PN-ACB-824

commu
nicatio
exchang
environ
nment
inform
ation
disabil
ities
nutritio
youth
educatio
children
institu
tion
manag
ement
health
compu
ters
training

LearnLink

Educational Technology Resource Handbook

AED

Academy for Educational Development

Prepared by the National Demonstration Laboratory

-1

Table of Contents

Section 1: Research on the Effectiveness of Educational Technology

Introduction by Jacqueline Hess, Director
National Demonstration Laboratory

Interactive Educational Technologies in Higher Education. (1994). Education and Social Policy Department, Human Resources Development and Operations Policy, The World Bank, Washington, D.C. 1

Technology and Education Reform: Studies of education reform. (1997). U.S. Department of Education, Office of Educational Research and Improvement, Washington, D.C. 2

Telecommunications and Education: Surfing and the art of change. (1994). The Institute for the Transfer of Technology to Education of the National School Boards Association, Alexandria, VA. 3

Section 2: Distance Education

Distance Education Overview

Distance Education: An Overview 4
Distance Education at a Glance Guide #1. (October 1995). University of Idaho.
<http://www.uidaho.edu/evo/dist1.html>

Strategies for Teaching at a Distance
Distance Education at a Glance Guide #2. (October 1995). University of Idaho.
<http://www.uidaho.edu/evo/dist2.html>

Evaluation for Distance Educators
Distance Education at a Glance Guide #4. (October 1995). University of Idaho.
<http://www.uidaho.edu/evo/dist4.html>

Computers in Distance Education
Distance Education at a Glance Guide #7. (October 1995). University of Idaho.
<http://www.uidaho.edu/evo/dist7.html>

Distance Education: Research
Distance Education at a Glance Guide #10. (January 1996).University of Idaho.
<http://www.uidaho.edu/evo/dist10.html>

Education and Instruction Through Telecommunications: Distance Learning for all Learners. (1995). Council of Chief State School Officers, Washington, D.C.

Section 2a: Distance Education and Web Conferencing Tools

Web Conferencing and Distance Education Tools

Electronic Mail: The Basics 5
<http://users.southeast.net/~habedd/polaris/topframe/top0100.htm#start>

Table of Contents

Troubleshooting E-mail problems
<http://www3.umassd.edu/public/cyberedhelp/tutorial/e-mail/em-probs.html>

Sending E-mail Attachments
<http://www3.umassd.edu/public/cyberedhelp/tutorial/e-mail/sendatt.html>

E-mail Miscellaneous
<http://users.southeast.net/~habedd/polaris/topframe/top0130.htm#start>

Wooley, David R. *Choosing Web Conferencing Software*. (1996). 6
<http://www.freenet.msp.mn.us/people/drwool/wcchoice.html>

Internet Chat 7
<http://users.southeast.net/~habedd/polaris/topnoframe/top0151.htm#start>

Virtual U 8
<http://virtual-u.cs.sfu.ca/vuweb/tour.html>

Interactive Videoconferencing in Distance Education 9
<http://www.uidaho.edu/evo/dist11.html>

Videoconferencing in the Classroom & Library: Instructional Strategies
<http://www.kn.pacbell.com/wired/vidconf/instruct/instruc.html>

CU-SeeMe

PictureTel

MBONE

Section 2b: Other Distance Education Tools

The Ten Most Commonly Asked Questions About IRI (Interactive Radio Instruction) 10

Excerpt from Naidoo, Gordon. "Educational Transformation and Open Learning Possibilities in South Africa," in UNESCO's *Learning Without Frontiers: Beyond Open and Distance Learning*. <http://unesco.uneb.edu/educprog/lwf/doc/icde/ICDEnaidoo.html>

What Makes IRI Work?

Overview of the Video Instructional Program at the University of Massachusetts, Amherst 11

Section 2c: Distance Education Projects

TEAMS (K-12 Distance education using broadcast TV and WWW) 12

Heritage Online (Teacher training via WWW) 13

University of Florida Continuing Medical Education (Professional Development via WWW) 14

Table of Contents

Olset (Primary - Adult Education through IRI) 15

Telesecundaria, Mexico (Secondary education through broadcast TV) 16

Section 2d: Resources in Distance Education

User Interface Design and Evaluation Guidelines 17

Using Computer Simulations for Training and Education 18

Resources in Distance Education 19

Section 3: Telecenters

Overview

Telecenter Project Examples 20

Online Telecenter Resources 21

Section 4: Internet Tools

The Internet in the Classroom & Workplace: Pull and Push Technologies

Locating Search Engines

AltaVista Advanced Query Help 22

Push Content Primer 23
<http://www.cnet.com/Content/Reviews/Compare/Push/ss03.html>

PointCast
<http://www.pointcast.com>

Intranets Supporting Students, Teachers and Administrators 24

Section 5: Resources

Bibliography 25

Organizations 26

Periodicals 27

NDL Applications List 28

Glossary of Technological Terms 29

4

National Demonstration Laboratory
for Interactive Information Technologies

The Effectiveness of Computers in the Classroom

Throughout the past 25 years, the computer has battled its way into K-12 environments. It has been hailed by some as a revolutionary, with the power to singlehandedly reform education. It has been condemned by others as a mindless, inappropriate and potentially dangerous toy. After a quarter century of experience, what do we, in fact, know about the learning effectiveness of computers in K-12 classrooms?

The first thing we know is that there are no easy answers to the question. There is no simple formula for computers to produce significant learning gains. Instead, we must look at a complex mix of factors, including: subject, teacher, pedagogical design, learning objectives, student control, ratio of students per computer and per teacher and the overall learning environment.

As these factors combine in different patterns, the effectiveness of computers varies. There are, however, some recognizable and well-documented patterns that have consistently produced superior learning gains.

Computer programs generally work better as supplements to traditional instruction than when they are substituted entirely for a traditional curriculum. They work better when students are grouped, 3-5 around one computer, than when the ratio is one student per computer. Generally, computer programs that allow a great deal of student control of pace and direction produce better outcomes than those that do not. Programs that incorprate video, sound and animation generally outproduce programs that merely mimic books, with elaborate text and a few still photos.

Programs that include pre-test and post-test modules are superior to those that do not. Those that employ post-tests with targeted feedback and remediation produce better outcomes that those that employ a simple answer-until-correct approach.

Some study results seem predictable, yet we have been slow to respond to them. Although we know that computer technology is much more effective when teacher and student have received prior training in how to use equipment, most school systems still do not provide adequate, systematic training.

Of course, many study results are difficult to implement because of budgetary constraints. We know, for instance, that in K-12 environments, computers are more effective when they remain resident in the classroom, rather than being isolated in a computer lab or library or transient on

AED
Academy for Educational Development
1255 23rd St. NW, Washington, DC 20037
Tel. 202-884-8906 Fax 202-884-8701 Internet JHESS@AED.ORG

mobile carts. The more the computer is seen as a natural part of the student's environment, the more invisible the hardware itself becomes, so that both teachers and students can focus on what is important--the information within the program.

When personal computers first appeared in schools, some worried that they would replace teachers, becoming independent "teachers-in-a-box." Now, 25 years later, we recognize this as

an unwarranted fear. Studies on effective computer use do show that the role of the teacher in technology-rich settings does change. However, rather than being eliminated, the teacher's role shifts from that of conveyor of memorized facts to that of a higher-level learning guide. Freed from the front of classroom where they deliver one-way lectures, they can work more closely with students in two-way exchanges, focusing on higher-order critical thinking skills.

In the end, as has been so often noted, computer programs are merely tools--potentially powerful, but only when well-designed and in the hands of capable, trained educators.

Jacqueline Hess, Director
National Demonstration Laboratory
Academy for Educational Development
November 1997

ESP Discussion Paper Series

Interactive Educational Technologies in Higher Education

Bojana Boh

October 1994

Education and Social Policy Department
Human Resources Development and Operations Policy
The World Bank

Executive Summary

Interactive educational technology is used:

- to improve the **effectiveness** of education by raising the quality of teaching and learning;
- to increase **efficiency** through lower-cost alternatives to conventional instruction;
- to increase **enrollment** and extend access to geographically, economically or socially isolated learners; and
- to produce graduates with better **adaptability** to information-based technological environments.

Developed and developing countries use interactive educational technology for different reasons. In developed countries, technologies are used primarily to improve the effectiveness of teaching and learning, to individually tailor instruction, and to provide specialized education to small groups of learners. Developing countries, on the other hand, seek low-cost alternatives that improve educational and research efficiency and increase access to education while maintaining a high level of effectiveness.

The rapid expansion of telecommunications and computer-related industries has resulted in a variety of interactive technologies applicable to higher education. Generally, they fall into two main groups:

- The first group consists of computer-mediated technologies, which are designed as **individual self-standing units**. These can be individual microcomputers or, less frequently, a series of microcomputers connected to a local area networks. They are most often used to increase the **effectiveness** of teaching and learning. Computer-driven self-paced tutorials, educational databases, graphic design programs, three-dimensional viewing and modeling, computer simulations, and expert systems are all example of such technology. The fast growing field of multimedia applications, which include Interactive Videodisks (IVD), Compact Disk - Digital Audio (CD-DA), Photo CD, CD-ROM and CD-ROM XA, Digital Video Interactive (DVI), Compact Disk Interactive (CDI), Video Information Systems (VIS), Electronic books and Virtual reality, is the main formats for such instruction.
- The second group is based on **telecommunications**. These technologies utilize local or wide area communication networks. These technologies are used to increase the **efficiency** of distance learning, while maintaining a high degree of effectiveness. The two main sub-categories of this group are: (1) technologies for **asynchronous** communication, such as telefax, teletex, videotex, electronic mail, and computer bulletin boards, (2) technologies for **synchronous** communication, which include audioconferencing, audiographics, computer conferencing, interactive one-way television with audio return, and interactive two-way and multi-point television systems.

The main developers and users of interactive educational technologies are high-income countries with strong technological and telecommunication infrastructures, especially the USA, Canada, Western Europe and Japan. The majority of developing countries do not yet use them on a large scale. However, basic infrastructure and telecommunications are improving in many developing countries, along with the managerial and technical capacity for implementing educational innovations. This makes the introduction of interactive educational technologies more feasible. Successful implementation now could spur expanded use of interactive technologies in universities and colleges in middle- and low-income countries in the future.

Several ***advantages and improvements*** can result from using interactive technologies in tertiary level education and research. If the systems are carefully designed and well implemented, they can result in the following educational and economic benefits:

1) **Improved effectiveness of on-campus and distance learning.** Increased interactivity of the programs permits more communication, and may lead to increased motivation, creativity and independence among learners. In addition, students can access much more information, receive quick feedback, and constantly evaluate their progress.
2) **Higher quality of instruction.** Interactivity, by overcoming time and geographic constraints, facilitates the inclusion of experts in specific fields to guest lecture in distance courses.
3) **Increased enrollment.** The time and place independence which some interactive courses offer provides the convenience which allows students to enroll who would have previously been unable to do so.
4) **Improved cost-effectiveness.** Under some circumstances, interactive technolgy can lower the cost of adding additional students who can be effectively taught. Time and place independence also saves travel time and costs.
5) **Better technological and communication skills.** Students learn to manipulate new technologies and to communicate electronically.

However, attention must be paid to potential ***dangers and problems***, which can arise due to inadequate technological, educational, economic, administrative or cultural conditions. These include:

1) **Technological problems.**
   - Interactive educational technologies will only run smoothly where a sound basic technological and telecommunications infrastructure exists, and where a high degree of technical expertise is available for maintenance and support of operations.
   - Short life spans of computer software and hardware, along with compatibility problems, make upgrading and additional investments necessary.

9

- Harsh climatic conditions may result in frequent telecommunication break-downs and equipment damage.

2) **Educational obstacles.**
   - Effective use of interactive technologies requires substantial faculty training and preparation, as well as an increased commitment, flexibility, cooperativeness and readiness to deal with occasional technical problems.
   - Technology *per se* cannot, nor is it intended to, replace teachers or usurp their responsibilities. Increased care and more time in curriculum design is necessary to create or adapt university courses which use interactive technologies benficially.
   - Insufficient cooperation and coordination between technology experts and curriculum developers, educational policy makers, technical support staff, faculty and students, reduces the effectiveness of interactive instruction.
   - Resistance to innovation can be a major barrier to implementation of interactive technologies. Faculty reluctance may be due to insufficient training with technology, unwillingness to change the established traditional teaching approaches, or both.

3) **Economic considerations.**
   - Introduction of interactive technologies is initially costly to an educational system. In low-income economies, these costs may be prohibitive. Even middle-income countries which can afford the initial investments may have difficulty meeting recurrent costs.
   - In some cases, positive educational impacts of interactive technologies are not viewed as significant enough to justify large scale investments.

4) **Administrative, legal, political or cultural barriers.**
   - Administrative regulations and bureaucratic procedures may interfere with efforts to increase communication and cooperation on micro and macro levels.
   - Unresolved intellectual property issues hinder a wider application of certain technologies.
   - In some countries state or political control of computer-mediated communication may make educational uses impossible.
   - Frequent leadership changes, lack of coordiantion between government agencies, or instability and discontinuity in educational institutions may adversely affect the implementation of interactive educational technologies.
   - Technophobia and resistance stemming from cultural, religious, ethnic or social traditions also inhibit use.

Numerous examples prove that interactive technologies can be successfully implemented and used at institutions of higher education around the world. Based on these experiences, the following suggestions and recommendations are stressed:

1) **Improving the technological environment.**
   - A system of technical support and expertise should be established and available to faculty and students.

10

- Permanent training to maintain the high quality technical support is essential for a long-term success.
- In order to lengthed the life span and increase the effective use of interactive educational technologies, a reliable supply of spare parts and maintenance and repair services must be available.
- Funds must be available for maintenance and regular upgrading of entire systems.
- Equipment and software should be reliable, easy to operate, simple to learn, widely available, expandable, standardized, and compatible with existing systems.
- Leasing hardware and telecommunication lines from commercial users may be an alternative way to begin interactive instruction where investment funds are scarce.

2) **Improving the educational environment.**

- Planning and implementation of educational technologies should start from a clear educational need or goal -- e.g. to improve quality of on-campus instruction, to supplement the program, to expand access to new students, or to reach distance learners.
- The introduction of interactive technologies should requires substantial advance preparation. It should be evolutionary and incremental. It should start with simpler settings or with courses that are easier to develop.
- A cooperative environment among faculty departments and specialists is essential when introducing a new interactive technology.
- Faculty/staff development and training should begin as soon as the introduction of technological innovations begins. It must accommodate different levels of experience with technology, as well as the differences among disciplines. Hands-on, interactive, on-going training programs should be offered.
- Instructors are more motivated when they are well informed and adequately trained, when they participate in planning and decision-making processes, and when they see administrative support and financial or other incentives for increasing development and use of interactive technologies.
- Students using interactive technologies in their studies must receive training.
- Different technologies suit different purposes. A combination of technologies is usually most appropriate. The choice of technology should be based on several factors, such as:
  * educational form -- distance education programs require different technologies than on-campus courses,
  * education field -- scientific and technological disciplines require approaches which differ from and educational tools than do arts, social sciences or business education,
  * degree of interactivity needed -- systems with high degree of interactivity are generally more expensive but also more efficient,
  * characteristics of learning audience -- numbers and geographical distribution of students, their educational level, age, cultural and technological backgrounds should be taken into account,
  * local conditions and individual characteristics of instructors should not be forgotten.

3) **Improving the economic environment.**
   - Stable and regular financing must be guaranteed for initial investments in technologies, for curriculum development and adaptations of educational materials, and to cover recurrent costs.
   - Educational projects funded with foreign aid donations should consider and plan for domestic funding to maintain the system when the aid project funding runs out.

4) **Improving the administrative environment.**
   - Agreement among policy-makers, administrators, program developers and end users users is necessary on topics such as the governance and decision making procedures, financing, implementation methodologies, and evaluation methods for the use of information technology.
   - Adequate training and early involvement of key administrators into these processes is essential.

The use of interactive educational technologies will without a doubt expand in future. As large computer systems become available more widely and international communications costs decrease, open electronic universities will offer a variety of distance programs and provide education internationally via global communication networks. Before this occurs, however, several barriers will have to be overcome. Telecommunication infrastructures which meet a minimum uniform standard of quality must be in place in developing as well as developed countries. Standardization of equipment must increase. International intellectual property issues must be resolved and national regulations which inhibit the diffusion of technology must be removed. Impediments due to differing curricula and approaches to education, language barriers, and fear of cultural imperialism must also be overcome. The current exponential expansion of international networks for scientific, technological and educational communication shows that such advances may be realizable much sooner than expected.

12

Studies of Education Reform

TECHNOLOGY AND EDUCATION REFORM

Prepared by
Barbara Means
Kerry Olson
SRI International

With the assistance of:

Joan Ruskus
Edys Quellmalz
Teresa Middleton
Katie Ann Kaattari
SRI International

Catherine Cobb Morocco
Arlene R. Remz
Judith Zorfass
Education Development Corporation

13

U.S. Department of Education
Richard W. Riley
Secretary

Office of Educational Research and Improvement
Marshall S. Smith
Acting Assistant Secretary

Office of Reform Assistance and Dissemination
Ronald W. Cartwright
Acting Director

April 1997

Studies of Education Reform

The 12 studies were commissioned by the Office of Educational Research and Improvement (OERI) in 1991 and were all completed by fall 1995. Each study comprises three volumes. Volume I contains a discussion of the study, case study summaries of the schools or school districts examined, and recommendations. Volume II contains detailed case studies. Volume III is a technical appendix explaining the study's methodology. OERI is publishing all Volumes I as a set. Titles in this series are:

Systemic Reform
Early Childhood Reform in Seven Communities
Education Reform and Students At Risk
Parent and Community Involvement in Education
The Uses of Time for Teaching and Learning
Systemic Reform in the Professionalism of Educators
Study of Curriculum Reform
Assessment of Student Performance
Assessment of School-Based Management
School Reform and Student Diversity
Technology and Education Reform
Study of School-to-Work Initiatives

The other two volumes for each study are available through the Education Resources Information Center (ERIC) system.

