers could be paired thematically so that an entire mini-session fit in one week (e.g. reading of papers on Monday and Tuesday, short questions for both papers on Wednesday, and general discussion of both papers on Thursday and Friday).
46. Help with problems with Adobe PDF format and needed plug ins - Some way to continue discussion beyond the two scheduled days when this is needed on a particular paper
47. Less papers per session and a bit more time for each paper - Maybe a break between papers - I noticed that the discussions were not as intense in the later papers.
50. This Conference seemed to work very well - no real changes
53. Conduct discussion on a web page through a chat mechanism or a customized Java interface
54. Run during middle of the summer (when schools on the quarter system have finished) - I was grading final examinations as I read the first papers and questions.
55. Maybe a little more time for discussion of papers and general discussion since some discussions were just warming up when the next one started
56. I thought the Conference was very well done and especially convenient!
57. 11 papers were a lot - I read most papers as the discussion was on-line - It would have been difficult for me to read the papers, follow the discussion and respond in a timely fashion.
58. Have fewer papers and an extra day for questions and discussion - Perhaps split the Conference into two conferences of 6 papers each.
60. I would suggest short conferences illustrating innovative teaching of a specific topic or module such as equilibria and molecular modeling.
61. The conference was very well organized and schedules. Thanks for a job well done. I would like to see more papers with simultaneous discussion so that one could choose which discussion to become involved in (as is the case at most conferences with many simultaneous sessions). Smaller discussion groups may encourage more individuals to participate in the discussions.
62. Having fewer papers with an extra day for both the questions and the discussion. Maybe split the conference into two conferences of six papers each.
63. Seemed OK to me

Question 18: Compare this Conference with the Usual On-Site Conference

3. Better than not attending anything, but on-site is more exciting - Face-to-face discussions are shorter, but allow for less blathering, which seemed to happen quite a lot
6. It's really unfair to compare because the two meet different needs. An on-line conference allows for more reflection on the papers and can produce more substantive comments. The on-site conference builds better networks of colleagues because of the hallway chats and face-to-face interaction.
7. I got far more out of this on-line conference than most on-site conferences.
8. Having the text of the presentation is better than the usual live conference. Also, there is a better chance to contact and discuss things with the author.
10. This is probably the only way I would see chem. ed. papers. At on-site chemistry conferences I need to spend my time attending research papers in my field.
11. On-line conferences are less expensive.
12. On-line conferences afford the participant more freedom and the ability to continue their regular work without interruption. I also feel

that the comments made in the discussion were more thorough than at a usual conference and attribute this to the freedom in scheduling and length of time alloted to participants for discussion.

15. Being able to access the papers and read them ahead of time is very good - one has time to consider what questions to ask and to absorb some of the ideas that are being presented. This is a real plus and certainly leads to improving my retention of these ideas. Also, it is very nice to be able to go to the Web site and review any paper and all that has been written publicly about it.
16. I think reading a paper is different from presenting a paper. It is a bit harder to get the same emphasis on important points and the author's enthusiasm is difficult to transmit. I think an on-line conference offers the opportunity for more people to participate than at an on-site conference, since there is often not enough time for answers to questions. It is nice to fly somewhere, stay in hotels, etc.
17. On-line and on-site conferences are very different events and comparing them is impossible.
18. Equally as good
19. Cost effective - good information - Some of the discussion is not as well thought out as discussion at an on-site conference. However, there is more time available to formulate a question and to give a reasoned response.
20. The authors were held to be MUCH more responsible for their work. The questioning at U. S. scientific conferences is seldom this intense. This is a plus.
21. This gave me the opportunity to participate and continue my summer research program without interruption!
23. It is easy to hear every person's point of view in an on-line conference. I believe discussions are more in-depth as people have more time to think about comments and think through their responses.
25. Time to consider ideas is available here. That is good.
26. Makes it accessible to those with limited budgets. Harder to get to know other conference "attendees" this way.
27. Not at all the same - here one has the opportunity to participate on an equal status with all others - paper quality was as good or better
28. An on-line conference provides a better opportunity to interact with a wide range of other faculty outside those I already know and would spend time with at a meeting - As a young faculty member on-line conferences provide me an excellent opportunities to network.
29. I liked it better - I could do things at my own pace - have e-mail chats with some of the authors and discussants - get hard copy of the things I was most interested in - come back to a paper to get more out of it - Discussion is much livelier than at on-site conferences where time is limited. Incidentally, I appeared to be a lurker in this conference but that didn't mean I wasn't interested. I didn't have anything to contribute that wasn't already being said by someone else. The last thing this conference needs is people doing a "Me too!". There is too much to read as it is.
31. The major advantage is being able to "attend" all sessions.
32. I prefer seeing people face-to-face, but this conference method is an excellent alternative and a good way to save money and still communicate. Idea exchange is slower on-line but the whole thing seemed to work very well.
33. Much longer time was an important feature - could catch up if you got busy with other things
34. Much more convenient and less expensive
35. The cost and time-saving are great, as well as hearing from a group of people which generally would not be able to be at the same site at the same time - Some spontaneity and collegiality are missing
40. This on-line conference was greatly superior.
42. The on-line conference is mostly superior due to the flexibility. At an on-site meeting you have to wait for someone to recognize you, and there is usually a limit to discussion.
43. Attendance, even reading the papers is definitely better than seeing only an abstract in a regular journal. One feels greater participation, even if only lurking. Like other lurkers, I do enjoy reading the discussion, though I felt inhibited from posting because I was always 2 or 3 days behind the postings - summer teaching, home responsibilities, need to use dial-up Internet connection - all contribute to this. (I regularly download the messages, then read them off-line to minimize tying up phone lines and minimizing on-line costs.) Some interaction is lost by not going to an on-site conference, but very often I can not afford the time or money. Those at teaching institutions don't get enough support to go off to conferences during the year.
44. In theory an on-line conference is better because it leaves me in better control of what and when I read the papers. Such conferences

