

transitions. This gives the students the opportunity to think about vibrational modes and the relationship of changing dipole moment to the intensity of the transitions in the infrared.

8. Problems in Paradise: Expect the Best, Prepare for the Worst
- III. The Future
 9. New Directions
 10. Network Learning: A Paradigm for the Twenty-first Century
 11. Epilogue: Email from the Future

- Appendix A. Learning Network Resource List
- Appendix B. Commercial Services
- Appendix C. Vendors of Computer Conferencing Systems
- Appendix D. Lists of Free-Nets
- Appendix E. Nonformal Education and Online Services
- Appendix F. Sample Course Description and Letter to Online Students
- Appendix G. Annotated Excerpts from an Online Course

**"Learning Networks:
A Field Guide to Teaching and Learning Online"**
by Linda Harasim, Starr Roxanne Hiltz, Lucio Teles
and Murray Tuross
The MIT Press, Cambridge MA, 1995
ISBN 0-262-08236-5 \$ 35

Donald Rosenthal
Department of Chemistry
Clarkson University
Potsdam NY 13699-5810
E-mail:ROSEN@CLVM.CLARKSON.EDU

This book considers the use of computer networks for educational activity in primary, secondary, university, and adult education. It indicates how this new technology can strengthen and transform teaching and learning practices, opportunities, and outcomes. It describes some of the advantages and pitfalls of network-based learning compared to traditional classroom techniques. The four authors have been actively engaged in online learning and describe their personal experience as well as providing information from a variety of online and published sources.

The book is 329 pages in length and consists of three sections, eleven chapters and seven appendices as well as eleven pages of references, a table of contents and an index.

The sections, chapters and appendices are:

- I. The Field
 1. Learning Networks: An Introduction
 2. Networks for Schools: Exemplars and Experiences
 3. Networks for Higher Education, Training and Informal Learning: Exemplars and Experiences
- II. The Guide
 4. Designs for Learning Networks
 5. Getting Started: The Implementation Process
 6. Teaching Online
 7. Learning Online

Here are a few selected quotations from the book:

"The traditional face-to-face classroom learning situation is generally assumed to be the best to support learning, with other learning modes perhaps perceived as less effective. There is no evidence to support this assumption. In fact, quite the opposite is true: Online environments facilitate learning outcomes that are equal or superior to those generated in the face-to-face situation."

"The asynchrony of online interactions allows participants time to reflect on a topic before commenting or carrying out online tasks. ... "

"In research on online ... courses ..., students identified the following benefits ...:

Increased interaction: quantity and intensity
"... I've never been involved in a course in which I've learned so much from other students. This was because there was no competition for the floor and therefore everyone was able to have her say. Also, as remarks were all documented, they were subject to more in-depth consideration than in the normal classroom."

Better access to group knowledge and support
"The information exchange is more diverse in that input is coming from everyone rather than only from the instructor."

"I learned much more than in a regular three-hour course because of the interaction of all the students in the course. It is much more enriching this way. Through this medium we could tap the combined knowledge of the group."

More democratic environment
"In online discussions, I think that there is a

tendency to respond to content rather than to personalities.”

“Conferencing as a course vehicle promotes more equal interaction among participants, dropping barriers of geography, urban/rural styles, social skills, mannerisms.”

Convenience of access

“I find myself thinking about the ideas in the online class more because there is no three-hour limit of class time.”

Increased motivation

“I am cold. I need to clean my lenses and I am thirsty. Yet, I’m still here. Know why? This is better than TV - the anticipation of a good show, great cast of characters, fast-moving plot, thought-provoking and, like a serial, the end is not in view.”

Active Learning

“Active learning is a major outcome ...

Participation is based on making input, responding to peers, and sharing ideas. ... Those who read but do not comment are sometimes referred to as “lurkers”, and others ... are likely to cajole or encourage lurkers into active participation. Teachers may allocate a grade for online participation, thereby providing incentives and acknowledging student effort to learn the system and formulate a comment.

Active participation strengthens learning. Putting ideas or information into written form requires intellectual effort and generally aids comprehension and retention. ...

Because online learning communities are always open, there is a wide opportunity to participate and to refine and reflect on ideas. In the traditional classroom, only one person at a time may speak, and many people who would like to contribute are never called on. In the online environment each student can comment whenever he or she wants.

Moreover, ideas can be developed interactively, over time. ... This expanded access to learning peers and activities encourages reflection on ideas and building of knowledge.”

Collaborative Learning

“Collaborative learning refers to any activity in which two or more people work together to create meaning, explore a topic, or improve skills. ... With Computer Mediated Communication, practically all course

activities can be designed as collaborative activities. Through formulating information or ideas in their own words, and receiving feedback and evaluation on these formulations from peers, knowledge,

thinking skills, and meaning are socially constructed.

