

11. APPLICATIONS OF NETWORKED COMPUTERS AND ELECTRONIC MAIL IN A CHEMISTRY COURSE FOR NONSCIENCE STUDENTS Carl H. Snyder, Chemistry Department, University of Miami, Coral Gables, FL 33124; CSNYDER@umiami.ir.miami.edu, and James Shelley, Academic and Research Systems, Information Resources, University of Miami, Coral Gables, FL 33124; JSHELLEY@umiami.ir.miami.edu

ABSTRACT: Both networked computers and electronic mail have been introduced into a chemistry course for nonscience students. A variety of course materials is available on networked departmental computers including a chapter-coordinated, instructor-written review executed through a commercially available program. In addition, for extra credit students are encouraged to submit their own multiple-choice questions suitable for use on course examinations. Questions may be submitted either on paper or, for additional credit, by e-mail. Students have access to e-mail on work-stations located throughout campus as well as on the departmental computers. Students are also encouraged to use e-mail as a supplement to office visits for communication with the instructor. Details of these applications are described, including the use of student-generated questions as exercises in English composition. -----  
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## 1.0 PRELIMINARY

Please note that this work is MS-DOS based and is designed for PCs. All appendices named in upper case in the following are available at the ftp site. All are text files. Additional details for any of the following can be obtained from C. H. Snyder (CHS).

### 1.1 INTRODUCTION

The University of Miami has a well established, campus-wide LAN in place for use by students, faculty and staff. With workstations located throughout campus and with servers maintained by its division of Information Resources (IR) at the Computer Center, the LAN provides student access to a variety of word processors, spreadsheets and instructional programs.

Within the past few years the Chemistry Department has installed its own departmental LAN dedicated to its own needs. For instructional use, this departmental LAN offers a major advantage over the IR LAN: quick and easy access by faculty from computers in their own offices. The Chemistry LAN is also hard-wired to the University's VAX mainframe, which gives it access to e-mail, among other facilities.

This paper describes an initial use of the Departmental LAN in a course for nonscience students. While many forms of computer aided instruction are available for majors at all levels, we found few if any useful for a terminal, nonmajors course. Instead, we developed a generic, relatively unsophisticated system that may have application in similar lower level as well as more advanced courses. (The appendix PAPER11SYL.TXT reveals much about the form and content of the course.)

## 2.0 FACILITIES

The Departmental network consists of:

- a model 80/386 IBM 315 meg PS/2 server, located in the Department office complex
- 11 IBM PS/2 55 XS cpu's, each with a 40 meg hard drive (and a locked 3 1/2" floppy drive), available to students in a resource room,
- 11 IBM computers identical to the above but with no floppy drives, and
- several IBM PS/2 386 computers in faculty and staff offices.

(An additional 1 gig 486 server is currently on order.)

This LAN is hardwired to an IR VAX/VMS mainframe.

## 3.0 OBJECTIVES

Our objectives were to use the Departmental network:

- a) to aid in nonscience course instruction
- b) to give nonscience students facility in computer use
- c) to introduce students to e-mail
- d) to explore instructional applications of e-mail

## 4.0 APPLICATIONS: Menu

The key to this work is the use of a flexible menu program that allows students easy access to a variety of files and utilities. Ours (Appendix: PAPER11MENU.TXT) is based on models described in "Supercharging MS DOS," Van Wolverton and Dan Gookin, Microsoft Press, 1991.

A stripped version of the menu appears below. For convenience of discussion we have altered the order of the file or utility titles.

