

Week 5, November 28

Sunday, Monday, Tuesday: Paper 6 Teaching Advanced Spectroscopy to Undergraduates Anton S. Wallner, Missouri Western State College.

Wednesday, Thursday, Friday: Closing Discussion.

Chemistry.”

2. Carlos Castro-Acuna, Ramiro Dominguez-Danache, Mercedes Llano-Lomas and Graciela Muller-Carrera (Universidad Nacional Autonoma de Mexico) “General Chemistry at UNAM : Providing Our Heterogeneous Student Body with a Launching Platform to Successfully Pursue Chemistry Careers”

3. Gabriela C. Weaver (Chemistry Department, University of Colorado at Denver) “Creating a Scientifically Literate Citizenry: What are the Long-Term Lessons that Students Should Take Away From General Chemistry?”

4. Brian Coppola (Department of Chemistry, University of Michigan at Ann Arbor) “Decisions, Decisions...”

5. Connie Murphy (Dow Chemical) “What Chemists in Industry Need to Know” (tentative title)

SEPTEMBER 1999 ON-LINE CONFICHEM

WHAT SHOULD STUDENTS KNOW WHEN THEY LEAVE GENERAL CHEMISTRY?

Organized and moderated by:

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ELECTRONIC HOMEWORK REVISITED

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General chemistry is a course that serves a vast and diverse student audience. Deciding what students need to know upon finishing the course is difficult because the audience is so varied. For example, how are the needs of pre-medical and pre-health students different from those of agriculture majors? What does the chemical industry think that students ought to know? What is needed for the one-semester vs. two-semester course? How do faculty define a student “need” vs. a faculty “preference” in the curriculum? What are some creative ways of dealing with diverse needs?

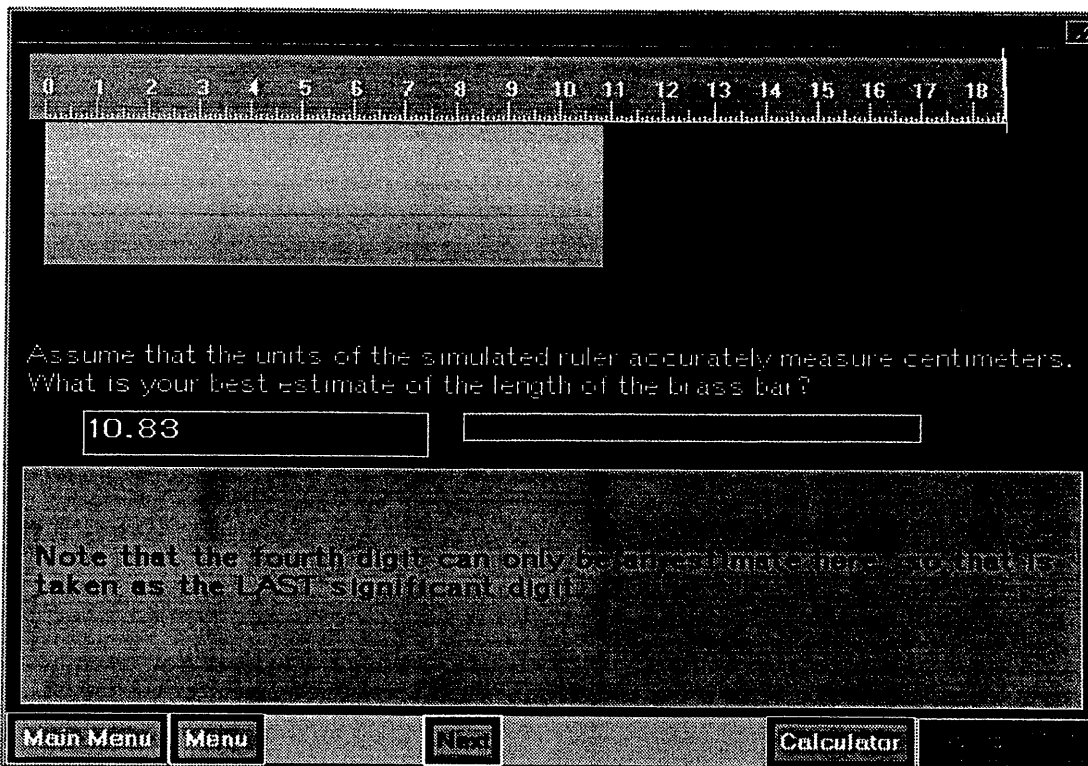
The CONFICHEM Discussion List and Website will be used for this session.

Authors of papers and their titles:

1. John Kenkel (Southeast Community College, Lincoln, NE) “On the Virtues of Industry-Based General

About four years ago, this Newsletter reported that Electronic Homework Passes First Large Scale Test (Appling, J and Spain, J., *Computers in Chemical Education Newsletter*, Spring 1995). This article dealt with the use of CHEMI-SKILL-BILDR by 1200 students in the General Chemistry class at Clemson University during the fall of 1994. The objective of this paper is to bring you up to date on the ChemSkill Builder (CSB) project.

The general term electronic homework refers to any system that uses computers to generate personalized homework questions and problems for students, maintains a record of student success and uses electronic means to transfer this record to the instructor so that credit for the work may be awarded. The CSB system is different in that: 1) it is based on a computer disk that the student purchases in the bookstore for a relatively small amount; 2) it provides full explanations of incorrectly answered questions and problems; 3) it



Sample Screen 1

maintains the student record directly on the disk which may be used at any location the student chooses to work; 4) it employs grade management programs that are provided without cost to adopting departments; 5) it requires no site license for departmental use.