This study was funded by the Office of Educational Research and Improvement, U.S. Department of Education, under contract no. RP 91-172010. The content does not necessarily reflect the views of the Department or any other agency of the U.S. Government.

Executive Summary

Educational reform calls for a shift away from organizing instruction around short blocks of time devoted to lecture or practicing discrete skills in specific academic disciplines toward an emphasis on engaging students in long-term, meaningful projects. It is well documented that technology can enhance student acquisition of discrete skills through drill and practice. This study addresses the question of whether technology can provide significant support for constructivist, project-based teaching and learning approaches and the associated issue of the elements needed for an effective implementation of technology within an educational reform context.

Case studies of nine sites that have been using technology in ways that enhance a restructuring of the classroom around students' needs and project-based activities form the centerpiece of the project. In selecting schools for study, we gave priority to sites that have emphasized education reform (rather than technology for its own sake) and that provide challenging, authentic activities for students from economically disadvantaged backgrounds. Eight individual schools and one network of 462 schools constituted the case study sample.

The Vision: Technology-Supported Constructivist Classrooms

The model of constructivist teaching that motivated our research design has student involvement in complex, meaningful tasks or projects at its core. Once a commitment is made to structuring the classroom around such projects, nearly every other aspect of pedagogy must change as well. Projects with real-world relevance will nearly always be multifaceted, incorporating both higher-order skills, such as design, composition, and analysis, and more basic skills, such as the mechanics of writing. They will also nearly always be multidisciplinary in nature and will require extended periods of time to complete. The very complexity of the task will make it advantageous to have students work on them in groups, resulting in a greater emphasis on teamwork and collaborative skills. Heterogeneous roles will tend to emerge as students tackle different portions of the project. Teachers will design the overall structure for project activities and provide the resources that students need to do them, but students will have much more responsibility for their own learning and for producing finished products that meet high standards. Teachers will function as roving coaches, helping individual students or groups over rough spots and capitalizing on the "teachable moment" within the context of the students' engagement in their work. In short, when instruction is organized around complex, authentic projects, there are strong pressures to break away from the discrete academic disciplines,

repetitive drill, short periods of instruction, and teacher-led lessons that have been the hallmarks of American education for so many years.

Effects of Using Technology

In our search for appropriate case study sites and in the field research that followed, we found that it is not easy for teachers to implement the reform vision described above. Constructivist, project-based teaching and learning make severe demands on teachers, and adding technology to the mix, at least initially, adds to the intellectual and logistical burdens. Nevertheless, there were teachers at our case study schools whose classrooms demonstrated what can be done when technology and carefully designed project-based activities are used in concert. The teachers we studied who were involving their students in long-term, complex projects supported by technology found that technology supported their efforts by:

- ***Adding to the students' perception that their work is authentic and important.*** Students evidenced greater concern about the quality of their technology-supported work, giving more consideration to how it could be perceived by external audiences.
- ***Increasing the complexity with which students can deal successfully.*** Teachers were often surprised not only by how quickly their students learned to use new hardware and software but also by how much farther they could go in specific subject areas when given technology supports. Technology can both automate mundane, repetitive portions of a task and support visualizing and presenting more essential, abstract elements.
- ***Dramatically enhancing student motivation and self-esteem.*** Case study teachers were nearly universal in citing the positive effects of technology on student motivation. Using technology increased the amount of time students spent on a task, their willingness to critically review and revise their work, and their pride in the finished product.
- ***Making obvious the need for longer blocks of time.*** When students used technology to support their project work, it became clear that time for working on project activities needs to be extensive enough so that students can get access to their work files, make significant progress, and then store them for future work.
- ***Creating a multiplicity of roles,*** leading to student specialization in different aspects of technology use. Given the ever-changing array of technology capabilities, students found a wide range of potential specialties ranging from creating hypertext links to navigating the Internet to videoediting to computer graphics. Each of these roles is valuable in a complex project, and students who had not excelled in more conventional academic settings often shone in one or more of these roles.
- ***Instigating greater collaboration,*** with students helping peers and sometimes their teachers. Working side by side on technology-based tasks, students exhibited a tendency

16

to seek advice and offer it to each other. Teachers reported that a collaborative ethic emerged that often spilled over into non-technology-based activities.

- ***Giving teachers additional impetus to take on a coaching and advisory role.*** When students were actively engaged with technology, the teacher had less need to be giving the whole class information or acting as disciplinarian. Instead, the teacher became a roving coach, working with one group or student and then another. Computer technology further supported this coaching role by providing a readily viewable display of the student's work and the capability for the student and teacher to jointly generate, try out, and evaluate alternative approaches.

Involvement in technology-based educational reform efforts had effects also on the teachers themselves. Although technology-supported classroom projects required a great deal of the teachers' own time, as well as great effort, they paid sizable dividends in terms of the teachers' own professional growth. Respondents talked about:

- ***An increase in their technology and pedagogical skills.*** In addition to learning about the technologies that are incorporated in their classroom activities, teachers acquired skills in setting up cooperative work groups, providing individualized coaching, and orchestrating multiple parallel activities within their classrooms.
- ***Greater collaboration within their own school.*** The introduction of new technologies gave teachers a compelling reason to come together to think about what they were really trying to teach and how technology could support their goals, to learn about new technologies, and to plan multidisciplinary technology-supported projects.
- ***Contact and collaboration with external school reform and research organizations.*** Many technology-supported projects were funded or initiated by outside organizations that worked with the classroom teachers in designing and implementing classroom applications of technology.
- ***Involvement in training and professional conferences.*** Involvement in technology-related activities brought many teachers recognition, not only within their schools but also at state, national, and international conferences.

Implementation Lessons

As challenging as it is to bring a constructivist approach to an individual classroom, there is an equally difficult challenge in implementing a schoolwide reform. Central to this challenge is getting all or most of the teachers within a school to buy into a coherent instructional vision and strategies for using technology to support that vision. School leadership and time and opportunity for joint decision-making and the forging and continual refinement of a common vision must emerge.

Our case study schools were not uniformly successful in implementing a schoolwide reform that brought the constructivist model and technology use to every classroom. But their disappointments and failures were just as informative as their successes. From their experiences, we derived a number of lessons for technology-supported educational reform efforts:

- ***Time must be devoted to developing a schoolwide vision,*** a consensus around instructional goals, and a shared philosophy concerning the kinds of technology-supported activities that would support those goals. Site-based management and grant opportunities can serve as catalysts for such discussions.
- ***Adequate technology access is needed for all students.*** To the extent that there are only a few computers in regular classrooms or computers are clustered in a few labs in one part of the school, most teachers have little opportunity to, and indeed feel little responsibility for, integrating technology into their instruction. We conclude that a classroom needs roughly one computer for every four students if students are to have the kind of access they need to engage in significant technology-supported projects.
- ***Teachers need time to learn to use technology and to incorporate it into their own curricular goals.*** Particularly after the initial hurdles, learning to use a new piece of hardware or software in a mechanical sense is a fairly short-term activity. Thinking about how technology can support one's own instructional goals, however, and learning how to orchestrate a class in which students are doing challenging projects, portions of which are technology based, take much longer. It is this latter kind of training that is all too often missing from technology implementation efforts. These kinds of learning need to occur over time, preferably with opportunities to observe models, to practice, and to receive feedback on one's actions.
- ***Easily accessible technical support is critical.*** Most teachers have limited technology experience, and, even if they are comfortable with using a technology they have not completely mastered in front of their students, these teachers will not be willing to plan around technology use if there is a good chance they will encounter technical problems that they cannot get fixed for days or weeks. Many more teachers will incorporate technology into their teaching if on-site technical assistance is readily available.
- ***The system should provide rewards and recognition for exemplary technology-supported activities.*** Like the rest of us, teachers are influenced by the reward structure around them when it comes to deciding where to place their energies. Not surprisingly, school leadership that values technology and education reform activities is associated with more widespread and sustained emphasis in these areas.
- ***Good curricular content must come first.*** Although in some cases the availability of new technology may inspire projects, it is critical that strong curriculum content drive the design of technology-supported activities. For some, there will be a temptation to assign projects that use an exciting new technology but have little curricular value. Starting

18

planning with educational needs and instructional goals can provide the discipline to keep technology-supported projects "on track."

- ***The project should provide opportunities for teachers to collaborate with peers.*** The most ambitious and successful technology-supported projects typically were planned and executed by teacher teams rather than a teacher working alone. All the well-known advantages of team work, such as multiple sources of inspiration, expertise, and energy, apply to the difficult job of bringing off a student-centered classroom. When teachers work together, they seem to plan more far-reaching and ambitious activities than when they work in isolation.
- ***Technology should be used across subject matters and classrooms.*** There is a certain amount of "overhead" that goes with learning to use any new technology. Students need to acquire keyboarding skills and learn how to get into programs and files and to store their work in appropriate ways. The more classes and grades over which this "technology overhead" can be spread, the better. Moreover, when technology is used across a broad range of classes, many more students find enjoyable uses for new technology applications and feel confident about their ability to learn them.

Costs for implementing technology-supported reforms will vary from school to school, depending on the kinds of technology used, the number of students, and the requirements for major infrastructure investments (e.g., wiring and structural modifications). As an order-of-magnitude approximation, we estimate that if costs for the needed additional teacher training and preparation time are included in the projection, attaining the vision of technology-supported constructivist classrooms will run about $400 to $500 per pupil a year. Teacher training and preparation costs are the missing or underfunded elements in many technology implementation budgets.

Policy Implications

We believe that the difficulty we experienced in finding schools with large numbers of classrooms incorporating technology-supported constructivist teaching and learning approaches is in itself a significant finding. The scarcity of these classrooms testifies to the magnitude of the change we are looking for and the challenges—individual, organizational, and logistical—to making it happen.

It is clear from our case studies that the effects that technology has on students depend on the instructional context provided by individual teachers. This finding implies not only that the impact of technology will vary from classroom to classroom but also that the issues of teacher buy-in, teacher training, and teacher support are essential to success. Approaches in which a higher level of the education system decides what equipment a school will get or how they are to

19

use it, where teachers do not participate in the process of thinking through instructional goals and selecting appropriate technologies and software to match them, are likely to lead to disappointment and wasted resources. At the same time, we do not advocate an entirely bottom-up approach. With no support, guidance, or encouragement from the system, a few exceptionally dedicated teachers will put in the time and energy to conceive and implement exciting technology-supported projects, at least for a while. Their students will benefit from their work and gain a new confidence in their ability to learn by using technology. Most students will never receive this kind of instruction, however, if there is no systemic support for it. Innovations have a fragile existence, particularly when they are not consistent with district or state curricula and accountability measures. Without institutional support, innovations often die off when their champion leaves or becomes discouraged. Higher levels of the education system have a responsibility to provide a framework that invites, supports, and sustains innovation.

These levels of the system have an important role also in guaranteeing equality of access. Student homes vary dramatically in the amount of technology available, and without state action, differences among schools serving advantaged and disadvantaged students are likely to reinforce such inequalities.

The fact that we identified classrooms and schools that do approximate our vision and that do so with students from all segments of our society is an encouraging message. Technology, project-based learning, and advanced skills are not the exclusive province of older, economically privileged, or fluent English-speaking students. Our case studies show clearly that these approaches are powerful motivators for students from all economic, linguistic, and cultural backgrounds. ***The most economically disadvantaged students in our society can use technology tools to support their own learning, to create high-quality products, and to support collaboration with others.***

In addition to the challenges to teachers, schools, and the education system described above, making technology a force for learning and positive change in our schools poses challenges to our communities. We think it is no accident that only one of our nine sites was able to launch its technology-intensive reform agenda without a significant level of funding from organizations outside the education system. In eight cases, private corporations and foundations and/or research organizations with external funding were pivotal. In an era of diminishing education budgets and public reluctance to raise taxes, ***we are unlikely to see the kinds of activities described in this report available to most of our children unless the private sector engages actively, constructively, and over the long term with schools that are eager to make technology part of significant efforts to improve.***

Overall, our research suggests that the press for reform is worthwhile, but it must be coupled with the realization that, especially when technology is involved, ***reform takes an extended period to come to fruition, requires significant resources, and must attend to teachers' needs for support in undertaking both new learning and more difficult roles.*** Technology is not an easy route to transforming schools, but our case study sites suggest that it is an exciting one.

21

Telecommunications and Education:

Surfing and the Art of Change

By

Gloria G. Frazier

Deneen Frazier

A Technology Leadership Network Special Report
from the Institute for the Transfer of Technology to Education
of the National School Boards Association

Copyright © 1994: National School Boards Association
International Standard Book Number: 0-88364-187-9

Section Three: Will surfing really make me a better educator?

Quality learning is dependent upon access to quality resources and quality interactions. Telecommunications can deliver access to both for all educators and students. In fact, it can support the transition into lifelong learning — the ultimate goal of our public education system.

Educators now have a learning tool that, if used extensively by teachers and students, could transform how we think as a society about teaching and learning. Will educators incorporate it merely as an add-on to support existing teaching and learning paradigms, or will they put their collective strength behind it to use its full power to support and transform our understanding of teaching and learning?

For the first time in our history, educators have the attention of all sectors of our society. Americans want public education to be successful for all children. New attention is focused now on content standards, expectations of students, and strategies for finding more time for instruction and better ways to spend that time.

How accessible is telecommunications for teaching and learning in schools?

The vast majority of teachers and students do not have access to the technology they need to go online. "Educational Technology Trends, Public Schools 1992-93," the sixth annual technology survey conducted by Quality Education Data Inc., estimates that 33 percent of 14,620 districts have modems and 22 percent of K-12 schools have modems. The survey provides no information about how many classrooms have access to modems. The survey does not indicate whether the use of these modems is for administrative or instructional purposes, but experience suggests that many are used to transmit administrative information such as attendance, finances, scheduling, e-mail communication with the central office, and student documentation. Whatever the current percentage of individual teaching and learning environments that have a computer, modem, and telephone line coupled with the flexibility and supportive resources needed to use that equipment effectively, it is nowhere near the critical mass required to make telecommunications a driver for a transformed education system.

Will there be a time when universal access to electronic networks is available at a low cost? Despite the considerable media coverage of plans to create an electronic highway for the nation, including reports that the telecommunications industry is getting ready to make fiber optic links more accessible to schools, the best estimates are that this will take five years at a minimum because of the political and regulatory decisions and the time required to build the infrastructure. Then there is the problem of retrofitting schools to use telecommunications and the costs associated with "going the last mile" to connect school buildings and classrooms to fiber optic cable dropped nearby.

Whether you currently are able to get to a beach shouldn't be the primary factor in your decision to get interested in electronic surfing. Your current lack of convenient accessibility/connectivity does not need to block you from initial attempts to use the technology in some fashion and increase its

accessibility, even if it requires some awkward configurations of time, space, and relationships. We are in the initial stages of creating a new information and communications system for our society that has the potential for changing when, how and what we learn as dramatically as the telephone changed our verbal methods of communication and information exchange. Public education can be a primary collaborating architect of this new system ... or it can ignore its role and perhaps be unhappy with the results later.

When and where are teachers using electronic networks?

The current examples of using telecommunications to support and transform teaching and learning are possible primarily because individuals and/or teams use personal time to do the professional tasks necessary to create the curriculum and learning activities. There's nothing new about that! Dedicated educators have always spent their own time and, often, their own resources to support their professional activities. As an active user of telecommunications and electronic networks for several years, a teacher recently captured the state-of-the-art when she said:

> *Only a few of us pioneers volunteer to stay up to 3:00 a.m. looking, exploring, navigating so that we can share with others.*

(Note: This comment and other quotes in italics interspersed throughout the rest of this section are from educators who responded to our online request for information and helped to shape the way in which we constructed this report.)

The Honey and Henriquez study of experienced telecommunication-using teachers, conducted by the Center for Technology in Education then based at Bank Street College of Education, confirms the anecdotal reports we received. When teachers identified where they conducted their professional telecommunication activities, they said:

69% at home (75% had modems at home)
28% in their own classroom
22% in a computer lab
18% in administrative offices
1% in another classroom

Of the experienced teachers who responded that they had modems at home, two-thirds were accessing telecommunications daily, two or three times a week, or weekly.

Teachers who are actively engaged in using telecommunications regularly tend to use multiple networks to find curriculum materials and new databases to support curriculum activity and to facilitate their professional development through exchanges with other educators. Many receive information regularly from listservs, and it is not unusual for them to receive 35 to 40 e-mail messages a day. Additionally, they engage weekly in one to three forums or conferences. It is this level of professional activity that the "pioneer" telecommunicating teachers are referring to when they say "I use it all the time" — and most of their use occurs during their time at home in the evening and early morning.

Engaging in electronic network activities demands not only time in terms of searching for quality resources but a commitment to enter into new relationships with others. And we know as interactions increase, relationships deepen and expectations and commitments increase between people. Well-connected surfers get a lot of cards and letters! It's kind of the love/hate relationships that celebrities talk about — it's tough to answer all the mail, but I'd sure hate it if it stopped coming! And despite the time-consuming nature of telecommunications online, respondents to both our survey and Bank Street's responded "No" when asked if telecommunications was too time-consuming to be an effective professional resource.

It's wonderful that the "pioneers" are exploring and using the technology, and that most of them are using it to support student-centered learning, but scaling up use significantly can't happen if telecommunications resources must be supplied from personal stockpiles and applied to activities added onto tasks already scheduled or mandated for their classrooms. We have to legitimize teachers and students using their learning time differently than when most of us went to school.

Educational networking must support transformation, not reinforce the status quo of teaching and learning.

How are teachers using electronic networking, and where should we put our efforts?