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C H E M I S T R Y    1 0 2
M A I N    M E N U
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Notes and Comments
Syllabus
Words List
Review Questions
Extra Credit
E-Mail Instructions
E-Mail Access
Exit
```

In operation, students gain access to the menu by activating a batch file after logging onto the departmental LAN. (See PAPER11BATCH.TXT.) One key letter of each of the menu titles appears in red. Pressing the corresponding key takes the student to the desired file or utility.

## 4.1 APPLICATIONS: Menu titles

"Notes and Comments" (PAPER11NOTES.TXT) provides specific detail on selected menu headings. It also provides a reference location for important class announcements so as to make them available to students who may have been absent.

"Syllabus" (PAPER11SYL.TXT) provides the course syllabus. Although a printed copy of this is distributed during the first and second class meetings, the printed sheet is all too often lost or misplaced by students. The computer file is available to all throughout the semester.

"Words List" presents a current list of words and phrases that point to key items for the following examination. It is kept current on the LAN, class by class; a printed copy of the complete list is distributed to the entire class during the period before the examination. This combination provides a partial but current list on the network, and a complete list distributed to all, just before the examination. PAPER11WRDLST.TXT contains an illustrative list for one of the course examinations.

"Review Questions" gives students access to a review of each chapter, in the form of a set of instructor-written multiple-choice questions with comments for each answer. Each review is written (by the instructor) through the Diploma IV set of programs, a commercial work available through the Brownstone Research Group, Inc., of Decatur Georgia [(404)-373-4001]. No appendix is provided for the review since it is written and formatted to meet the specific requirements of the Diploma IV program.

"Extra Credit" (PAPER11EXTRCR.TXT) describes a means for obtaining extra credit by writing original multiple-choice questions. This is designed to motivate study, but the additional credit given for electronic submission is also intended to motivate students to learn and use electronic communication.

"E-Mail Instructions" (PAPER11EMAIL.TXT) and "E-Mail Access" provide instructions and actual access to e-mail through the LAN and the VAX mainframe. (The accessing batch file is not provided in the appendix since it is written for the specific configuration of the departmental LAN.)

"Exit" terminates the MENU program and returns students to the DOS prompt.

#### 4.2 APPLICATIONS: Extra Credit Submission

Students were given individual VAX accounts and names and were instructed to place their extra credit problems directly into their own VAX directories. They were not permitted to submit extra credit work by e-mail. CHS was given access to all student directories on the VAX. With this arrangement: 1) Students had access to the VAX through campus workstations as well as through the Chemistry LAN; and 2) CHS could review and grade submissions from a home computer, via modem, as well as from a campus computer. A compelling reason for prohibiting submission

directly by e-mail was to control the submission of repeated, corrected and updated versions of the same homework. By e-mail, this would have produced a deluge of constantly updated e-mail messages, each of which would have to be examined individually as new mail. Limiting the consideration of extra work to those problems placed in the VAX directory allowed CHS to examine only the latest entry for any specific assignment and to ignore all earlier entries. Technical guidance for assignment submissions was provided by a series of e-mail communications to all the students. These have been concatenated into the file PAPER11HINTS.TXT.

#### 5.0 RESULTS: Extra Credit Questions

The following table summarizes the award of extra credit for questions submitted electronically and on paper, as described in PAPER11EXTRCR.TXT. The following two considerations apply: 1) A total of 10 questions was permitted; 2) of these, the first set was necessarily submitted on paper since the LAN had not yet been set up for electronic submission; and 3) only those questions for which extra credit was actually awarded -- perhaps 90% of all those submitted -- are shown in the table. As a result the maximum number that could be submitted by either means was 10; the maximum electronically was 9. A few representative examples of extra credit questions and CHS's responses are contained in PAPER11HWK.TXT. (For anonymity, student names are replaced by the uppercase STUDENT throughout.)

The class consisted of 28 students. The table is organized by class standing, with the top student ranked 1. For legibility and analysis it is divided into quartiles. Following each quartile the sum of submission is shown in parentheses.

Student Rank	Electronic Submissions	Total Submissions
1	7	8
2	0	2
3	8	9
4	0	8
5	6	7
6	0	0
7	0	0
(SUM)	(21)	(34)
8	6	7
9	6	7
10	6	7
11	0	1
12	0	3
13	1	8
14	0	9
(SUM)	(19)	(42)
15	3	4
16	4	5
17	2	5
18	0	0
19	0	7
20	5	7

21	1	2
(SUM)	(15)	(30)
22	0	0
23	0	1
24	0	0
25	0	1
26	0	0
27	1	2
28	0	0
(SUM)	(1)	(4)

### 5.1 ANALYSIS: Extra Credit Questions

A brief analysis suggests that students in higher ranking quartiles are more likely to submit coursework electronically, perhaps because of differences in motivation and/or skills. The observation that the total combined number of questions submitted was higher for the second quartile than for the first may reflect a greater degree of academic self-confidence in the top quartile students than in the second quartile.

### 5.2 ANALYSIS: Student E-mail

Students made little use of e-mail for communicating with CHS. They seemed to prefer to place questions and comments in files within their directories. Perhaps since they had to learn this technique for the extra credit, they simply stuck to it without bothering to learn an additional e-mail utility. In fairness, very few came in to see CHS during office hours either. Perhaps this reflects apathy at least as much as a reluctance to learn the fine points of electronic communication. One student of the 28 did make extensive use of e-mail to communicate with friends in other schools. We consider this a minor success of the program.

### 6.0 CONCLUSIONS

The LAN itself was used heavily, but almost exclusively for review during the few days before examinations. As noted above, we found that electronic communication was used by students in rough parallel to their eventual class standing. With all this, it should be remembered that the class consisted of nonscience students none or few of whom presumably had previous contact with electronic communication.

### 6.1 FUTURE ACTION

We regret that no attempt was made to assess student attitudes, toward use of the LAN and toward the use of electronic communications, before and after this trial. We expect to carry out such an assessment next semester.

### 7.0 QUESTIONS FOR READERS

1. Are there better carrots to use than extra credit to induce students to learn and use electronic communication?

2. Is there a body of instructional software particularly suited to the nonmajor?

3. Can e-mail become a useful supplement to office conferences?

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