Chairman's Comments

WHERE DO WE GO FROM HERE?

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In the previous issue of the Newsletter, my editorial focused on the achievements of the CCCE under the chairmanship of Don Rosenthal. This was appropriate, since these accomplishments have been significant. It would be a mistake, however, to think that the work of the Committee is largely completed. The changes in chemical education in the past few years are only a prelude to what lies ahead.

Let me give you an example of how far we have to go. Two years ago, during the ACS meeting in Orlando, I attended a symposium on the international chemical industry. My main motivation was curiosity; how have changes in communications affected the way that chemical companies do business? The answer surprised me.

One speaker discussed the development of a new product, which began with an initial discovery at a university in Massachusetts. Then the Massachusetts group worked with the main company laboratory in New Jersey to confirm their results. There was almost no face-to-face communication; the two groups exchanged information mainly by means of teleconferences and electronic mail. Next, a pilot plant in Holland was brought into the process, and now all three groups communicated by telecommunications. Finally, a production plant in the Carolinas produced the product, while all four groups now cooperated by means of electronic communications.

As I heard this description, I could not help but ask myself, "Are we preparing our students to work in this kind of workplace?" When I looked around the room, I was startled to realize that I was probably the only chemical educator present. The total audience was only a dozen people, and most of them were the speakers from the symposium. It left me with an uneasy feeling about how far we in higher education have to go in order to give our students a solid preparation for the world they will encounter after graduation.

This fall I attended the ACS meeting in Boston and came away with at least a partial answer to my concerns. During a symposium organized by Dr. George Long (Indiana University of Pennsylvania), a member of this Committee, I heard several papers that described how electronic collaborative methods were being used for teaching. In two cases, consortia of professors from several different campuses had created an opportunity for their students to work together in the physical chemistry course. Another paper reported on the latest On-Line Chemistry Course, in which students from several different campuses work cooperatively. I was delighted and gratified to note that many of the faculty who are involved in these projects are members of the CCCE, and, of course, the On-Line Chemistry Courses are sponsored by this committee.

Higher education will not adopt new technologies overnight, nor will there be an immediate consensus about how to use these technologies for teaching. The process of exploring and implementing new methods will require both time and dedication. One job of the CCCE is to test the most promising new technologies. There may still be a long way to go before I can be satisfied that we are preparing our students for the new world of telecommunications, but the members of the committee are working hard to learn how to do this. It is clear that the CCCE has a full agenda for some time to come.

Multimedia in Lecture
First Attempts

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Lady luck came through for us at my college and we obtained some funding for updating computer equipment. I was able to purchase a Mac PowerBook 292 Mhz/9 G HD, and 160 M RAM. It's got a 14.1 inch active matrix screen and is probably the fastest laptop available at the moment.

I'm using it with an Epson 5000, 750 lumen projector. This is bright enough to work with lights on, though I tend to shut the lights at the front of the room off. I project the PowerPoint lectures on the sidewall, this leaves me with the freedom to use the front board, to answer student questions.

I queried a number of people about the methods they find most effective and I'm trying two with somewhat

different emphasis. One is based on some of the ideas in 'Peer Instruction", by Eric Mazur Prentice Hall, 1997 ISBN 0-13-565441-6.

One class is getting more short questions projected, that they try to answer. This gives me some idea of how they are understanding the topics. The second is getting more special effects with short QuickTime movies. I can project movies full screen with sound with no problem with the PowerBook. I'm also using Director animations that I've made up.

A great help has been using computer programs to generate examples live in class. For instance I'm currently going over g->mol type problems. After going over the basic ideas and definitions I project a g->mol program. Then select a problem and show the students how to do the problem using the program. The program is set up so all interaction with the user is by choosing from 4 multiple guess answers, A), B), C), or D). It has a built in tutor to walk the user through setting up a problem map or unit path then filling in step by step, with student input, each 'conversion factor' that makes up the map.

If you have set this up in PowerPoint you realize it can be very time consuming to do. Not for me I just click on a button in my PowerPoint lecture and the link starts up the program. I can show a variety of problems (random number generators give a choice of a large number of potential problems) and have step by step interaction with the class in doing the problem. I can have students hold up cards containing A), B), C), or D) to indicate their choice at a each step of the solution. This gives me immediate feedback of how each student is following the solution. The students have already been in the Mac lab and know how to use the programs, so this reinforces using the programs.

I want to reinforce this since we have been using programs for over 5 years and students who use them for more than a few hours show 2-2.5 grades higher on tests than those who don't. My projector has a zoom lens and a custom zoom (software) feature that allows me to make the program window quite large. Some of the programs have simulations available that project quite well.

The problem of students taking down every word of notes vs. others who take briefer notes, is more obvious with PowerPoint than with a board. Using chalk you have several boards to keep material up for a longer time. With PowerPoint some are getting fidgety while others are still busy writing. If you've come up with a solution to this let me know.

Note taking is helped by using computer programs that the students have access to. The students can use the programs themselves and work through similar problems- with less need to take detailed notes.

Multimedia in Lectures and on The World Wide Web.
Part 2

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Abstract:
How effective and efficient is the use of multimedia for learning in lecture and on the Internet? Most results are anecdotal and show positive outcomes, with students being enthusiastic about new methods of learning. It appears that most of this effect can be ascribed to using multimedia methods students are not familiar with (Hawthorne effect). No proof was found that multimedia learning is more efficient, i.e., that more is learned during the same time spent studying. Students did spend more time with the multimedia, so they learn more due to the increased time spent not because multimedia is inherently more efficient. This does not make the additional learning less meaningful.

It does suggest that a model for developing and using multimedia should include an awareness that the effect of 'new' multimedia may be short term. Development models should include the easiest ways possible of updating substantial parts of multimedia to include the newest and best material.

We increasingly have the need to prepare students not just with the ability to solve a given set of problems. They will need to gain the abilities to use new technologies to better understand what the problem is to start with, and then discover how to solve it. So its not sufficient to know the gas laws, we need to see in a situation that gas laws could solve an inherent problem. For instance global warming is currently much in the news, but how do you measure the temperature of the globe? If it is primarily the atmosphere then perhaps we can apply the gas laws to get our estimate. There is a sizable jump between being able to plug numbers into the gas laws and being able to estimate the global temperature using these laws and experimental data. Or to judge how good are the calculations done by experts.

If simply using new multimedia hardware and software