If more teachers are to use telecommunications to support higher quality student learning, then the various stakeholders concerned with transforming education should focus on the following six key strategies that educators say electronic networks help them to advance:

- **Extend the learning environment**
- **Engage students in learning from other students**
- **Increase the quality of student learning and work**
- **Provide access to quality resources**
- **Build a professional community**
- **Promote empowerment**

Extend the learning environment

It removes the walls of the classroom by bringing the world to the student.

Students are able to reach beyond the confines of their building for research and communication.

For those students never out of their neighborhoods, it offers equity of access to other experiences.

It lets teachers take the classroom outside.

It has expanded our classroom ... blown away the walls ... filled us with a sense of possibility ... made us less provincial ... personally involved us with the nation and the world.

We're more keenly aware of a world outside the classroom, in the sense of being able to reach out to information resources and not operating in a vacuum.

Electronic networks bring real equality of education to all students. My inner city students were learning and participating with private school students who have access to very specialized equipment. Through Internet, my students were unaware of the social status of these students. It was wonderful to watch them exchange scientific information with students they would be very uncomfortable with in a classroom.

My students have broadened their thinking beyond our city.

It gives my students knowledge, language and a cultural and a global outlook they will need in an increasingly interdependent world.

Extending the learning space impacts both teachers and students. It reduces feelings of isolation, increases access to information, facilitates communication with people, and creates a level playing field.

To increase the number of teaching and learning environments no longer constrained by the classroom or school walls, issues of connectivity must be addressed seriously at national, regional, state, and local levels. Critical to this effort is a dramatic increase in

25

the number of working agreements between public education and the private sector organizations responsible for designing and constructing the connections and their pricing structures.

The pressure points for effecting systemic change in teaching and learning using telecommunications include:

- The "Last Mile"
  - Retrofit the infrastructure of school facilities for direct classroom connections.
- User Interface
  - Develop friendly hardware and software systems for network navigation.
  - Develop graphic interfaces.
  - Facilitate cross-platform and operating system compatibility.
- Internet Access
  - All networks must provide universal, direct, full Internet access.
  - Fragmentation of the total possible user community diminishes its voice.
- Public/Private Balance
  - Commercial competition supports an informed and connected society.
  - Inter-network collaboration by network management and sponsors can ensure that all subscribers have full operational participation in the total user community.
- Local Education Budget Priorities
  - District and school budgets provide funds for teacher and student involvement in multiple networks and projects.
- Local Community Priorities
  - Educators engage social and cultural leadership in designing telecommunication infrastructures to support lifetime learning for their communities.

Engage students in learning from other students

Students broaden their thinking by hearing other students' views.

The pen (key) pal concept helps lonely and alienated students find friends and acceptance

Education is becoming more global. On Internet, students can be in almost instantaneous contact with other students all over the world. Global collaboration on Internet projects is commonplace. Such interactions help to break down discriminatory boundaries posted by long traditions of separation.

Kids in touch with other kids, sharing experiences across the globe, are developing a sense of perspective about how they fit into the world.

Middle school children want and need to reach out and touch someone. Middle school children want immediate feedback. Electronic media provides the answer for both of these.

Students are joining other students in conducting student designed and managed experiments and national and international studies and projects.

Students learning from students creates networks of peers, reduces alienation and loneliness, and broadens their knowledge of the world and people. It not only broadens their knowledge about the world but also enhances their social responsibility and participation.

In particular, adolescents struggle with the developmental issues involved in gaining an identity. Research suggests that this is the time to connect them with as many of their peers as possible, so that their vision of the world and their place in it can be expanded as rapidly as their developing sense of identity. Telecommunications can provide

students with access to other students of varying backgrounds and experiences, without the constraints of local or parochial social customs or information. It is questionable, however, how much student-to-student communication will be allowed by our society. Traditional teaching pedagogy that prevails in many schools today does not reflect the student-centered, project-based, interdisciplinary curriculum in which such activity could thrive. Educators must step back from their roles of gatekeeper and source of information to allow student-to-student communication to be meaningful. And parents and communities, who ultimately are responsible for their children's education, must be open to the strategy as well.

The pressure points in promoting local, regional, national, and international student-to-student communication include:

- Socio-Cultural Priorities/Values
  - — Population segments differ about whether children should learn culture and social values beyond their own family and community perspectives.

- Professional Priorities/Values and Pedagogy
  - — Are student-to-student interactions that convey value-laden information valuable in curriculum?
  - — Alternative strategies include:
    - – teacher-mediated network exchanges between students.
    - – teacher-controlled network exchanges between students.
    - – unmediated network exchanges between students.
    - – private student network accounts and mailboxes.
    - – network exchanges between students limited to project-related data.
    - – network exchanges between teachers only.
  - — Policy decisions and management issues such as decentralized decisionmaking create equity of access differences for learning environments, schools, districts.
  - — How should educators address entity of access differences among various learning environments, as differences are created by policy and management approaches such as site-based decisionmaking?

- Accountability Systems (formal and informal)
  - — Does the school system or educator have a legal/moral responsibility to filter, manage, or censor contemporary "real-world" content for students?
  - — Does the school system or educator have a legal/moral responsibility to assist students with contemporary personal/social issues through curriculum content, including higher-order thinking skills?
  - — Does the school system or educator have a legal/moral responsibility to assist students in "making sense" of value-laden information acquired either in or out of school?

Increase the quality of student learning and work

My students were motivated to extend their research projects to university-level quality products.

Enhanced resources resulted in sending more projects to the district-level science fair this year than the past four years combined.

It provides instant access to a level of professional expertise formerly not available to the classroom. We have frequently sought help from scientists and mathematicians through the Internet when questions arose out of class discussions that we could not answer. We received answers almost immediately. This gave students a

27

sense that what they were doing in school was important, if a professional would take time to give their questions serious consideration and thoughtful replies.

My students and I have used more databases than I ever knew existed in my subject area. I have been surprised that we could gain access to so many up-to-date sources.

We have shared our climate, endangered species, and trivia about our city with students in Ohio and Canada. My students learned for the first time what minus temperatures and snow flurries are, which was information that I had assumed they already knew.

We are currently participating in some environmental issues on our state network that involve creative problem solving and research.

The quality of student research has increased beyond my expectations.

I think many of my previously lower achieving students may be producing higher quality work because telecommunications more closely matches their learning style it supports kinesthetic learning; has a game feel to it in searching for treasures; and involves real people and things. The hands-on activities really work.

My students have come to realize the need to broker knowledge, not just store it.

The students realized the need to know the state postal codes when they tried to figure out if a message was from Mississippi, Missouri, or Minnesota. Before, it was just a memorization task that teachers made you do for a test. Now it is important to know that information. When people from other states ask questions, then researching the answers becomes very important to them.

Students have wanted to write! Letter writing and report writing have become meaningful, because they can put what they write on the network. They have a purpose for writing that they think is important.

The quality of student learning and their products increases when telecommunications is used in support of their work and increases still more when students have "hands-on" roles in the network exchanges. Quality increases in terms of research conducted, resources cited, analysis and synthesis of data, independent and cooperative learning, discussion of issues in larger and more significant contexts and communication skills, specific questioning, interviewing, and writing.

The introduction of electronic networking activities can motivate students as it gives them a greater feeling of ownership of their work. Unless the teacher dominates networked exchanges and their outcomes, telecommunications can drive a restructured curriculum that supports the developmental and Constructivist pedagogy preferred by today's leading learning theorists.

To be more specific, electronic networking encourages strategies that use theme, interdisciplinary, inquiry, and project-based curriculum activities to promote active learning, individual and group investigations, and information-gathering and analysis/synthesis tasks for student learning. Network-driven projects are prime opportunities to develop learning activities that require students to access new information; demonstrate knowledge and skills around real issues and tasks; and communicate creatively.

Research has shown over and over again that student achievement dramatically increases when students must apply acquired knowledge to create something and demonstrate their achievement to an audience. On networks, students have a built-in audience to whom they can show their work.

Educators struggle to deal with the wide disparity of developmental needs among their students. Telecommunications offers a mechanism to support individual differences (as in individual research or writing) and at

the same time to provide ways for students to interact in groups and be members of communities (as in collaborative projects). Typically, educators have found that teacher-initiated projects that involve up to 10 teachers and their students toward some common learning goal seem to be manageable and have the highest student learning results.

As sites attempt to scale-up electronic networking to increase the quality of student learning, single on-site individuals tend to emerge as change agents, translators, and staff development leaders. Successful schools often release a teacher to be an on-site person responsible for recruiting teachers (individuals and teams of teachers), identifying networking opportunities that would be of interest to staff setting up a successful learning path for new users, providing on-demand technical assistance to the new user, transferring ownership of the process to the teacher and student, and developing shared planning and reflection activities for all staff and students involved in telecommunications.

The pressure points for dialogue and action about using electronic networking to increase the quality of student learning and work include:

- Project-Based and Inquiry Learning
  - — Established, quality network-delivered projects with track records for support and documented student results tend to be most effective.
  - — Well-defined student-centered projects require:
    - – information/database search and retrieval.
    - – identification of experts in the field who can engage in interviews and reviews of student work via telecommunications for independent evaluation, feedback, and legitimacy.
- Teacher-initiated Projects
  - — There is higher achievement, motivation, and intrinsic reward when teachers invite other teachers and their students to collaborate in an online project.
- In-House Support Personnel (individuals or teams) can:
  - – recruit teacher(s) to telecommunications.
  - – sift and identify network resources.
  - – broker network resources to staff.
  - – create a successful learning path for staff learning.
  - – design staff development experiences.
  - – provide on-demand technical assistance.
  - – transfer "hands-on" ownership to staff.
  - – link with online resources to create collaborative activities through which staff can investigate areas such as curriculum, staff development, systemic change initiatives, and grant/proposal writing.

Provide access to quality resources

There is no way we can possibly transmit enough information to educate our students. We can, at best, teach them where to find it for themselves, so they will be able to get what they need. Electronic resources are the most up-to-date and most easily accessible.

It provides access to information, as well as access to people.

The resources available to educators and students are amazing!

I bring experts and other students into my classroom in real time or with a short delay from virtually any field of interest and any corner of the globe.

Electronic networks have made the world our library.

My students have exchanged information with NASA officials and other people of importance whom they might otherwise feel uncomfortable talking to in person as an adolescent. It is exciting for them to participate and not feel threatened by the presence of the person at the other end.

29

Sharing curriculum and lesson plans has given me and my students the best of many teachers.

Our school budget could never have paid for the expert assistance our students received via the electronic networks. Nor would the budget have been able to pay for the professional development I got from other teachers working on the same projects with my students. I've been mentored by the best for so little cost to my district.

The middle-school-aged child is very self-conscious and avoids contact with people of expertise for fear of being thought stupid. Electronic networks take away that fear and let real exchanges of information take place.

My students have really learned a lot from participating in simulations. We did one on the United Nations where there were open-ended questions and challenges were placed on the network. Students submitted their findings and results to an international panel of experts. They learned a lot more than when I used to lecture them about the UN functions.

Telecommunications provides students and teachers access to a vast array of print and human resources well beyond what is available within their classroom, school, or community. It is not subject-matter dependent nor is it grade-level dependent. It supports graded and nongraded, discipline-based and interdisciplinary teaching and learning. And online, people respond quickly and at no cost to inquiries or requests for assistance, and they volunteer their time to work with students on projects.

A major problem for teachers and students is being overwhelmed by the extensive amount of data and human resources available online. Navigating through networks and evaluating available information sources to find quality resources takes time and energy. All that effort builds critical analysis and synthesis skills for both teachers and students. But friendlier hardware and software systems such as the Internet file server, Copernicus, or Internet search and retrieval tools such as Mosaic or The Guide will make finding desired information in that vast volume of information a greater likelihood for everyone.

Studies show that while education network users of all levels of expertise rate electronic mail and other modes of collegial exchange as most important, they place increasing importance on information access as they gain experience. Thus, education leaders who want teachers to access and use information databases should first facilitate online collegiality. In the metaphor of face-to-face meetings, get everyone acquainted and comfortable as quickly as possible so they can get into the work of the breakout sessions!

The pressure points that will help to ensure that high quality information and online resources are maximized and integrated into the teaching and learning environment include:

- Online Network Facilitation
  - — Create online network facilitators/coaches who encourage dialogue, broker information, and link users with similar interests.
- Collaborative network products
  - — Solicit and recruit teachers and students to help create curriculum materials to be delivered and supported online, and merge in some of the power of locally-initiated products.
- Information search and retrieval
  - — Create intelligent and user-friendly search and retrieval aids, particularly for the large databases of the Internet, reducing gathering time and allowing more time for analysis, evaluation, and synthesis.

Build a professional community

The biggest bonus is the contact with colleagues beyond your local school environment.

You realize all the great things that are going on in the country and the world in education, and it motivates you.

My professional development has been given a major boost by participating with peers on a global scale.

I have challenged myself to reach further and to expect more of myself and my students.

It makes you feel more professional about your role.

You share information with schools within your area and develop information that other schools can access by computer.

It creates an incentive to write grants with schools outside your area.

It has changed my way of teaching, because I can get input from colleagues in a convenient manner when I want help or information.

You get positive feedback instead of the negative messages the media bombards us with.

I no longer feel isolated in the challenges that I have to meet.

It has provided me with many wonderful resources when I am looking for answers to specific questions. Usually several people have suggestions of books or people who can help.

Being a part of a network of people with a similar philosophy and goals for changing education has helped me to understand that there are others who think as I do.

The power of electronic telecommunications to transform the educational culture from one of isolation to one of connectedness seems almost miraculous to teachers. It happens so quickly, with so little effort compared to making the same connections face-to-face.

Every study of telecommunication use by teachers captures the enthusiasm of educators finding others who care about similar issues, are having similar experiences, have neat ideas and materials, will supply critiques, can solve short-term problems, and are open to sharing their successes and failures in hopes of bettering their own teaching. The concept of personal sharing often is belittled by others as of minimal importance in restructuring the teaching and learning environment. Yet all of the psychological and sociological research suggests that unless individuals feel a sense of belonging and connectedness, the chance of them making significant behavioral or attitudinal changes ranges from "slim to none." Research also indicates that as relationships develop and trust grows, discussion becomes deeper and more complex.

Professional benefits for teachers include curriculum development, enhanced materials, and rapid feedback on curriculum issues and new issues related to school reform, such as decentralized decisionmaking, alternative assessment, curriculum standards, student-centered curriculum, accountability systems, and linking students and families to health and social services.

Most teachers rarely have opportunities to engage in professional dialogue with educators who teach other grades and subjects. Online, teachers at one school level can develop electronic linkages with teachers at other levels in their feeder stream or district as easily as they can with teachers geographically distant. Middle schools, for example, should create telecommunications links with the elementary and high schools with which they articulate their student populations. Articulation has been advocated for years, but it's still not happening on a large scale. Telecommunications can alleviate many of the logistical problems that stand in the way of cross-site collaboration and can facilitate transitioning curriculum, articulating students, and creating shared visions across levels for teaching and learning. When educators at all levels, including postsecondary, create articulated connections, students may

see for the first time that there really is systemic concern for their success.

Teachers also are grasping for help and tools in designing more student-centered learning experiences and developing more authentic assessments. Using electronic networks, individual teachers are sharing and developing authentic assessments tools, interdisciplinary curricula, lesson plans, project-based units of study, and inquiry activities.

This is sometimes called the "shared ignorance" model by educators more accustomed to the traditional "expert" top-down model of professional development. To go beyond traditional professional development experiences of workshops, seminars, and conferences — an essential transition in significantly changing the quality of the 2-million-teacher workforce — we'll have to employ new strategies for promoting professional growth. Many of these strategies will only emerge from the interactive "shared-ignorance" model, where new learning is created without undue reliance on a handful of experts.

If we're to successfully restructure the way in which teaching and learning happens, we'll need electronic communications to deliver formal and informal professional development experiences. Raising the level of dialogue among educators online will require expansion of the conference moderator role to include making strategic interventions that raise the expectancies of a group's dialogue. Moderators also must develop the skill to broker dialogue and information into a larger community of learners on their network and across networks.

Organizations that exist to support learning can help develop the professional education community by providing online dialogue forums, resident experts and databases filled with upcoming events, funding opportunities, in-progress documents of and information on current projects, and issues under discussion by the organization's leadership. The following electronic "blurb" downloaded from America Online shows how the National Association of Elementary School Principals organizes its National Principals' Center Online:

ABOUT NATIONAL PRINCIPALS' CENTER ONLINE

The National Principals' Center Online is dedicated to the Principals of America. This area not only provides information pertaining to education, but also provides a gathering place where principals can come to exchange information, ideas, and experiences as well as discuss issues which effect education.

Features include:

• The Principals' Forum – a conference and message board area where a variety of educational issues are discussed live each week and opportunities for frank continuing dialogue are given.

• The Interchange – the NPC message board center, to be used for the creative exchange of information and ideas on a variety of topics.

• The Education Newsstand – containing educational news items hot off the wires, regular feature articles from prestigious magazines such as Scholastic's Electronic Learning and the NSBA's American School Board Journal, articles of interest to educators from the small presses, software reviews, and a searchable database of information about more than 300 magazines.

• The Resource Center – a valuable collection of educational and professional resources designed for today's principal.

• Professional Development Programs – principals teaching principals in live seminar-style classes, an opportunity to learn new skills from old pros and to contribute to the education of the next generation of educators.

• The Internet Center – designed to give you fast and easy access to the Internet through America Online. The Internet Center can help you understand what is available on the Internet, and to show you how to take advantage of its resources.

• The Convention Center – where you can learn about education conferences and events scheduled by various educational boards, associations, and organizations across the country.

The National Principals' Center Online is sponsored by the National Association of Elementary School Principals. For more information about NAESP, see "About NAESP" on the next menu.