... In designing an online course, the creative challenge to the instructor is to rethink the syllabus in order to build in as many collaborative activities as possible. ...”

Learning Communities

“The community that forms among network users can be both personally and educationally enriching. Many people who enter a learning network for the first time fear they will find an impersonal, dehumanized space. The social reality of the environment frequently comes as a complete surprise. The communication flows enabled by the networks bring friendship, comradeship, intellectual stimulation, and personal satisfaction. Friendships are formed as the network becomes a “place” to share insights and concerns, problems and solutions, enthusiasms and fears. ...”

“The predominant application of school-based networks are based on curriculum enhancements; networks thus serve as a supplement or adjunct to regular instruction. This approach, referred to here as adjunct mode, is also the most common in university and distance education networking activities. However, two additional modes of networking are also widely used in postsecondary courses: mixed mode, in which a significant portion of a face-to-face or distance education is conducted by email or computer conferencing, and totally online mode, in which the network serves as the primary environment for course discussions, assignments and interactions.”

Adjunct Mode

“Adjunct mode use of networks allows students to communicate with instructors and other students outside normal classroom or office hours for such purposes as extending opportunities for class discussion and debate, increasing access to instructors, submitting and/or exchanging class assignments, enabling group tasks among students in the same classroom or in a networked classroom approach, and expanding opportunities for informal group discussion and social interaction. . . . Networking also introduces opportunities for learner-learner interaction and collaborative learning approaches in distance education. . . . Computer networking lets us all talk to each other when we’re feeling our best, and it allows teachers and students to speak freely without

allows teachers and students to speak freely without the restrictions of age and power differences that sometimes arise in an office.

Computer conferencing systems have been found valuable for such adjunct mode activities as electronic office hours. Many questions are of interest and relevance to the whole class, and the use of a conference for open class discussion avoids duplication of effort for the professor. Sometimes students assist one another . . . Instructors use email and computer conferencing for distributing class outlines, supplementary notes, handouts, instructions, assignments, test questions, and, sometimes, administering tests and quizzes."

This book is of interest to those educators who are interested in online learning. I recommend it.

INFORMATION ABOUT AND EVALUATION OF THE SPRING 1996

ON-LINE INTERCOLLEGIATE COURSE

"ENVIRONMENTAL AND INDUSTRIAL CHEMISTRY"

Donald Rosenthal, Chair, CCCE

Department of Chemistry
Clarkson University
Potsdam NY 13699-5810
rosen@clvm.clarkson.edu

I. INTRODUCTION

The on-line intercollegiate course is described in the Spring 1996 issue of the "Computers in Chemical Education Newsletter" pages 17 to 20. 104 students from 22 schools registered for the course. Due to computer problems six students who registered from Nanyang University were not able to participate. The on-line segment was common to each of the courses, but instructors at each of the participating schools had autonomy in determining what activities were expected of their students, how grades would be assigned and how the course was to be structured.

In order to obtain a better understanding of the different courses, an information and evaluation form was sent via e-mail to each course student. This article summarizes information from 49 of the

98 students at 17 of the 21 schools. Many of the student responses are quoted in unedited form. (Some quotes were edited. Some student responses are not included in this summary.)

Additional information about the course can be found on the World Wide Web site:
<http://dirac.py.iup.edu/college/chemistry/chem-course/webpage.html>

In addition, this issue of the Newsletter contains an article by James M. Beard, chair of the course organizing committee with some comments and analysis of the 1996 on-line course and some suggestions about future on-line courses.

II. SUMMARY OF INFORMATION AND STUDENT RESPONSES

A. About the Students

71 % were seniors
24 % were juniors
2 % were sophomores
2 % were graduate students

51 % were chemistry majors
10 % were biochemistry majors
14 % were physical science majors
6 % were science majors - chemistry emphasis
2 % were environmental chemistry majors
6 % were environmental science majors
10 % were biology majors
2 % were construction engineering majors

B. Course Title:

59 % of students registered for
"Environmental and Industrial Chemistry"
23 % for "Special Topics in Physical Science"
10 % for "Chemistry on the Internet"
3 % for "Advanced Topics"
3 % for "Independent Project"
3 % for "Readings in Chemistry"

67 % of the students registered for a
3 credit hour course
31 % for a 1 credit hour course
2 % for a 2 credit hour course

Course class size varied from 1 to 13.

C. Course Descriptions

From analysis of the information questionnaires it was obvious that different instructors had very different requirements for their students.

1. Before the On-Line Segment

Generally, two or three weeks before the