Students hand in their homework by bringing their disks, containing the record file, either to a single master computer, or to a network of computers, where the transfer program is available. This program causes student records to accumulate in a class file from which they are accessed for analysis by a grade manager program. This results in summary data that can be viewed in a variety of ways and easily combined with the overall class record file. Typically, schools give 5-10% credit towards the final grade. We recommend keeping the credit as low as possible, as the major objective is to improve overall student success in chemistry. The credit is simply an enticement to get them started using this study aid. The individualized problem sets prevents students from simply copying from one another. However, there is no way to prevent one student from doing the work for another, though we believe that the time required to do this is a major deterrent.

The initial programs were written in QuickBasic and designed to be used with PC computers running on DOS. As a result, computer graphics and student interaction was restricted. Despite these limitations, the number of client institutions grew to about 20 during these first two years of operation and the total number

of packages sold increased to 20,000. Faculty and student reaction was generally very positive. During the summer of 1995, Spain was joined by Dr. Harold Peters (who had previously been Director of CONDUIT, the educational software clearinghouse at the University of Iowa). Peters began work on a new ChemSkill Builder for Windows, using Visual Basic. This provided an opportunity to develop many new kinds of student interaction as well as being more pleasing visually. CSB/WIN, Version 4.1. was released in the fall of 1996, consisting of two disks, one for each semester, packaged in jewel cases. This all worked as long as the instructor didn't want to employ the units from both disks during the same term, as the grade management system didn't allow overlap. Another disadvantage of Ver. 4.1 was that it was possible to have only 10 chapters on each disk, with the total limited to 20 chapters. During the 96-97 academic year, all software was sold by WCB/McGraw-Hill, either individually or in combination with their texts. However, this arrangement didn't work out, so the responsibility for individual disk sales was returned to Electronic Homework Systems, Inc in the summer of 1997. Since then we have contracted out CSB production and sales to Midwestern Diskette Center of Creston, Iowa. This is a large duplication center that has been very effective in providing a quality product to meet the needs of our client institutions. Meanwhile, WCB/MGH has continued to provide CSB bundled with their texts.

CSB/WIN, Version 5.1 was released in the fall

of 1997. This consisted of the full 24 chapters of material either on a CD-ROM or three floppy disks. At the same time, the grade management system was restructured, using Visual Basic, so records of all 24 chapters were in a single data file, eliminating the problem of assigning materials from both semesters during the same course. The CD-ROM with record-keeping disk was found to provide many conveniences over the floppy disk, the most obvious being that it was not subject to virus problems. All new software was packaged in a much more attractive and protective plastic folder. This package was reviewed recently by M. Larry Peck in the Journal of Chemical Education (1998(75) 831 [Jul]), where he stated that ChemSkill Builder should be considered by all criteria to be one of the best General Chemistry electronic homework packages... The program was found to be friendly. It is easy to use, has large visuals, gives friendly comments, is patient, gives immediate feedback, and (the record of student activity) is very well encrypted.

In the fall of 1998, we released ChemSkill Foundations, new software that was designed for introductory or prep chem. courses. This package started at a lower level than CSB and provided more graphical explanations than had been employed before. For example, we developed a simulation of gas behavior that was intended to provide an intuitive understanding

Lewis dot structures, pH meter, crystal structure, simple measurement and significant figures. As they were being developed, we could see that these sections would have significant value in the CSB package as well. We also learned much from the faculty review of CSF that will be of value in restructuring and upgrading CSB.

It appears that our software is meeting a need and that the marketing strategy of selling it directly to the students, rather than using the site license approach, is a successful one. The number of client institutions who purchase software independent of texts has grown to over one hundred and some, such as the University of Georgia and the University of Florida, have continued to employ our materials and contribute to program development since the inception of the project. This fall, EHS will have been in operation for five years and will pass the 100,000 mark in the number of student packages sold.

Peters and Spain continue to work full time on product development. Planned for release in the fall of 1999 is the NEW ChemSkill Builder/2000. This package will provide all the features of CSB, Ver. 5.1, plus most of the features of CSF, plus additional sections in the second semester CSB to result in 25 units (chapters), plus an appendix, all provided in a CD-ROM

system that will accompany this allows the instructor to

The screenshot shows a software interface for a chemistry simulation. At the top, text reads: "Use the simulated graduated cylinder to obtain the best estimate of the volume of (blue) liquid it contains." Below this, a question asks: "How many mL does it contain?" The answer "71.8" is entered in a text box. To the left is a simulated graduated cylinder with a scale from 0 to 100 mL, with a 50 mL mark visible. Below the cylinder is a note: "Note that the third digit can only be an estimate here, so that is taken as the last significant digit." At the bottom, there is a navigation bar with buttons for "Main Menu", "Menu", "Next", and "Calculator".

Sample Screen 3

pick and choose sections for assignment from any of the 25 units provided. This will allow CSB/12000 to be used with either general chemistry, or elements of chemistry texts. CSB Ver. 5.1 and CSF Ver. 1.2 will be available for users who wish to continue with these products.

Also under development at this time is an electronic homework package for the short course in organic chemistry. This is being designed and programmed by Pienta, Kessler and Associates at Chapel Hill, North Carolina. This software will make use of the same grade management system that has proven so successful for CSB and CSF. The name for this new package is yet to be decided, however one possibility is OrganoSkillBuilder or O-Chem SkillBuilder. Individuals

who would like to ask questions about, or contribute ideas to this project are invited to contact Norb Pienta at: pienta@pyrite.chem.unc.edu

Further information about CSB or CSF may be obtained by visiting our homepage: <http://www.avalon.net/~chemskil/> From this you may download sample copies of the first third of either CSB or CSF. These are complete except for the ability to retain a record of student work on the disk and may be used to test the pedagogy of our software on first semester chemistry students. If you have any questions relating to our materials, please feel free to contact me by e-mail or call me at: 1-800-836-3949. I look forward to hearing from you.