Transmitted: 94-03-02 10:15:31 EST

37

The ATLES network on Prodigy helps organizations and is dedicated to creating cross-organizational leadership collaboration and providing a public communication forum. Organizational networks that address issues of education reform must not only create communities within their organizations; they also must link their communities with others exploring restructuring. Initial attempts by the National Education Association, the Coalition of Essential Schools, Accelerated Schools, the National Alliance for Restructuring Education, the National Science Foundation SSI Projects, Bolt Beranek and Newman Inc. consulting firm, and others are clearly steps in the right direction. The NEA's School Renewal Network and their practice of including researchers online with teachers is particularly helpful in focusing systemic issues and bringing resources to teachers.

However, actual professional dialogue in the various forums is quite sporadic between professionals and needs further support to become a more significant medium for change. In many instances, the telecommunications technology is so new to the managers of the projects, programs, and consortia that their own learning curves limit the use of the technology by the practitioners they serve.

For teachers to use online networking as a professional tool, they need pre-service education programs that include training in telecommunications and engage them in telecommunications projects, including interaction with K-12 teachers and students. Currently, the few pre-service programs that include telecommunications make it part of their student teaching experience rather than part of the regular program. Schools could take the lead by forging online relationships with the teacher education programs that most often supply their pool of teacher applicants. Such relationships could help schools mold their workforces to operate in restructured teaching and learning environments that are student-centered, results-based, inquiry-based, interdisciplinary, project-based, and accountable through performance-based alternative assessment methods. The effort is particularly important in light of the large number of teachers who will be retiring from the public system in the next five years.

Professional networks for first-year teachers, such as one at Harvard University, have been instrumental in reducing initial stress and supplying needed professional resources to ensure successful entry into the profession. The power of such networks can be fully realized, however, only if interactive engagement is facilitated online with networks of experienced teachers and organizations that can transcend the instructor-student paradigm and bring beginning teachers into the larger electronic learning community.

The following bit of electronic mail is a positive statement that progress is being made to connect beginning professionals for support and learning. We've included it in its entirety because it exemplifies the strengths that we've listed for electronic networking. The project was generated at the postsecondary level and was conceived through face-to-face conference networking, which it can then help to support and enlarge online. It encourages development of a global community involved in preparing education professionals. It advocates collaborative projects for teacher training curricula. It encourages direct participation by teachers-in-training. It encourages horizontal learning between students and teachers. It specifically offers an opportunity for students to demonstrate their work to an expert audience. And, while it doesn't specifically talk about including teachers already on the job in its discussions, the beauty of this democratic technology is that any teacher anywhere can subscribe to the listserv and become a contributor to the dialogue. Most importantly, it radiates the excitement and energy about learning that electronic networking can create and sustain.

Date:Sat. 18 Dec 1993 00:03:41 -0500
From: "Larry S. Anderson" <lsal@ra.msstate.edu>
To: Multiple recipients of list <cosndisc@yukon.cren.org>
Subject: PreSTO List for Preservice Teacher

**** UPDATE ON DISCUSSION LIST FOR ****
PRESERVICE & STUDENT TEACHERS

The PreSTO (Preservice and Student Teachers Online) discussion list is now a reality. Today, it became an honest-to-goodness entity. After a brief testing phase during which we'll try to make the system jump all the hoops and perform "up to snuff," we'll pass along the information on how you can get your preservice and student teachers to subscribe.

Remember, this list is a direct result of recommendations that emerged at the ISTE Tel-Ed '93 Conference in Dallas during November, 1993. At the prodding of Sue Espinoza, we have brought the dream to life. This will be a place that teachers-in-training around the world may gather to discuss topics, share ideas, and, we hope, work collaboratively on projects that surpass our current imagination.

Please contribute your ideas on how this might grow. Also, please begin compiling a list of teacher educators who will want to make sure their students participate in the PreSTO list. Won't it be fun to watch these people learn? Won't we learn a lot from them?

Another thought – let's use our collective creativity to ensure that the preservice and student teachers of our country have ample opportunities to "show off" their work. Maybe this will mean that some of us will have to propose panel presentations at conferences; maybe we'll have to help them submit their work in writing to a professional journal; maybe ___ (you fill in the blank).

In the near future, I shall send out the subscription information for the PreSTO list. For now, though, just know that the dream has had life breathed into it and will soon stand and walk on its own!

Postsecondary institutions have a clear responsibility to provide continuous online learning experiences for teachers at all levels of experience, by fostering the development of online courses that help teachers develop the knowledge and skills they need in today's and tomorrow's developmental and Constructivist learning environments. Currently, of the few such courses offered by postsecondary institutions, many teach some specific technology skill or general technological literacy rather than use electronic networking as an interactive delivery mechanism. A few postsecondary institutions offer entire degrees online, but even they fail to capture the full power of networked learning interactions. The flexibility and immediacy that is neither time nor place dependent and the variety, accessibility, and relatively low cost of information and human resource exchanges that can be conducted online suggest that the possibilities for continuous value-added services are limitless.

Pressure points where telecommunications should be facilitated to create and sustain professional growth and learning and to enlarge and engage all stakeholders in the dialogue and action around systemic restructuring of teaching and learning include:

- *Online Forums*
  - — Create multiple special-interest forums where dialogue can be focused.
  - — Create interactive links with larger conference/network user populations to:
    - – Allow feelings of identity and community to generalize.
    - – Integrate special-interest agendas into inclusive contexts.
  - — Broker the dialogue and information of their conference into a larger community of learners on networks.
- *Forum / Conference / Network Facilitator*
  - — Expand forum/conference moderator role to:
    - – Raise the level and expectations for dialogue.

- Develop online professional learning communities.
- Provide background information and discussion vehicles for relating discussions to systemic change and telecommunications integration.
- Keep participants "tuned in" for extended and expanded continuing discussion.
- Broker and disseminate resources and dialogue across networks to user populations with similar interests.

- *Organization / Association Support*
  - — Provide accessible databases.
  - — Directly link face-to-face seminars, workshops, and conferences with online information and communication services.
  - — Link restructuring agendas, databases, and ongoing learning experiences across organizations.
  - — Promote creation of special interest forums for educators.
- *Teacher Education Support*
  - — Include hands-on telecommunications training.
  - — Include hands-on experience with telecommunications curriculum projects.
  - — Prepare student teachers to work in restructured teaching and learning environments.
  - — Create K-12 postsecondary dialogue and interaction throughout the teacher education program.
  - — Create network forums and conferences to support beginning teachers.

Promote empowerment

It is empowering and mind expanding for students and teachers.

Students become more facile network navigators than their instructors; the roles are reversed. Learning then becomes an activity of shared participation, instead of a one-way interaction. Students become owners of the information ... empowered and motivated to do and want more.

Putting the technology in the hands of the kids so they can become their own information gatherers and managers is a greater service to them than trying to impart information.

Empowerment of students and teachers in the learning environment

Teachers who use telecommunications in their learning environments are often a small and sometimes alienated group in and of themselves. It is important that they join and lead the larger school community in using telecommunications to advance student learning. Schools that have moved to the team configuration have an infrastructure in place that can facilitate mentoring of teachers not yet online, who will witness networking's benefits in their teams. Knowledge is power, and as students gain knowledge and control of information the power base of the traditional teaching paradigm inevitably alters. Students and teachers become equal partners in identifying, analyzing and synthesizing information. The teacher's pedagogical teaching roles become guide, coach, mentor, facilitator, and researcher.

Equal empowerment of the users and the technology itself, however, is not guaranteed — as in when only teachers are allowed access to equipment or when connectivity is insufficient for users to respond quickly to "teachable moments." Resources should be targeted at direct access for learning environments, as opposed to funneling access through controlled gateways. Learning activities should be tailored to the immediate need of the learner, not to availability of technology.

Empowerment of teachers with other stakeholders

Educators' role in society will be strengthened when their online communication extends beyond the education community and gives them opportunities to be recognized and influential in public and private sector realms that historically have been segregated from their professional lives. For example, school administrators can empower educators and raise their morale by encouraging them to become part of a state, regional, or national project or dialogue that focuses on a component of education reform and that involves other stakeholders from outside the education profession.

In the growing climate of decentralized decisionmaking, teachers and administrators can come to the table as equal partners with other stakeholders involved in education reform. And when online forums offer subgroup discussions that target geographic regions and role groups, educators can participate in discussions and activities of immediate importance to their local or special interest learning communities while still viewing the big picture through a national or global focus.

Empowerment of everyone to learn

When telecommunications transactions are user-driven, they create leadership opportunities for everyone online and support the principles of democratic communities. This is particularly true as local communities create an electronic infrastructure that links all stakeholders with the transformation of the educational process. National "testbed" pilot communities such as Blacksburg, VA, are interconnecting community resources with citizens in ways that will greatly alter *how* America does business ... education ... government ... health care ... social services ... entertainment.

As more and more people go online, the organizers, sponsors, funders, and owners of electronic networks must constantly be aware of the extent to which their agendas override the interactions of network participants. The power of networking technology will be lost unless its inherent quality for providing what writer and college professor Crawford Killian calls "forums of anarchy" is maintained and encouraged. If a primary virtue of electronic networking is that it creates learning communities, it must be allowed to do so within the operating construct of a community. Those who are empowered must empower the technology to empower everyone.

Distance Education Overview

Recently, the term "distance education" has become a requisite buzzword in any informed discussion of educational technology. Educators, professionals, human resource training departments, and eager entrepreneurs alike are talking about the virtues of Voxware codecs and multicast videoconferences. However, when one peels back the layers of technology that shroud many courses labeled "distance education," it is not surprising to find little more than glorified correspondence courses that impose an antiquated paradigm on a frame of information technologies. While classic correspondence courses may have a place within the educational toolbox, the availability of tools like the Internet, satellites, speakerphones, even radio and television create an imperative for responsible educators to take a new approach to teaching from a distance.

Though "distance education" and "distance learning" are used interchangably and often, few distance educators talk about "distance teaching." Perhaps this is brushed off because "in distance education the focus is on learning [and the learner] rather than teaching" (Gilliard-Cook and Todorova, 1997). Ignoring the significant role a teacher plays in distance education can be lethal, even if it doesn't appear to fit into the popular learner-centered climate of current education philosophy circles. Research indicates that the instructor's preparedness, organization, knowledge of distance education technologies, and especially ability to match appropriate distance teaching methods (technologies) to particular types of content and tasks, all contribute significantly to whether learning objectives are achieved in a distance education course. Indeed, the definition of "distance teaching" is much more than simply delivering information to students separated by distance; distance teaching is creating an environment which represents the convergence of learner-centered teaching paradigms, classic correspondence courses, and new technologies, to support learners in building knowledge.

Distance learning/working/collaborating/teaching technologies can be applied broadly to the fields of education, training, healthcare, law, agriculture, banking, and business. The obvious application is the provision of professional development or continuing education programs at a distance. In this chapter, there are several models of this kind of distance education for a wide range of learners including teachers, K-12 students, and doctors. Each model highlights advantages and disadvantages of using the Internet to deliver instruction. Among some of the drawbacks are the requirement of high bandwidth and processing power to support high resolution images for certain learning tasks (e.g. medical education); data security; data integrity; and user or source identification.

Having framed it thus, this chapter defines distance education through overviews, a brief coverage of the research, suggested strategies for designing and implementing a distance education course, and examples of distance education programs using a variety of technologies. Finally, the annotated resource list at the end of the chapter includes references to articles, reports, and examples of innovative distance education programs available over the Internet, as well as a list of e-mail discussion groups, Usenet groups, and upcoming conferences pertaining to distance education.

Distance Education at a Glance
Guide #1
October 1995

Engineering Outreach
College of Engineering
University of Idaho

Guide #1
Distance Education: An Overview

- What is Distance Education?
- How is Distance Education Delivered?
- Effective Distance Education
- References
- Is Distance Education Effective?
- Which Technology is Best?
- Key Players in Distance Education
- For Further Information

• What is Distance Education?

Within a context of rapid technological change and shifting market conditions, the American education system is challenged with providing increased educational opportunities without increased budgets. Many educational institutions are answering this challenge by developing distance education programs. At its most basic level, distance education takes place when a teacher and student(s) are separated by physical distance, and technology (i.e., voice, video, data, and print), often in concert with face-to-face communication, is used to bridge the instructional gap. These types of programs can provide adults with a second chance at a college education, reach those disadvantaged by limited time, distance or physical disability, and update the knowledge base of workers at their places of employment.

• Is Distance Education Effective?

Many educators ask if distant students learn as much as students receiving traditional face-to-face instruction. Research comparing distance education to traditional face-to-face instruction indicates that teaching and studying at a distance can be as effective as traditional instruction, when the method and technologies used are appropriate to the instructional tasks, there is student-to-student interaction, and when there is timely teacher-to- student feedback (see Moore & Thompson, 1990; Verduin & Clark, 1991).

• How is Distance Education Delivered?

A wide range of technological options are available to the distance educator. They fall into four major categories:

Voice - Instructional audio tools include the interactive technologies of telephone, audioconferencing, and short-wave radio. Passive (i.e., one-way) audio tools include tapes and radio.

Video - Instructional video tools include still images such as slides, pre-produced moving images (e.g., film, videotape), and real-time moving images combined with audioconferencing (one-way or two-way video with two-way audio).

Data - Computers send and receive information electronically. For this reason, the term "data" is used to describe this broad category of instructional tools. Computer applications for distance education are varied and include:

- Computer-assisted instruction (CAI) - uses the computer as a self-contained teaching machine to present individual lessons.

present individual lessons.

- Computer-managed instruction (CMI) - uses the computer to organize instruction and track student records and progress. The instruction itself need not be delivered via a computer, although CAI is often combined with CMI.

- Computer-mediated education (CME) - describes computer applications that facilitate the delivery of instruction. Examples include
- electronic mail, fax, real-time computer conferencing, and World-Wide Web applications.

Print - is a foundational element of distance education programs and the basis from which all other delivery systems have evolved. Various print formats are available including: textbooks, study guides, workbooks, course syllabi, and case studies.

• Which Technology is Best?

Although technology plays a key role in the delivery of distance education, educators must remain focused on instructional outcomes, not the technology of delivery. The key to effective distance education is focusing on the needs of the learners, the requirements of the content, and the constraints faced by the teacher, before selecting a delivery system. Typically, this systematic approach will result in a mix of media, each serving a specific purpose. For example:

- A strong print component can provide much of the basic instructional content in the form of a course text, as well as readings, the syllabus, and day-to-day schedule.

- Interactive audio or video conferencing can provide real time face-to-face (or voice-to-voice) interaction. This is also an excellent and cost-effective way to incorporate guest speakers and content experts.

- Computer conferencing or electronic mail can be used to send messages, assignment feedback, and other targeted communication to one or more class members. It can also be used to increase interaction among students.

- Pre-recorded video tapes can be used to present class lectures and visually oriented content.

- Fax can be used to distribute assignments, last minute announcements, to receive student assignments, and to provide timely feedback.

Using this integrated approach, the educator's task is to carefully select among the technological options. The goal is to build a mix of instructional media, meeting the needs of the learner in a manner that is instructionally effective and economically prudent.

• Effective Distance Education

Without exception, effective distance education programs begin with careful planning and a focused understanding of course requirements and student needs. Appropriate technology can only be selected once these elements are understood in detail. There is no mystery to the way effective distance education programs develop. They don't happen spontaneously; they evolve through the hard work and dedicated efforts of many individuals and organizations. In fact, successful distance education programs rely on the consistent and integrated efforts of students, faculty, facilitators, support staff, and administrators.

• Key Players in Distance Education

The following briefly describes the roles of these key players in the distance education enterprise and the challenges they face.

Students - Meeting the instructional needs of students is the cornerstone of every effective distance

Students - Meeting the instructional needs of students is the cornerstone of every effective distance education program, and the test by which all efforts in the field are judged. Regardless of the educational context, the primary role of the student is to learn. This is a daunting task under the best of circumstances, requiring motivation, planning, and an ability to analyze and apply the instructional content being taught. When instruction is delivered at a distance, additional challenges result because students are often separated from others sharing their backgrounds and interests, have few if any opportunities to interact with teachers outside of class, and must rely on technical linkages to bridge the gap separating class participants.

Faculty - The success of any distance education effort rests squarely on the shoulders of the faculty. In a traditional classroom setting, the instructor's responsiblity includes assembling course content and developing an understanding of student needs. Special challenges confront those teaching at a distance. For example, the instructor must:

- Develop an understanding of the characteristics and needs of distant students with little first-hand experience and limited, if any, face-to-face contact.
- Adapt teaching styles taking into consideration the needs and expectations of multiple, often diverse, audiences.
- Develop a working understanding of delivery technology, while remaining focused on their teaching role.
- Function effectively as a skilled facilitator as well as content provider.

Facilitators - The instructor often finds it beneficial to rely on a site facilitator to act as a bridge between the students and the instructor. To be effective, a facilitator must understand the students being served and the instructor's expectations. Most importantly, the facilitator must be willing to follow the directive established by the teacher. Where budget and logistics permit, the role of on-site facilitators has increased even in classes in which they have little, if any, content expertise. At a minimum, they set up equipment, collect assignments, proctor tests, and act as the instructor's on-site eyes and ears.

Support Staff - These individuals are the silent heroes of the distance education enterprise and ensure that the myriad details required for program success are dealt with effectively. Most successful distance education programs consolidate support service functions to include student registration, materials duplication and distribution, textbook ordering, securing of copyright clearances, facilities scheduling, processing grade reports, managing technical resources, etc. Support personnel are truly the glue that keeps the distance education effort together and on track.

Administrators - Although administrators are typically influential in planning an institution's distance education program, they often lose contact or relinquish control to technical managers once the program is operational. Effective distance education administrators are more than idea people. They are consensus builders, decision makers, and referees. They work closely with technical and support service personnel, ensuring that technological resources are effectively deployed to further the institution's academic mission. Most importantly, they maintain an academic focus, realizing that meeting the instructional needs of distant students is their ultimate responsiblity.