also allow for more discussion, which I think is more interesting than the papers themselves. Everyone has a chance to be heard.

45. The signal to noise ratio was a bit lower than for a traditional conference, but this is more than offset by the ability to participate at essentially no cost (only time, and how much of that one spends is entirely up to the individual).
46. It is easier to participate on-line. It could be better, but participation and the discussion was not outstanding this time.
47. Participation in an on-line conference does not require me to leave my place of work and family. However, participation more than doubled my workload. Many times keeping up was left until late in the evening.
49. It seems to me there is a lot more communication and thought which occurs in an on-line conference.
50. On-line conferences are less expensive for a participant and more convenient. However, it is more difficult to talk and get into deep conversations by e-mail. At an on-site conference everyone hears the questions and answers at the same time so there is not so much repetition of the discussion. Also, it is nice to put faces with names. But I think this is an excellent way to have conferences. I just wouldn't give up the on-site ones.
51. The inability to "walk away" from discussions means that one has to sit through a lot of discussion in which one is not interested. The use of the subject line to categorize comment works only to a limited degree. On the other hand, discussions are often more far-reaching when an interesting topic arises, because of the number of people who contribute to the discussion.
52. On-line conferences are much more productive.
53. I participated in my pajamas! I didn't have to worry about insulting a discussion contributor when I skipped his or her comments.
54. On the plus side - time and money saved by not traveling - not having to choose between simultaneous sessions - easier for me to ask questions or provide comments
On the minus side - Professional interactions with others limited - attention divided because of local concerns
55. An on-line conference saves time in travel as well as the dead times during the normal conference. Far less stressful
56. The extra time to reflect upon and review a paper is wonderful for slow thinkers like myself.
57. I think we miss a lot of the connection we need doing this on-line. Perhaps more people from all over can participate, but the comfort level necessary for responses, questions, discussion, etc. is missing. Maybe that explains why so many lurk. There isn't the follow-up interaction to inspire.
58. Interesting but not intense
59. I prefer this on-line conference because it allowed more discussion and was less expensive.
60. No "simultaneous presentation time conflicts" - no travel or registration costs as with on-site conferences - no direct contact with colleagues is a negative but is mitigated by access to the participants list and their e-mail addresses - The "social" interactions associated with on-site conferences is less or at least of a different nature on-line.
61. More access to the discussion and papers which I could read at my leisure - Even my vacation did not interfere. - Much less choice in papers and sessions than at an on-site conference. I also miss the valuable opportunity to interact with those attending the sessions as well as the presenters. There didn't seem to be too many different individuals participating in the discussions (especially the last couple of weeks). I also miss the freely disseminated ideas and resources that occurs during an on-site conference. In a sense, e-mail and written discussion seems to limit communication.
63. Compares favorably

FURTHER DISCUSSION OF ON-LINE MEETINGS

A discussion of the format and nature of on-line meetings will be held on the CHEMCONF Listserv during November. The organizers of the 1997 Conference would be interested in any further comments or suggestions from those who participated in the Summer 1997 or earlier Conferences. If you wish to participate or monitor the discussion and are not presently subscribed to CHEMCONF, send the message:
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1. General articles on how teachers are using computers ____
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OVER PLEASE

11. Are you a member of the:

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Division of Computers in Chemistry?	____ Yes	____ No

12. Areas of Computer Activity and Interest:
Leave the space provided below blank, if you have no present interest or activity. Insert a number from 1 to 4 depending on the amount of activity.
1 means with a consuming passion, 2 means considerable
3 means moderate, and 4 means a little.

	Activity	Interest	Description of Use
Word Processing	____	____	_____
Spreadsheets	____	____	_____
Data Bases	____	____	_____
Other Languages	____	____	_____
Simulation	____	____	_____
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Laboratory Automation	____	____	_____
Drill and Practice	____	____	_____
Other (specify)	____	____	_____

13. Provide a brief description of the hardware you use.

_____

14. Other Comments or Suggestions:

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