• References

Moore, M.G. & Thompson, M.M., with Quigley, A.B., Clark, G.C., & Goff, G.G. (1990). The effects of distance learning: A summary of the literature. Research Monograph No. 2. University Park, PA: The Pennsylvania State University, American Center for the Study of Distance Education. (ED 330 321)

Verduin, J.R. & Clark, T.A. (1991). Distance education: The foundations of effective practice. San Francisco, CA: Jossey-Bass Publishers.

Willis, B. (1993). Distance education: A practical guide. Englewood Cliffs, NJ: Educational Technology

Publications.

• For Further Information

This guide is one in a series entitled **Distance Education at a Glance** developed by University of Idaho Engineering Outreach staff. Other guides in this series include:

#1 Distance Education: An Overview
#2 Strategies for Teaching at a Distance
#3 Instructional Development for Distance Education
#4 Evaluation for Distance Educators
#5 Instructional Television
#6 Instructional Audio
#7 Computers in Distance Education
#8 Print in Distance Education
#9 Strategies for Learning at a Distance
#10 Distance Education: Research
#11 Interactive Videoconferencing in Distance Education
#12 Distance Education and the WWW
#13 Copyright and Distance Education
#14 Glossary of Distance Education Terminology

Distance at a Glance Index
Engineering Outreach Home Page

This guide was edited by Tania H. Gottschalk
University of Idaho
Engineering Outreach

Comments about this page to: outreach@uidaho.edu

Loaded on the Web: May 31, 1996 and then revised November 25, 1996 by Tania H. Gottschalk
URL: http://www.uidaho.edu/evo/dist1.html

Distance Education at a Glance
Guide #2
October 1995

Engineering Outreach
College of Engineering
University of Idaho

Guide #2
Strategies for Teaching at a Distance

- What's Different About Distant Teaching?
- Why Teach at a Distance?
- Improving Planning and Organization
- Meeting Student Needs
- Improving Interaction & Feedback
- Use Effective Teaching Skills
- References
- For Further Information

• What's Different About Distant Teaching

Classroom teachers rely on a number of visual and unobtrusive cues from their students to enhance their delivery of instructional content. A quick glance, for example, reveals who is attentively taking notes, pondering a difficult concept, or preparing to make a comment. The student who is frustrated, confused, tired, or bored is equally evident. The attentive teacher consciously and subconsciously receives and analyzes these visual cues and adjusts the course delivery to meet the needs of the class during a particular lesson.

In contrast, the distant teacher has few, if any, visual cues. Those cues that do exist are filtered through technological devices such as video monitors. It is difficult to carry on a stimulating teacher-class discussion when spontaneity is altered by technical requirements and distance.

Without the use of a real-time visual medium such as television, the teacher receives no visual information from the distant sites. The teacher might never really know, for example, if students are asleep, talking among themselves or even in the room. Separation by distance also affects the general rapport of the class. Living in different communities, geographic regions, or even states deprives the teacher and students of a common community link.

• Why Teach at a Distance?

Many teachers feel the opportunities offered by distance education outweigh the obstacles. In fact, instructors often comment that the focused preparation required by distance teaching improves their overall teaching and empathy for their students. The challenges posed by distance education are countered by opportunities to:

- Reach a wider student audience
- Meet the needs of students who are unable to attend on-campus classes
- Involve outside speakers who would otherwise be unavailable
- Link students from different social, cultural, economic, and experiential backgrounds

• Improving Planning and Organization

In developing or adapting distance instruction, the core content remains basically unchanged, although its presentation requires new strategies and additional preparation time. Suggestions for planning and organizing a distance delivered course include:

- Begin the course planning process by studying distance education research findings. There are several research summaries available (see Moore & Thompson, 1990).
- Before developing something new, check and review existing materials for content and presentation ideas.
- Analyze and understand the strengths and weaknesses of the possible delivery systems available to you (e.g., audio, video, data, and print) not only in terms of how they are delivered (e.g., satellite, microwave, fiber optic cable, etc.), but in terms of learner needs and course requirements before selecting a mix of instructional technology.
- Hands-on training with the technology of delivery is critical for both teacher and students. Consider a pre-class session in which the class meets informally using the delivery technology and learns about the roles and responsibilities of technical support staff.
- At the start of class initiate a frank discussion to set rules, guidelines, and standards. Once procedures have been established, consistently uphold them.
- Make sure each site is properly equipped with functional and accessible equipment. Provide a toll-free "hotline" for reporting and rectifying problems.
- If course materials are sent by mail, make sure they are received well before class begins. To help students keep materials organized, consider binding the syllabus, handouts, and other readings prior to distribution.
- Start off slowly with a manageable number of sites and students. The logistical difficulties of distant teaching increase with each additional site.

• Meeting Student Needs

To function effectively, students must quickly become comfortable with the nature of teaching and learning at a distance. Efforts should be made to adapt the delivery system to best motivate and meet the needs of the students, in terms of both content and preferred learning styles. Consider the following strategies for meeting students' needs:

- Assist students in becoming both familiar and comfortable with the delivery technology and prepare them to resolve the technical problems that will arise. Focus on joint problem solving, not placing blame for the occasional technical difficulty.
- Make students aware of and comfortable with new patterns of communication to be used in the course (Holmberg, 1985).
- Learn about students' backgrounds and experiences. Discussing the instructor's background and interests is equally important.
- Be sensitive to different communication styles and varied cultural backgrounds. Remember, for example, that students may have different language skills, and that humor is culturally specific and won't be perceived the same way by all.
- Remember that students must take an active role in the distance delivered course by independently taking responsibility for their learning.
- Be aware of students' needs in meeting standard university deadlines, despite the lag time often involved in rural mail delivery.

• Use Effective Teaching Skills

43

For the most part, effective distance teaching requires the enhancement of existing skills, rather than developing new abilities. Pay special attention to the following:

- Realistically assess the amount of content that can be effectively delivered in the course. Because of the logistics involved, presenting content at a distance is usually more time consuming than presenting the same content in a traditional classroom.
- Be aware that student participants will have different learning styles. Some will learn easily in group settings, while others will excel when working independently.
- Diversify and pace course activities and avoid long lectures. Intersperse content presentations with discussions and student-centered exercises.
- Humanize the course by focusing on the students, not the delivery system.
- Consider using a print component to supplement non-print materials (see Graham & Wedman, 1989).
- Use locally relevant case studies and examples as often as possible to assist students in understanding and applying course content. Typically, the earlier in the course this is done, the better.
- Be concise. Use short, cohesive statements and ask direct questions, realizing that technical linkages might increase the time it takes for students to respond.
- Develop strategies for student reinforcement, review, repetition, and remediation. Towards this end, one-on-one phone discussions and electronic mail communication can be especially effective.
- And finally...relax. Participants will quickly grow comfortable with the process of distance education and the natural rhythm of effective teaching will return.

• Improving Interaction and Feedback

Using effective interaction and feedback strategies will enable the instructor to identify and meet individual student needs while providing a forum for suggesting course improvements. To improve interaction and feedback, consider the following:

- Use pre-class study questions and advance organizers to encourage critical thinking and informed participation on the part of all learners. Realize that it will take time to improve poor communication patterns.
- Early in the course, require students to contact you and interact among themselves via electronic mail, so they become comfortable with the process. Maintaining and sharing electronic journal entries can be very effective toward this end.
- Arrange telephone office hours using a toll-free number. Set evening office hours if most of your students work during the day.
- Integrate a variety of delivery systems for interaction and feedback, including one-on-one and conference calls, fax, E-mail, video, and computer conferencing. When feasible, consider personal visits as well.
- Contact each site (or student) every week if possible, especially early in the course. Take note of students who don't participate during the first session, and contact them individually after class.
- Use pre-stamped and addressed postcards, out-of-class phone conferences, and e-mail for feedback regarding course content, relevancy, pace, delivery problems, and instructional concerns.

regarding course content, relevancy, pace, delivery problems, and instructional concerns.

- Have students keep a journal of their thoughts and ideas regarding the course content, as well as their individual progress and other concerns. Have students submit journal entries frequently.
- Use an on-site facilitator to stimulate interaction when distant students are hesitant to ask questions or participate. In addition, the facilitator can act as your on-site "eyes and ears".
- Call on individual students to ensure that all participants have ample opportunity to interact. At the same time, politely but firmly discourage individual students or sites from monopolizing class time.
- Make detailed comments on written assignments, referring to additional sources for supplementary information. Return assignments without delay, using fax or electronic mail, if practical.

• References

Blanchard, W.(1989). Telecourse effectiveness: A research-review update. Olympia, WA: Washington State Board for Community College Education. (ED 320 554)

Graham, S.W., & Wedman, J.F.(1989). Enhancing the appeal of teletraining. Journal of Instructional Psychology, 16(4), 183-191.

Holmberg, B.(1985). Communication in distance study. In Status and trends of distance education. Lund, Sweden: Lector Publishing.

Moore, M.G.,& Thompson, M.M., with Quigley, A.B., Clark, G.C., & Goff, G.G.(1990). The effects of distance learning: A summary of the literature. Research Monograph No. 2. University Park, PA: The Pennsylvania State University, American Center for the Study of Distance Education. (ED 330 321)

Willis, B. (1993). Distance education: A practical guide. Englewood Cliffs, NJ: Educational Technology Publications

• For Further Information

This guide is one in a series entitled **Distance Education at a Glance** developed by University of Idaho Engineering Outreach staff. Other guides in this series include:

#1 Distance Education: An Overview
#2 Strategies for Teaching at a Distance
#3 Instructional Development for Distance Education
#4 Evaluation for Distance Educators
#5 Instructional Television
#6 Instructional Audio
#7 Computers in Distance Education
#8 Print in Distance Education
#9 Strategies for Learning at a Distance
#10 Distance Education: Research
#11 Interactive Videoconferencing in Distance Education
#12 Distance Education and the WWW
#13 Copyright and Distance Education
#14 Glossary of Distance Education Terminology

Distance at a Glance Index Order Distance at a Glance Series Engineering Outreach Home Page

---

Distance Education at a Glance
Guide #4
October 1995

Engineering Outreach
College of Engineering
University of Idaho

Guide #4
Evaluation for Distance Educators

- Why Evaluate?
- Evaluation Methods
- Evaluation Tips
- Information
- Types of Evaluation
- What to Evaluate
- References

• Why Evaluate?

Effective teachers use a variety of means, some formal and others informal, to determine how much and how well their students are learning. For example, to formally evaluate student learning, most teachers use quizzes, tests, examinations, term papers, lab reports, and homework. These formal evaluation techniques help the instructor to evaluate student achievement and assign grades.

To evaluate classroom learning informally, teachers also use a variety of techniques. For example, teachers pose questions, listen carefully to student questions and comments, and monitor body language and facial expressions. Informal, often implicit evaluations permit the teacher to make adjustments in their teaching: to slow down or review material in response to questions, confusion, and misunderstandings; or to move on when student performance exceeds expectations.

When teaching at a distance, educators must address a different teaching challenge than when teaching in a traditional classroom. For example, instructors no longer have:

- A traditional, familiar classroom.
- A relatively homogeneous group of students.
- Face-to-face feedback during class (e.g. students' questions, comments, body language, and facial expressions).
- Total control over the distance delivery system.
- Convenient opportunities to talk to students individually.

For these reasons, distance educators may find it useful to not only formally evaluate students through testing and homework, but to use a more informal approach (see Angelo and Cross, 1993) in collecting data to determine:

- Student comfort with the method used to deliver the distant instruction.
- Appropriateness of assignments.
- Clarity of course content.
- If class time is well spent.
- Teaching effectiveness.
- How a course can be improved.

• Types of Evaluation

Evaluation can be either formative, summative, or a combination of both.

Formative evaluation:

- Is an on-going process to be considered at all stages of instruction.
- Will enable the instructor to improve the course as he/she proceeds.
- Facilitates course and content adaptation.
- Will identify major gaps in the instructional plan or the need for minor adjustments.

Some strategies that educators can use to collect formative data from their distant students include:

- Post cards - provide each student with prestamped and preaddressed poscards. On a weekly basis, have students use the postcards to share their concerns or respond to questions during the last three to five minutes of class.
- Electronic mail - Can be a very effective way for instructors and students to communicate. Another plus, while the instructor is eliciting information about classroom learning, students become familiar with the use of electronic mail, a valuable skill.
- Telephone - Call students often. Ask them open ended questions (e.g., "What snags did you run into on the second writing assignment?") to let students voice their concerns. Follow with probes (e.g., "Then, will you need more information sources?"). Set phone-in office hours but be sure to welcome calls at other times.

Summative evaluation:

- Assesses overall effectiveness of the finished product or course.
- Can be a springboard in developing a revision plan.
- Can be a baseline of information for designing a new plan, program, or course.
- Will not help current students since it is conducted upon course completion.

Some questions that educators may want to ask students when collecting summative data include:

- List five weaknesses of the course.
- List three (or five) strengths of the course.
- If you were teaching the course, what would you do differently?
- Student background information: age, level in school, number of distance delivered courses taken prior to this one.
- What would you recommend to a friend planning to take this course?
- What did you think would be covered in this course but was not?
- Would you recommend this course to a friend? Why or why not?

Evaluation Methods

• Evaluation Methods

Within the context of formative and summative evaluation, data may be collected through quantitative and qualitative methods.

Quantitative evaluation:

- Involves asking questions which can be statistically tabulated and analyzed, frequently using a scale, check list, or yes/no responses.
- Limits students to responding to the categories made available to them.
- Needs a large student sample for relevant statistical analyses.

Quantitative methods may be most useful for gathering information on large numbers of respondents for whom more in-depth, personalized approaches are not feasible. However, they do have some significant drawbacks:

- Many distance education courses have relatively small class sizes with students from various backgrounds. These small, stratified populations typically defy relevant statistical analysis.
- Quantitative surveys typically result in a rate of return of under 50 percent. A low rate of return often suggests that only those feeling very positively or negatively about the course responded to the evaluation.
- By definition and design, forced choice surveys offer respondents a limited number of possible response options. Therefore, fresh insights and unique perspectives falling outside the provided response categories go unreported.
- The cumbersome and often tedious nature of quantitative data collection can discourage formative evaluation, and often results in an over-reliance on summative evaluation.
- Statistical analysis often results in an illusion of precision that may be far from reality.

Qualitative evaluation:

- Is typically more subjective.
- Involves gathering a wider range and depth of information.
- Is more difficult to tabulate into neat categories.
- Will be less affected by typical small class size.
- Is a more flexible and dynamic method.
- Is not limited to pre-conceived topic of inquiry.
- Allows for student output of topics.

Can use:

- Open ended questioning -- with respondents asked to identify course strengths and weaknesses, suggest changes, explore attitudes towards distance delivery methods, etc.
- Participant observation -- with the distance educator observing group dynamics and behavior while participating in the class as an observer, asking occasional questions, and seeking insights regarding the process of distance education.
- Non-participant observation -- with the distance educator observing a course (e.g., an audioconference, interactive television class, etc.) without actually participating or asking questions.

  Content analysis -- with the evaluator using predetermined criteria to review course documents

- Content analysis -- with the evaluator using predetermined criteria to review course documents including the syllabus and instructional materials as well as student assignments and course-related planning documents.
- Interviews -- with a facilitator or specially trained individual collecting evaluative data through one-on-one and small-group interviews with students.

• What to Evaluate

Consider the following areas:

- Use of technology - familiarity, concerns, problems, positive aspects, attitude toward technology.
- Class formats - effectiveness of lecture, discussion, question and answer; quality of questions or problems raised in class; encouragement given students to express themselves.
- Class atmosphere - conduciveness to student learning.
- Quantity and quality of interaction with other students and with instructor.
- Course content - relevancy, adequate body of knowledge, organization.
- Assignments - usefulness, degree of difficulty and time required, timeliness of feedback, readability level of print materials.
- Tests - frequency, relevancy, sufficient review, difficulty, feedback.
- Support services - facilitator, technology, library services, instructor availability.
- Student achievement - adequacy, appropriateness, timeliness, student involvement.
- Student attitude - attendance, assignments submitted, class participation.
- Instructor - contribution as discussion leader, effectiveness, organization, preparation,enthusiasm, openness to student views.

• Evaluation Tips

- Check out and adapt already published questionnaires; there's no need to re-invent the wheel.
- Draft and revise questions; change if necessary.
- Make use of follow-up probes:
- Alternate between instruction and interaction.
- Sequence your questions for best effect - go ahead and ask for suggestions for improvement before asking for what is good. This will help convey sincerity for seeking improvements.
- Place open ended questions after quick answer questions. This gives students built-in thinking time.
- On summative evaluation, assure anonymity. This can be accomplished by having all questionnaires sent to a neutral site where they would be removed from their envelopes and forwarded to the instructor without a postmark.
- Establish rapport by being interested and supportive. Withhold judgmental responses.

- Adapt to the student in degree of formality and pace of communication.<
- Use evaluation as a method for understanding teaching and learning.
- Try to get both positive and negative feedback. It is important not only to know what is not working, but also what is working.

• References

Angelo, T. & Cross, P. (1993). Classroom assessment techniques: A handbook for college teachers. San Francisco: Josey-Bass Publishers.

Willis, B. (1993). Distance education: A practical guide. Englewood Cliffs, NJ: Educational Technology Publications

• For Further Information

#1 Distance Education: An Overview
#2 Strategies for Teaching at a Distance
#3 Instructional Development for Distance Education
#4 Evaluation for Distance Educators
#5 Instructional Television
#6 Instructional Audio
#7 Computers in Distance Education
#8 Print in Distance Education
#9 Strategies for Learning at a Distance
#10 Distance Education: Research
#11 Interactive Videoconferencing in Distance Education
#12 Distance Education and the WWW
#13 Copyright and Distance Education
#14 Glossary of Distance Education Terminology

Distance at a Glance Index

Engineering Outreach Home Page

This guide was edited by Tania H. Gottschalk
University of Idaho
Engineering Outreach

Comments about this page to: outreach@uidaho.edu

Loaded on the Web: May 31, 1996 and then revised November 25, 1996 by Tania H. Gottschalk
URL: http://www.uidaho.edu/evo/dist4.html

Distance Education at a Glance
Guide #7
October 1995

Engineering Outreach
College of Engineering
University of Idaho

Guide #7
Computers in Distance Education

- Why Computers in Distance Education
- Advantages of Computers
- Limitations of Computers
- The Internet and Distance Education
- Instructional Possibilities
- Teaching Considerations
- References
- For Further Information

•Why Computers in Distance Education?

In recent years, educators have witnessed the rapid development of computer networks, dramatic improvements in the processing power of personal computers, and striking advances in magnetic storage technology. These developments have made the computer a dynamic force in distance education, providing a new and interactive means of overcoming time and distance to reach learners.

Computer applications for distance education fall into four broad categories:

- **Computer Assisted Instruction (CAI)** - uses the computer as a self-contained teaching machine to present discrete lessons to achieve specific but limited educational objectives. There are several CAI modes, including: drill and practice, tutorial, simulations and games, and problem-solving.
- **Computer Managed Instruction (CMI)** - uses the computer's branching, storage, and retrieval capabilities to organize instruction and track student records and progress. The instruction need not be delivered via computer, although often CAI (the instructional component) is combined with CMI.
- **Computer Mediated Communication (CMC)**- describes computer applications that facilitate communication. Examples include electronic mail, computer conferencing, and electronic bulletin boards.
- **Computer-Based Multimedia**- HyperCard, hypermedia, and a still-developing generation of powerful, sophisticated, and flexible computing tools have gained the attention of distance educators in recent years. The goal of computer-based multimedia is to integrate various voice, video, and computer technologies into a single, easily accessible delivery system.

•Advantages of Computers

- Computers can facilitate self-paced learning. In the CAI mode, for example, computers individualize learning, while giving immediate reinforcement and feedback.
- Computers are a multimedia tool. With integrated graphic, print, audio, and video capabilities, computers can effectively link various technologies. Interactive video and CD-ROM technologies can be incorporated into computer-based instructional units, lessons, and learning environments.
- Computers are interactive. Microcomputer systems incorporating various software packages are extremely flexible and maximize learner control.
- Computer technology is rapidly advancing. Innovations are constantly emerging, while related costs drop. By understanding their present needs and future technical requirements, the cost-conscious educator can effectively navigate the volatile computer hardware and software market.
- Computers increase access. Local, regional, and national networks link resources and individuals, wherever they might be. In fact, many institutions now offer complete undergraduate and graduate programs relying almost exclusively on computer-based resources.

programs relying almost exclusively on computer-based resources.

•Limitations of Computers

- Computer networks are costly to develop. Although individual computers are relatively inexpensive and the computer hardware and software market is very competitive, it is still costly to develop instructional networks and purchase the system software to run them.
- The technology is changing rapidly. Computer technology evolves so quickly that the distant educator focused solely on innovation "not meeting tangible needs" will constantly change equipment in an effort to keep pace with the "latest" technical advancements.
- Widespread computer illiteracy still exists. While computers have been widely used since the 1960's, there are many who do not have access to computers or computer networks.
- Students must be highly motivated and proficient in computer operation before they can successfully function in a computer-based distance learning environment.

•The Internet and Distance Education

The Internet is the largest, most powerful computer network in the world. It encompasses 1.3 million computers with Internet addresses that are used by up to 30 million people in more than fifty countries. As more and more colleges, universities, schools, companies, and private citizens connect to the Internet either through affiliations with regional not-for-profit networks or by subscribing to information services provided by for-profit companies, more possibilities are opened for distance educators to overcome time and distance to reach students.

With access to the Internet, distance educators and their students can use:

- **Electronic mail (e-mail)** - Like postal mail, e-mail is used to exchange messages or other information with people. Instead of being delivered by the postal service to a postal address, e-mail is delivered by Internet software through a computer network to a computer address.
- **Bulletin boards** - Many bulletin boards can be accessed through the Internet. Two common public bulletin boards on the Internet are USENET and LISTSERV. USENET is a collection of thousands of topically organized newsgroups, covering everything from supercomputer design to bungee cord jumping, and ranging in distribution from the whole world to single institutions. LISTSERV also provides discussion forums on a variety of topics broken out by topic or area of special interest.
- **World-Wide Web (WWW)** -The WWW is an exciting and innovative front-end to the Internet. Officially WWW is described as a "...wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents" (Hughes, 1994). The WWW provides Internet users with a uniform and convenient means of accessing the wide variety of resources (pictures, text, data, sound, video) available on the Internet. Popular software interfaces, such as Mosaic and Netscape, facilitate navigation and use of the WWW. The central organizing feature of the WWW is the "home page". Every organization and even every individual user of the WWW can create a home page that contains whatever information they want to present. The hypertext capabilities of the WWW facilitate linking of information within your own home page and with all other home pages on the WWW.

•Instructional Possibilities of the Internet

Distance educators can use the Internet and WWW to help students gain a basic understanding of how to navigate and take full advantage of the networked world into which they will be graduating. Some instructional possibilities of the Internet include:

- Using e-mail for informal one-to-one correspondence. Feedback from the instructor can be received more quickly than messages sent by mail. Students can read messages at their convenience and easily store them for later reference.
- Establishing a classroom bulletin board. Distant students often work in isolation without the assistance and support of fellow students. Setting up a class bulletin board can encourage student-to-student interaction. With a class computer conference, individual students can post their comments or questions to the class, and every other individual is free to respond. The conference

52

comments or questions to the class, and every other individual is free to respond. The conference can also be used to post all modifications to the class schedule or curriculum, assignments/tests, and answers to assignments/tests.
- Engaging students in dialogue with other students, faculty, and researchers by encouraging them to join a bulletin board(s) on topic(s) related to the class.
- Developing a classroom home page. The home page can cover information about the class including the syllabus, exercises, literature references, and the instructor's biography. The instructor can also provide links to information on the WWW that would be useful to students in the class (e.g., real research data on agricultural markets, global climate change, or space missions). Other links could access library catalogs or each student's individual home page.

•Teaching Considerations

When incorporating the Internet into a distance delivered course, remember that:

- All students in a course must have Internet and WWW access to ensure equal opportunities for computer interaction and feedback. Also, convenient access to a computer at home or work may influence student success.
- Students may face the concurrent challenges of learning basic computer skills, new software, and appropriate online communication skills. Trouble-shooting student computer problems will probably become a part of normal instructional responsibilities. Setting up a specific classroom conference for ongoing discussions of specific hardware and software problems may help students to work through these problems on their own.
- Some students might hesitate to contribute to computer conferences or to send e-mail because of a lack of familiarity with the proper protocols. Encourage students to use e-mail, classroom conferences, electronic bulletin boards, and the WWW early in the course so they overcome inhibitions. Specifying a minimum number of e-mail communications per week will encourage active participation.
- Using e-mail can help the instructor provide feedback more quickly than surface mail or telephone. Prompt response generally increases student motivation and performance.
- Prompt responses might not always be appropriate. Computer conferences can foster student-to-student interaction. To ensure that this interaction is sustained, work towards a facilitative role. It might be appropriate to delay response to a query in a classroom conference in order to allow students to respond to the issue and to each other.
- Becoming familiar with the resources available on the Internet and the most effective ways to use them will be part of the instructional challenge. A number of helpful guides to the Internet and WWW are available (see Kochmer, 1995; Hughes, 1994).

•References

Kochmer, J. (1995). Internet passport: Northwestnet's guide to our world online. Bellevue, WA: NorthWestNet and Northwest Academic Computing Consortium, Inc. (http://info.nwnet.net/passport)

Huges, K. (1994). Entering the World-Wide Web: A Guide to Cyberspace. Enterprise Integration Technologies (http://www.acu.edu/userhelp/guide.61.html/guide.toc.html)

• For Further Information

This guide is one in a series entitled **Distance Education at a Glance** developed by University of Idaho Engineering Outreach staff. Other guides in this series include:

#1 Distance Education: An Overview
#2 Strategies for Teaching at a Distance
#3 Instructional Development for Distance Education
#4 Evaluation for Distance Educators
#5 Instructional Television
#6 Instructional Audio

Distance Education at a Glance
Guide #10
January 1996

Engineering Outreach
College of Engineering
University of Idaho

Guide #10
Distance Education: Research

- Common Research Questions
- Why is Instruction Successful?
- References
- Distance vs. Traditional Education
- How Important is Interaction?
- For Further Information
- Why are Students Successful?
- Cost vs. Benefits

•Common Research Questions

Because distance education is perceived as an increasingly effective method of instruction, educational researchers have examined the purposes and situations for which distance education is best suited. Frequently asked questions cluster in five areas:

- Is technology-assisted, distant teaching as effective as traditional face-to-face teaching?
- What factors determine the most effective mix of technology in a given distant teaching situation?
- What are the characteristics of effective distant students and teachers?
- How important is teacher-student and student-student interaction in the distance education process and in what form(s) can this interaction most effectively take place?
- What cost factors should be considered when planning or implementing distance education programs and how are those costs offset by benefits to the learner?

•Distance vs. Traditional Education

Research indicates that the instructional format itself (e.g., interactive video vs. videotape vs. "live" instructor) has little effect on student achievement as long as the delivery technology is appropriate to the content being offered and all participants have access to the same technology. Other conclusions drawn from this line of research suggest:

- Achievement on various tests administered by course instructors tends to be higher for distant as opposed to traditional students (Souder, 1993), yet no significant difference in positive attitudes toward course material is apparent between distant and traditional education (Martin & Rainey, 1993).
- Conventional instruction is perceived to be better organized and more clearly presented than distance education (Egan, et al., 1991).
- The organization and reflection needed to effectively teach at a distance often improves an instructor's traditional teaching.
- Future research should focus on the critical factor in determining student achievement: the design of instruction itself (Whittington, 1987).

•Why are Students Successful?

Research suggests distant students bring basic characteristics to their learning experience which influence their success in coursework. Distance education students: Are voluntarily seeking further education.

- Have post-secondary education goals with expectations for higher grades (Schlosser & Anderson, 1994).
- Are highly motivated and self-disciplined.

- Are highly motivated and self-disciplined.
- Are older.

Studies also conclude that similar factors determine successful learning whether the students are distant or traditional. These factors include:

- Willingness to initiate calls to instructors for assistance.
- Possessing a more serious attitude toward the courses.
- Employment in a field where career advances can be readily "achieved through academic upgrading in a distance education environment" (Ross & Powell, 1990).
- Previous completion of a college degree (Bernt & Bugbee, 1993).

•Why is Instruction Successful?

Good distance teaching practices are fundamentally identical to good traditional teaching practices and "those factors which influence good instruction may be generally universal across different environments and populations." (Wilkes & Burnham, 1991). Because distance education and its technologies require extensive planning and preparation, distance educators must consider the following in order to improve their effectiveness (Schlosser & Anderson, 1994):

- Extensive pre-planning and formative evaluation is necessary. Teachers cannot "wing it". Distance learners value instructors who are well prepared and organized (Egan, et al., 1991).
- Learners benefit significantly from a well-designed syllabus and presentation outlines (Egan, et al., 1991). Structured note taking, using tools such as interactive study guides, and the use of visuals and graphics as part of the syllabus and presentation outlines contribute to student understanding of the course. However, these visuals must be tailored to the characteristics of the medium and to the characteristics of the students.
- Teachers must be properly trained both in the use of equipment and in those techniques proven effective in the distance education environment. Learners get more from the courses when the instructor seems comfortable with the technology, maintains eye contact with the camera, repeats questions, and possesses a sense of humor (Egan, et al., 1991).

•How Important is Interaction?

Many distant learners require support and guidance to make the most of their distance learning experiences (Threlkeld & Brzoska, 1994). This support typically takes the form of some combination of student-instructor and student-student interaction.

Research findings on the need for interaction have produced some important guidelines for instructors organizing courses for distant students:

- Learners value timely feedback regarding course assignments, exams, and projects (Egan, et al., 1991).
- Learners benefit significantly from their involvement in small learning groups. These groups provide support and encouragement along with extra feedback on course assignments. Most importantly, the groups foster the feeling that if help is needed it is readily available.
- Learners are more motivated if they are in frequent contact with the instructor. More structured contact might be utilized as a motivational tool (Coldeway, et al., 1980).
- Utilization of on-site facilitators who develop a personal rapport with students and who are familiar with equipment and other course materials increases student satisfaction with courses (Burge & Howard, 1990).
- The use of technologies such as fax machines, computers, and telephones can also provide learner support and interaction opportunities.

•Cost vs. Benefits

When establishing a distance education program, one of the first things considered is the cost of the system. Several cost components factor into the design of a distance education system (Threlkeld &

system. Several cost components factor into the design of a distance education system (Threlkeld & Brzoska, 1994):

- **Technology** - hardware (e.g., videotape players, cameras) and software (e.g., computer programs).
- **Transmission** - the on-going expense of leasing transmission access (e.g., T-1, satellite, microwave).
- **Maintenance** - repairing and updating equipment.
- **Infrastructure** - the foundational network and telecommunications infrastructure located at the originating and receiving campuses.
- **Production** - technological and personnel support required to develop and adapt teaching materials.
- **Support** - miscellaneous expenses needed to ensure the system works successfully including administrative costs, registration, advising/counseling, local support costs, facilities, and overhead costs.
- **Personnel** - to staff all functions previously described.

Although the costs of offering distance education courses may be high, there are high costs associated with offering conventional courses. Benefits of distance education courses to the learner include (Ludlow, 1994):

- Accessible training to students in rural areas.
- Students may complete their course of study without suffering the loss of salary due to relocation.
- Students are exposed to the expertise of the most qualified faculty.

Perhaps the question institutions must answer is whether it is part of their mission as educators to offer programs to those who might not be reached without distance education. The primary benefit to educational institutions through distance education may be the increased number of non-traditional students they are able to attract and serve. Research also suggests that as programs become more efficient, program costs should decrease (Ludlow, 1994).

•References

Bernt, F.L. & Bugbee, A.C. (1993). Study practices and attitudes related to academic success in a distance learning programme. Distance Education, 14(1), 97-112.

Burge, E.J., & Howard, J.L. (1990). Audio-conferencing in graduate education: A Case Study. The American Journal of Distance Education, 4(2), 3-13.

Coldeway, D.O., MacRury, K., & Spencer, R. (1980). Distance education from the learner's perspective: The results of individual learner tracking at Athabasca University. Edmonton, Alberta: Athabasca University. (ED 259 228)

Egan, M.W., Sebastian, J., & Welch, M. (1991, March). Effective television teaching: Perceptions of those who count most...distance learners. Proceedings of the Rural Education Symposium, Nashville, TN. (ED 342 579)

Ludlow, B.L. (1994). A comparison of traditional and distance education models. Proceedings of the Annual National Conference of the American Council on Rural Special Education, Austin, TX. (ED 369 599)

Martin, E.E., & Rainey, L. (1993). Student achievement and attitude in a satellite-delivered high school science course. The American Journal of Distance Education, 7(1), 54-61.

Ross, L.R., & Powell, R. (1990). Relationships between gender and success in distance education courses: A preliminary investigation. Research in Distance Education, 2(2), 10-11.

Schlosser, C.A., & Anderson, M.L. (1994). Distance education: A review of the literature. Ames, IA: Iowa Distance Education Alliance, Iowa State University. (ED 382 159)

Souder, W.E. (1993). The effectiveness of traditional vs. satellite delivery in three management of technology master's degree programs. The American Journal of Distance Education, 7(1), 37-53.

Threlkeld, R., & Brzoska, K. (1994). Research in distance education. In B. Willis (Ed.), Distance Education: Strategies and Tools. Englewood Cliffs, NJ: Educational Technology Publications, Inc.

Whittington, N. (1987). Is instructional television educationally effective? A research review. The American Journal of Distance Education, 1(1), 47-57.

Wilkes, C.W., & Burnham, B.R. (1991). Adult learner motivations and electronics distance education. The American Journal of Distance Education, 5(1), 43-50.

•For Further Information

This guide is one in a series entitled **Distance Education at a Glance** developed by University of Idaho Engineering Outreach staff. Other guides in this series include:

#1 Distance Education: An Overview
#2 Strategies for Teaching at a Distance
#3 Instructional Development for Distance Education
#4 Evaluation for Distance Educators
#5 Instructional Television
#6 Instructional Audio
#7 Computers in Distance Education
#8 Print in Distance Education
#9 Strategies for Learning at a Distance
#10 Distance Education: Research
#11 Interactive Videoconferencing in Distance Education
#12 Distance Education and the WWW
#13 Copyright and Distance Education
#14 Glossary of Distance Education Terminology

Distance at a Glance Index Engineering Outreach Home Page

This guide was edited by Vicki Trier
University of Idaho
Engineering Outreach

Comments about this page to: outreach@uidaho.edu

Loaded on the Web: May 31, 1996 and then revised November 25, 1996 by Tania H. Gottschalk
URL: http://www.uidaho.edu/evo/dist1.html

UNITED STATES

EDUCATION AND INSTRUCTION

THROUGH TELECOMMUNICATIONS

Distance Learning for All Learners

COUNCIL OF
CHIEF STATE
SCHOOL OFFICERS
WASHINGTON, DC
1995

58

The Council of Chief State School Officers is a nationwide, nonprofit organization of the 57 public officials who head departments of elementary and secondary education in every state, the District of Columbia, the Department of Defense Dependents Schools, and the five extra-state jurisdictions of American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and the Virgin Islands. Through its structure of committees and task forces, the Council responds to a broad range of concerns about education and provides leadership on major education issues.

CCSSO is committed to supporting the effective use of technology to improve learning, provide new opportunities for collaboration and professional development among educators, and extend opportunities for lifelong learning to all Americans. The Learning Technologies program assists states through a network of state technology representatives (STRs), individuals appointed by the chief state school officers. The Council hosts forums on major issues concerning new developments and applications of technology. It also monitors federal regulatory activity affecting telecommunications and education.

ISBN 1-884037-07-0
Copyright © 1995 by
Council of Chief State School Officers

COUNCIL OF CHIEF STATE SCHOOL OFFICERS

Judith A. Billings (Washington), President
Ted Sanders (Ohio), President-Elect
Alan D. Morgan (New Mexico), Vice President
Gordon M. Ambach, Executive Director

Council of Chief State School Officers
One Massachusetts Avenue, N.W., Suite 700
Washington, DC 20001-1431
(202) 408-5505

United States Education and Instruction Through Telecommunications Governing Board
Dr. Henry Marockie, West Virginia State Department of Education, Chair
Mr. Decker Anstrom, National Cable Television Association
Mr. Steve Cisler, Apple Computer, Inc.
Mr. Dennis Connors, National Telecommunications and Information Administration
Dr. Robert Davila, New York School for the Deaf
Ms. Cheryl Garnette, U.S. Department of Education
Dr. Jose G. Mendez, Sr., Ana G. Mendez University System
Mr. David Merkowitz, American Council on Education
Dr. Inabeth Miller, The Lightspan Partnership, Inc.
Mr. Clarence O'Banner, BellSouth
Dr. E. Marie Oberle, National University Teleconference Network (until October 1994)
Dr. David Pierce, American Association of Community Colleges
Dr. Linda Roberts, U.S. Department of Education
Dr. Nora Sabelli, National Science Foundation
Dr. Anne Savage, National University Teleconference Network (since October 1994)
Dr. Michael Sullivan, Agency for Instructional Technology
Dr. Sandy Welch, Public Broadcasting Service

CONSULTANTS
Susan Fratkin, Fratkin Associates
Richard Hezel, Hezel Associates
Saul Rockman, Rockman, et al.
Pam Pease, Mind Extension University
Ron Anderson, University of Minnesota
Judy Gray, Issue Dynamics, Inc.
John Cradler, Far West Regional Educational Laboratory

LITERATURE SEARCH
Barbara Minninger, Southwest Regional Educational Laboratory

United States Department of Commerce
Ronald H. Brown, Secretary, United States Department of Commerce
Larry Irving, Assistant Secretary for Communications & Information and Administrator, NTIA
Charles M. Rush, Acting Associate Administrator, Office of Telecommunications and Information Applications

CCSSO would like to thank the following NTIA staff members for their assistance and cooperation:
Dennis Connors, Director, Public Telecommunications Facilities Program
Richard Harland, Senior Project Officer
Robert Sestili, Senior Communications Advisor

THE CONTEXT FOR THIS REPORT

Purpose

This report presents the findings and recommendations of the United States Education and Instruction through Telecommunications (USE IT) project. Begun in January 1993, USE IT assessed the relationship of distance learning to the nation's educational needs, especially its role in achieving the National Education Goals. USE IT examined all levels of education, prekindergarten through adult continuing education and worker training. The working definition of distance learning used in this report is "the delivery of video, voice, or text instruction or information to a learner over distance, from one location to another, using some form of telecommunications technology."

Operating Premises

USE IT has been conducted on the following premises, derived from an extensive analysis and evaluation of the literature on how technology is used in education:

1. The objectives for learners, as included in the National Education Goals, determine how technology is applied to learning and teaching.
2. Distance learning offers great promise in providing educational services, chiefly because information and telecommunications technology provide access to instruction and content that students at all levels could not otherwise have.
3. Distance-learning technologies increase learning effectiveness by offering diverse interactions ranging from "one to many" to "many to many" for learning.
4. Distance learning is a source of cost-effective professional development for teachers and school administrators.
5. Distance learning enables schools to use the most effective teachers available in a given subject area, without geographic limitations.
6. Changes in information technology are having a powerful effect on how those technologies are being designed and used in education.
7. Developments in telecommunications and distance-learning policy and operations for education are closely related to developments in general telecommunications policy.
8. Initiatives, support, and direction for telecommunications policy, operations, and financing will come from both public and private sectors.

DISTANCE LEARNING AND THE NATIONAL EDUCATION GOALS

Two distinct trends form the backdrop of this report: (1) the confluence of three major forces that are shaping our society—information and telecommunications technologies, a globally competitive economy, and the changing needs of the workplace—and (2) an unprecedented, decade-long commitment to education reform that seeks to move America from being "a nation at risk" to being a model of world-class education.

The National Education Goals and the benchmarking legislation designed to help achieve them (e.g., the Goals 2000: Educate America Act, the Improving America's Schools Act, and the School to Work Opportunities Act) will help to orient students to the new world of work and learning. The tools of telecommunication and distance learning, including broadcast, cable, satellite, and telephone networks, have a vital role to play in education reform and in meeting the needs of all learners. New digital interactive systems have emerged that significantly influence learning and teaching. These technologies can serve all learners, regardless of age, disability or language. These tools are already being brought together in a National Information Infrastructure (NII) that provides students with improved access to full voice, video, and data services. According to a recent survey, Americans rank education and instruction as the most important benefits to be gleaned from the NII.

Specifically, distance learning provides the following educational advantages that can contribute to achieving the National Education Goals:

- Distance learning offers a broad range of technologies to serve a variety of educational functions.
- Distance learning continues to serve such tra-

ditional functions as providing instruction to learners at remote sites and instruction in subject matter not readily available. A recent survey of small, rural school districts found that half of them use distance learning.

- Distance learning will be increasingly helpful in improving instructional practices through such offerings as electronic field trips and visits to other resource-rich environments.
- Distance learning is uniquely able to connect school-based learning to its applications in the workplace through electronic linkages.
- Distance learning offers educators staff development and school management capabilities not available through other means.
- Distance learning supports lifelong learning, from adult literacy to higher education. This capability is crucial for workers seeking to update skills and for job training and retraining.

But providing these advantages means that distance learning must meet certain functional requirements to realize its advantages: (1) distance-learning materials must maintain high-quality content and should be continually evaluated; (2) distance learning should itself be supported by training, technical assistance, and professional development, both in school and workplace settings; (3) distance learning should be available in a variety of learning environments; and (4) distance-learning applications should be planned for a multiplicity of uses, including integration with the developing NII.

NAVIGATING THE WORLD OF DISTANCE LEARNING

The USE IT report includes information on distance-learning resources, the integration of technologies, types of service providers, and the use of resources.

Distance-Learning Resources

Distance-learning resources come in a bewildering variety of forms and formats. For the technologically insecure, even the sheer terminology can be overwhelming. The report discusses the following telecommunications technologies, their advantages, and their disadvantages:

Broadcasting. Broadcasting is the earth-based, one-way transmission of video and audio signals, usually within a 35-50-mile range. The nation's extensive broadcasting network(s) are regulated by the Federal Communications Commission. Virtually all distance-learning broadcasting is done from some public broadcasting source, for example, the Public Broadcasting Service (PBS) or some institution of higher learning or public channels. Some 98 percent of all American homes have TV sets that can receive public broadcast signals, and about 94 percent of the country is currently within transmission range of public broadcasting stations. Broadcasting costs are high; costs for seven popular children's series on PBS range from $152,000 to $811,000 per broadcast hour. But on a cost-per-viewer basis, broadcasting's ability to reach huge audiences cuts costs to about a 1-cent per household per program hour.

Satellites. Satellites are basically relay devices for signals; their geosynchronous position above the earth makes it possible to send signals across much greater distances. Reception requires an "uplink" transponder and a "downlink" antenna dish. Approximately 29 commercial satellites are now in orbit, capable of delivering signals to the continental United States and, in some cases, Hawaii and Alaska. Satellite advantages include the ability to transmit anywhere in the United States, resiliency with respect to natural and man-made disasters, and a low cost-to-distance ratio. But satellites are expensive. Apart from launching costs, "uplink" transmission facilities can cost from $80,000 to $300,000 to build, and "downlink" dishes range from $4,000 to $6,000 for standard models. Transponder time costs about $300 per hour for a one-year lease. Currently, only about 70-80 percent of the available satellite transponder capacity is in use. Direct broadcast satellites and Very Small Aperture Terminals (VSAT) technologies show promise for further satellite-based distance-learning applications.

Cable. Cable TV sends a signal over coaxial or fiber-optic cable to specially equipped receivers for

a monthly fee. There are 11,160 individual cable systems operating in the United States, which accounts for one of cable's biggest advantages: penetration. Currently, however, only 10 percent of all cable systems in the United States are equipped to provide the interactive services that number among distance learning's most attractive potentials. About 3 of 5 public and private elementary schools (34.5 million students) were cable equipped in 1993, but 95 percent of all high schools will be cable equipped by 1995; 14 percent of community colleges and 22 percent of four-year institutions use cable TV to deliver distance learning. The trend in the cable industry is to replace copper coaxial cable with fiber-optic cable. Fiber-optic's main advantages are its virtually unlimited bandwidth (it can carry enormous amounts of programming and data), its consequent potential for expanded uses, and its reduced need for signal boosting over long distances. Its main disadvantages are its lack of installed base, high costs, and physical constraints in handling and installing.

Telephone. Combined with modems and computers, telephones provide a powerful learning medium. Despite the fact that 95 percent of all American homes have telephones, this technology is not widely used in education; only about 12 percent of U.S. classrooms are telephone equipped. A significant inhibitory factor affecting telephone usage for education is the current rate structures of state public utility commissions. But possibilities exist for creating an "education rate" to complement existing commercial and residential rates. Through fiber optics and other technologies, it is estimated that by the year 2035, 93 percent of all U.S. schools, offices, and households will be served by broadband phone networks.

Microwave/ITFS. Two types of microwave technologies are now being used: (1) point-to-point, line-of-sight transmission of digital or audio signals on the radio spectrum; and (2) Instructional Television Fixed Services (ITFS). ITFS has a more limited range than broadcast TV and costs between $20,000 and $30,000 per channel, compared to the low-end $80,000 to $100,000 cost of a satellite uplink. Four-channel receiving antennas are relatively cheap, at about $150 each. When the unused, commercial-use portions of the ITFS spectrum were allocated in the 1980s, they were bought up by a flood of commercial entrepreneurs. These companies have developed partnerships with educational institutions in which ITFS hardware is provided free to schools. In return, the companies can lease some portion of the four channels allotted per license.

Wireless. Wireless communications technologies include direct-broadcast satellite, broadband broadcast radio, personal communications services (e.g., hand-held radios and cellular phones), wireless local area networks (LANs), and advanced television. Cellular technology is now being used on a very limited basis to transmit and pick up video signals. It is expected that wireless technologies will greatly facilitate delivering the NII to schools and other learning sites and to rural and inner-city areas lacking wired communications.

Computer Networking. Multiple technologies are often combined with a computer network that delivers data and video signals for distance learning. There are currently about 4.5 million computers in America's schools. Since 1989, the number of schools using both internal and external networks has grown substantially, with the fastest growth reported at the upper secondary level. Because computers can store data for later retrieval, networks make interaction among learners, teachers, and service providers much easier. Networks vary greatly in size, scope, and means of communication. Some 38 states now have either fully or partially operational networks for instructional services. LANs connect any number of individual computers, printers, file servers, CD-ROMs, modems, and fax machines. The Internet is a "network of networks," an electronic pathway for data to travel anywhere in the world. There is no "central control"; that means extensive freedom and creativity in using the Internet, with all the advantages and disadvantages entailed. Teachers complain that using the Internet requires a formidable sophistication with computers.

Nevertheless, about half the institutions of higher education that are network equipped report participating in the Internet.

Integration of Technologies

These several technologies are seldom used alone; instead, multiple technologies are integrated into systems or networks, a trend facilitated by the widespread use of digital information, which can be more easily transmitted than standard analog signals. Currently, the integration of distance-learning technologies is occurring at two main levels: (1) delivery systems, which transport voice, radio, and data signals; and (2) interface units, which allow users to access and transmit signals on their own. Even when the available technology permits only one of these, the trend is still in the direction of integrating as many technologies as are necessary to provide interaction and support to learners. In 1991, for example, community colleges engaged in distance learning reported using an average of 3.7 different technologies for delivering and receiving instruction, with an expected increased to 5.6 technologies by 1994. Four-year institutions expected to move from 3.4 to 6.1 technologies in the same time period.

Providers of Distance-Learning Resources

Distance learning is packaged in two basic ways: as video programming (live and prerecorded instruction) and as information services (data bases). Providers of these packages range from multistate, nonprofit consortia to independent producers of for-profit information services. This report describes the distance-learning services and technologies of many major providers, for example:

- PBS and its 300+ public television stations.
- The National Technological University, a consortium of 45 leading engineering schools, which offers degree and nondegree programs, as well as credit and noncredit courses;
- The Massachusetts Corporation for Educational Telecommunications, which serves learners in 37 states with satellite programming, electronic networks, and conferencing capabilities.
- The Satellite Educational Resources Consortium, which serves 5,000 predominantly rural high school students from 500 schools in 34 states, 71 percent of whom are eligible for Chapter 1 funds.
- The Black College Satellite Network, which provides programming for prekindergarten through higher education in 23 states, with more than 1,000 participating downlink sites.
- Mind Extension University, which provides fully accredited college and graduate-level courses via cable TV to approximately 25 million households;
- The Agricultural Satellite Corporation, a consortium of land-grant institutions, government agencies, business, and industry, which provides distance-learning services for agricultural producers and rural families and businesses.
- KIDLINK, a free, global program that involves children ages 10-15 in an international dialogue. The interactive service focuses on conversations between participants.

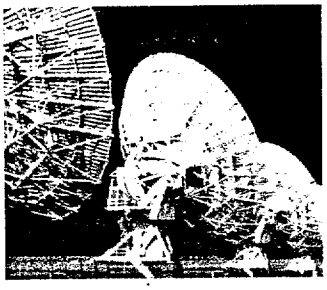
The Use of Distance-Learning Resources

Although comprehensive data concerning the use of distance-learning resources is not available, this report reveals that they are being used at all levels of education, in and out of school. For example, the cable industry reports serving approximately 34.5 million students nationwide. About 4 in 10 of the schools that use distance-learning video programming report receiving it by satellite dish; over a third receive programming by cable television; 9 percent receive programming via ITFS, 5.2 percent via fiber optics; and 4.4 percent via copper-based telephone wiring. Four out of five two-year colleges and 78 percent of all four-year colleges anticipate using distance learning by the end of 1994. Nearly a third of all Fortune 500 companies report using distance learning to train their workers. The report provides a resource-by-resource break-out of how various technologies are typically used. For example:

- Broadcast services are typically used to reach learners both in school and at home; they are seeking to achieve a high degree of interactivity.

HOW TECHNOLOGIES ARE BEING INTEGRATED TO PROVIDE DISTANCE LEARNING

- Fiber optic cable is being used nationwide by all local and long-distance phone companies and many cable companies. A fiber/cable model in Indiana links the Indianapolis Regional Economic/Academic network, Thompson Consumer Electronics, and the Indianapolis schools.
- In Detroit, the Community Telecommunications Network serves approximately half a million schoolchildren by using ITFS as a redistribution system for satellite, cable, and other signals for broadcast microwave reception.
- The San Marcos Telephone Company in Texas has deployed fiber optic cable to connect three education sites: San Marcos High School, the Gary Jobs Corps Training Center, and Southwest Texas State University.
- Maine is currently operating a statewide community college system completely using distance-learning resources, including ITFS, fiber, and an electronic network.



- Satellite use is typically found in school, home, and the workplace.
- Microwave technology is more typically used as a transport link, for example, to link classroom sites participating in live distance-learning sessions.
- ITFS is typically used when a large number of users need to be served in multiple learning sites in a small, defined region of about 30 miles.
- Cable is used in many contexts, from "Cable in the Classroom" documentaries to distributing locally produced courses.
- Telephones are typically used to provide a voice return to a televised instructor, or to connect to online computer services.
- Computer networking is most often used as a secondary form of interaction to support some other distance-learning resource, for example, accessing support materials for a televised class. An emerging use of computer networking is delivering integrated voice, video, and data services directly to a student's electronic desktop.
- Wireless technology is most often used to make the "last link" to the user in unintegrated systems. This is a relatively untested distance-learning option.

CHALLENGES AND BARRIERS TO DISTANCE LEARNING

Despite its growing popularity, distance learning is still a relatively untapped resource with enormous potential to provide improved learning opportunities across the education spectrum. Although many barriers have been overcome, many remain. This report examines the most important of these barriers and offers recommendations, which, taken together, can be instrumental in overcoming them. These recommendations are listed in full at the end of this summary. (The numbered recommendations pertinent to each barrier are provided in parentheses.) Recommendation 1, related to the using distance learning to achieve the National Education Goals, applies across the board.

1. Incompatibility of Technical Systems. Because distance learning incorporates an integration of technologies, compatibility issues are crucial. A typical example is the problems created by the introduction of digital compression technology. Digital compression allows for a much more efficient use of bandwidth and air time, but adopting the technology usually involves new equipment, additional training, and complications in transmissions. Sometimes services have to be offered in both new and old formats to accommodate all users. This particular issue will become more critical as time passes. (Recommendations 3, 10)
2. Insufficient Use of Available Resources. There are many reasons why distance-learning resources are not well used. Not all delivery systems are available everywhere. The haphazard evolution of technologies has created many incompatibilities, inhibiting the integration of distance-learning resources. In many cases, local school systems find it difficult to incorporate distance learning into their existing instructional programs, either because of internal scheduling difficulties or because of scheduling conflicts with cable companies and broadcasters. The rigidity of the school day and year also present conflicts that are difficult to resolve. (Recommendations 3, 4, 6, 9)
3. Costs of Technology. Distance learning involves both significant start-up costs and continuing programming and operational costs. Even audio teleconferencing, a highly accessible and simple technology to use—and low-cost in comparison to using satellite networks—can cost $50 to $400 for each speakerphone and $1,000-$3,000 per port for bridge equipment, plus toll charges. Audiographics equipment can run from $6,000 to $13,000 per school. (Recommendations 6, 9, 10)
4. Regulatory Barriers. All telecommunication systems used to deliver distance learning are regulated by state or federal agencies. Telephone companies and cable companies have made commitments to providing broadband communication networks to schools, but

many issues are yet to be resolved, including to whom access will be required, what fee structures should apply to education and training, and what types of services will be provided. These issues are continuously being discussed, negotiated, and legislated. Copyright and viewing restrictions are also significant concerns for distance learning, and intellectual property rights and "fair use" definitions have not yet been clearly defined for emerging distance-learning technologies. (Recommendation 5)

5 Training People to Use Distance-Learning Technologies. This challenge is particularly acute in the schools, where teachers have been inadequately prepared to use distance-learning technologies. One study conducted by the U.S. Congress's Office of Technology Assessment, for example, reported that 64 percent of the teachers involved in teleteaching had not received any prior training in the distance-learning systems used. The American Association of Colleges of Teacher Education reports that only about 20 percent of teacher training programs offer coursework incorporating current learning technologies. (Recommendations 7, 11)

6 Course Accreditation. In general, course-accreditation issues are most significant at the high school level, where state-regulated graduation requirements must be fulfilled by approved curricula and teaching done by state-certified teachers. (Recommendation 2, 8)

7 Cost and Accounting Systems. Whereas most colleges and universities use cost-accounting systems that relate to specific academic departments, most public schools use the accrual method, which does not distinguish between areas of instruction. In consequence, it is difficult for school-based decision makers to estimate or track the cost-effectiveness of using distance-learning technologies, including space and personnel costs. The business community tends to have a clearer picture of the cost-effectiveness of distance-learning technology with respect to its training mission. (Recommendations 5, 9)

8 Institutional Structures. The overwhelmingly local character of education in the United States greatly complicates the use of distance learning. A critical example is teacher certification. Often, a distance-learning teacher must be certified in every state where the teacher's lessons are used. In addition, the organizational structure of both educational institutions and businesses often prohibits effective planning for nontraditional methods of instruction. But state governments have been taking increasing initiative in planning for distance learning to avoid incompatible and duplicate efforts. State planning for using technology in education increasingly includes partnerships between public and private sectors. (Recommendations 2, 4, 8, 10)

9 Programming Quality. An effective on-screen presence requires different skills than does traditional classroom teaching or training in adult education or the workplace. Traditional distance-learning programming formats also tended toward the "talking head" approach. Formats that are much higher in their production values and appropriate to desired content are needed. (Recommendations 7, 8, 11)

10 Awareness and Acceptance. Distance learning is still plagued by the myth that it offers a second-rate alternative to real instruction in a classroom. Schools have been reluctant to turn to distance learning, except to solve teacher shortages, to meet the challenges of great distance in rural areas, or to provide more cost-effective instruction in certain subject areas. In K-12 schools, particularly, distance-learning resources suffer from the "not invented here" syndrome that prohibits ready acceptance of curriculum developed elsewhere and teachers who are not known. Also, distance learning is often saddled with the image of TV as a time waster and negative influence on students. For this reason, it has been used most often for more self-motivated adult learners. A potential remedy for distance learning's awareness and acceptance problems may lie in its wide array of interactive options and feedback systems, and in

65

its ability to tailor instruction through different modes of learning. (Recommendations 11, 12)

RECOMMENDATIONS

Significant barriers stand in the way of using distance learning to achieve the National Education Goals. The following 12 recommendations have been developed to address them, within the nation's plans for the NII. These recommendations are nationwide in scope and, therefore, general rather than specific to particular states, localities, institutions, or businesses. They encompass an essential principle for the development of distance learning—namely, that such development requires combined private and public action through federal, state, and local education agencies, private industry, and distance-learning service providers. Recommendations are as follows (the rationale for each is provided in the full report):

Recommendation 1: Education agencies at all levels must support the development and use of distance-learning resources to achieve the National Education Goals.

Recommendation 2: Education agencies at all levels must ensure equitable access to distance-learning resources to increase the opportunity for all citizens to learn.

Recommendation 3: The telecommunications industry, distance-learning service providers, and regulatory agencies must support and develop distance-learning delivery systems and information networks that are compatible, interoperable, and cost effective.

Recommendation 4: Federal and state governments, together with local communities, educational institutions, the telecommunications industry, and business and industry, should promote public/private partnerships for distance learning and support regional and statewide applications of distance learning as part of an integrated national resource.

Recommendation 5: State and federal regulatory agencies must develop policies that ensure affordable rates for the educational uses of telecommunications resources. Regulatory agencies having appropriate responsibility should ensure availability of universal telecommunications services for all levels of lifelong learning and maintain reasonable fair-use copyright guidelines for instructional materials used in distance learning.

Recommendation 6: Federal and state agencies, in cooperation with the private sector, should develop new resources for investment and capital development for distance learning. Support from federal agencies must be coordinated to provide efficient and effective funding uses.

Recommendation 7: Professional development programs for educators and administrators should rely increasingly on distance learning and include technical training for the use of distance learning in formal education programs.

Recommendation 8: State education agencies must improve course accreditation procedures to advance the use of distance learning and other alternative education offerings.

Recommendation 9: Providers of distance learning must develop cost-accounting standards that provide accurate information on unit-of-instruction costs and instructional effectiveness assessments for distance learning.

Recommendation 10: Education institution authorities planning to use or expand distance learning must take special actions to create organizational environments for undertaking the values and limits of the service for the desired effects to be realized.

Recommendation 11: Distance-learning providers and users must join forces to strengthen distance-learning content requirements and instructional formats.

Recommendation 12: Local, state, and national authorities should undertake awareness and outreach activities to inform educators, business and industry, and the public of the value and importance of distance learning to achieve the National Education Goals.

Web Conferencing and Distance Education Tools

The Internet supports multiple modes of communication, making it an ideal tool for teaching, learning, meeting and collaboration, as well as for interpersonal interaction. Those modes fall into two general categories: synchronous and asynchronous communication.

The term "real time" refers to synchronous communication, where two people on the Internet at the same time can "talk" to each other, either through typing text or transmitting audio and/or video. Real-time audio exchange is enabled with such tools as InternetPhone. This tool is fairly equipment intensive, requiring that participants have machines with sound cards, speakers and microphones, as well as a minimum modem speed of 28.8kbps, which will only support a low sound quality connection. Even when all participants have adequate equipment, one of the problems that plague audio conferencing tools is incompatibility between different types of software.

Meanwhile, videoconferencing technology has received a great deal of attention both in the technology industry, as well as in the private sector as a substitute for face-to-face meetings and activities. As a result, desktop videoconferencing systems are further along the evolutionary chain than are audio conferencing technologies. Using either POTS, ISDN, T1, or T3 lines, the newest iterations of desktop PC video cameras and software using the newest standards released by the ITU (H.323 and H.324) have begun to improve the quality of video via the Internet. A connection via T3 lines can support full video transmission at 30 frames per second - "television speed"; however, in professions where image resolution is critical, even the H.324 standard over a T3 may not suffice. In these cases, desktop videoconferencing is not yet evolved enough to be the answer. Full videoconferencing systems such as those manufactured by PictureTel can provide high resolution transmission and reception of video at 30 frames per second; however, the price for such a system is upwards of $20,000.00 in comparison to desktop videoconferencing cameras and software which are all under $1,000.00.

In addition to audio and videoconferencing, many programs now support online document and application sharing, allowing multiple users in different locations to each view and make changes to the same spreadsheet, or report, or graphic -- most any file.

Another less technologically "sexy" synchronous communication tool, Internet Relay Chat (IRC), is a protocol that most "chatrooms" use allowing a number of people to have a discussion through typed text. In a chatroom, a

user can direct a remark at specific users in the same "room," punctuate statements with "emotions," or speak to the whole group at once. Most chatrooms are used for social purposes only, but are becoming more popular in supporting international commercial meetings because IRC does not require sophisticated equipment or high bandwidth. One drawback of IRC is that many IRC clients do not have intuitive graphical user interfaces, necessitating user knowledge of specific commands in order to participate.

Asynchronous communication tools are still the most widely used communication tools on the Internet. These include e-mail, listservs, Usenet groups, and web-based fora. Besides providing the glue for many long-distance relationships, e-mail and e-mail listservs have served the purpose of allowing interest groups to share information, develop a knowledge base, and participate in pre-meeting online workshops. Usenet groups have the same advantages as e-mail, plus Usenet messages are searchable through web search engines. More and more websites devoted to specific issues are hosting fora on which visitors to the site can post responses and opinions, read the perspectives of other visitors, and synthesize a broadly informed opinion based on contributions of users around the globe.

This chapter focuses largely on videoconferencing and some of the different options available for desktop videoconferencing including the popular CU-SeeMe and the MBONE, as well as descriptions of PictureTel products. As with any technology, the decision to select and purchase must be driven by purpose. What will your videoconferencing system be used for? If it's teleneurosurgery, then CU-SeeMe is not the answer. If it's simply to "see" distant relatives, then PictureTel is probably overkill. And perhaps the question is, can your objective be met at all with the use of videoconferencing? Beware the temptation to implement a technology a la mode, as they have a tendency to be more highly touted than genuinely useful.

Electronic Mail: The Basics

Advantages

You might ask, "What's the point in using Electronic-Mail (E-Mail) when I can just as easily use my phone, my fax machine, or the U.S. Postal Service?" Well, in an attempt to answer this question, some of the advantages of using E-Mail are listed below:

- **Speed** - The physical process of transferring E-Mail is virtually instantaneous.
- **Free** - The is no per-message charge when it comes to E-Mail.
- **Portability** - If you have a computer handy, you can dial your Provider and retrieve you E-Mail from anywhere in the world.
- **File Transfer** - E-Mail can be used to transfer binary files, including executable programs, graphics, sound, and data files.
- **Permanent Address** - If you're always "on the go," E-Mail can give you a permanent address. Using E-Mail, friends can always keep in touch, even if they don't have your most recent phone number.

While E-Mail may not replace the intimacy of a phone call (not yet), it can provide an easy way for friends and relatives to communicate without having to worry about outrageous long-distance charges.

E-Mail Addresses

In the same way that everyone with a mailbox has a postal address, everyone with an E-Mail account has an E-Mail **address**. These addresses may look unusual, but the rules governing the creation of E-Mail addresses are actually quite simple.

An E-Mail address consists of two parts: the *user ID* and the *domain*. A person's user ID is what they use to login to their Internet Provider. While some user ID's resemble the person's actual name (Rob Jones = robjones, Steven McAffee = smcaffee), others are not as obvious (Marsha Thompson = mt295b). The domain is the name of the person's Internet Provider. When the user ID and domain are arranged in the form of an E-Mail address, they look like this:

mclark@finearts.caltech.edu

In this example, the user ID is mclark, which we can say stands for Matthew Clark. Everything after the @ symbol is the domain. This symbol is always pronounced as, "at." The periods separating the parts of the domain are pronounced as, "dot." Using these guidelines, the example would be pronounced as, "M Clark *at* Fine Arts *dot* CalTech *dot* E D U."

Finding Someone's E-Mail Address

Obviously, you have to *know* someone's E-Mail address before you can send them E-Mail. Fortunately, there are many ways of obtaining E-Mail addresses:

- **Just Ask!** - This is the most obvious and easiest way to get someone's E-Mail address. Just ask them to give it to you either by phone, in person, or by mail.
- **Check an E-Mail Directory** - Many companies, educational institutions, and organizations have their E-Mail directories available on the Internet.

69

- **Look at the Return Address** - If someone has sent you E-Mail in the past, just look at the "From:" line in the header. The address given there is most likely that person's E-Mail address.
- **Use an Online E-Mail Search Service** - There are several Internet sites on the World Wide Web that serve as clearing houses for E-Mail addresses. Some examples are Four11 and WhoWhere?.

University of Massachusetts Dartmouth

CyberEd

E-Mail

Settings
How To Send
E-Mail Tips
Sending Plain Text
Sending Attachments
Receiving Attachments
TroubleShoot

Tutorials

Web Browsers
E-Mail
FTP
HTML Guide
Mailing Lists
Chat
Forms
Graphics

Main Menu

Software
Tutorials
TroubleShoot
HTML Guide
Help Staff

Help Desk

Call: (508) 999-8501

E-Mail:

Troubleshooting E-Mail Problems

Is anyone out there?

Are people ignoring your email messages? Are you feeling cut off and like no one is hearing you? It may be because your reply-to address is incorrectly set up. Most people when responding to a message do so relying on the Reply command of their own email software. But if your reply-to address is wrong, using the Reply command only sends responses off into the ether.

To insure that someone can quickly and easily send a reply to your messages, check in your email's preferences to see if there is a reply-to address box and make sure there are no typos if you already have it filled in. In Eudora, the reply-to address box in located in the Special menu prior to version 1.5.3 and in the Tools menu in releases past that.

Attachments can be tricky

Remember that while plain text E-mail messages can usually be sent between people with different types of computers and mail programs pretty easily, attached files may be more difficult to share. A file that two Windows users can send and view easily might be more difficult (but not necessarily impossible) for a Mac user to open, and vice versa.

Some types of files require special software to view. A word processor file saved with formatting like fonts and italics and sent as an E-mail attachment will not be readable unless the person who receives it has a compatible word processor, even if they have a similar computer. Sometimes even different versions of the same program are not compatible. Check your software documentation for details.

Problems receiving messages

E-Mail:
CyberEd Staff

Comments or questions about this site?

The first thing to try when you get a message or attachment that you cannot read is to try to get some information from the sender about what specific type of a file it is (ie. plain text, MS Word 6.0 document, GIF image, HTML document, etc.), and what type of encoding or compression might have been used to send the file (ie. BinHex or Zip compression, MIME or UU encoding). Some additional hints:

The message or attachment has a lot of <'s and >'s in it -- This is probably an HTML document. Try saving the message as a file with an ".htm" or ".html" extension on the end of the name and then opening this file from your Web browser.

The message looks like "Š &àGN+e8µtÏ2Xj&o" -- Some E-mail programs will dump a file sent as a message attachment into the message itself. If you are feeling adventurous, you may be able to rescue such a file. Start by scanning the beginning and end of the message for clues about what type of file it may be. If you have the right program for the file type, you may be able to open it this way:

1. Determine what kind of file it is, and whether you have the right kind of software to view it:
   - "<!DOCTYPE" or "<HTML>" indicates the beginning of an HTML document. You should be able to view these files with your Web browser program.
   - "GIF87a" or "GIF89a" indicates the beginning of a "gif" image file. You should be able to view these files with your web browser program.
   - "ÿØÿà JFIF " indicates the beginning of a "jpeg" image file, which you should be able to view with your Web browser.
   - "ÐÏ à¡± á" indicates a Microsoft Word document - you will need a compatible viewer or word processing program to read this file.
   - "(This file must be converted with BinHex 4.0)" -- you can use a program like "StuffIt" expander to convert a BinHex encoded file. Any type of file (ie. text, image, or sound) may be sent BinHex encoded.
2. Save the message by clicking "File" and then "Save as" and including an appropriate file

extension on the end of the file name:

- ".htm" or ".html" for and HTML document
- ".gif" for a GIF imager file
- ".jpg" (Windows) or ".JPEG" (Mac) for JPEG image files
- ".doc" for formatted Microsoft Word documents
- binhexed files probably do not need a special extension on the name, but if you have problems, try ".hqx"

The Eudora mail programs' "Save As" dialogue box includes a checkbox option to "Save headers" - UN-check this box. If you are using a mail program that does not offer this option, you will have to reopen the file with a plain text editor and edit out the header information in the message (everything that comes before the file identifier as described above), then save and close the file.

3. Open the appropriate program for viewing the file, and open the edited and saved version of the file. Voila!

The attachment opened, but it looks like "ÐÏ à¡± á " -- this problem may be solved by pretty much the same method described in the section above ("The message looks like "Š &àGN+e8µtÏ2Xj&o"). The only difference is that you will not need to edit out any header information, and you may be able to skip step 2. Once you use a program like Winzip or StuffIt to open a file, the converted file will probably have an appropriate file extension for the program you need to use to view it (ie. a browser or a text editor). If not, try opening the file in a word processor as a plain text file, and snooping around as described in step one above.

The attachment will not open -- the first thing you need to do is figure out what kind of file this attachment is. Start by looking at the extension at the end of the file name indicated in the message it was mailed with:

- If the file extension is "**.zip**" then you need a compression program like "Winzip" to open it. This is a DOS/Windows program.

- If the file extension is "**.hqx**" or "**.bin**" then you need a compression program like "StuffIt" to open it. This program comes in both Mac and Windows versions.

It is possible that you just need to tell your computer

what program to use to open this file, or change the file extension to one that it can easily recognize. It is also possible that you do not have the necessary software installed for viewing this type of file.

Problems sending messages

Messages don't seem to be sent out properly -- Remember that hitting the "Queue" or "Send" button on your E-mail program may not send a message immediately, and your messages may not be automatically sent when you retrieve new mail. To help you keep track of what you have sent, the Eudora E-mail program can be configured to save copies of all messages you queue and send:

1. **Open** Eudora.
2. On the menu bar, click "**Special**."
3. Click "**Switches**" from the drop down menu.
4. Looked for the section marked "**Composition**" in the top left corner.
5. Click to place a check mark in the box marked "**keep copies**."
6. **Close** the "Switches" box.

If you are using a mail program that does not have this feature, or you want to be sure something has actualy been sent, try using the "CC:" addressing line to send your self a copy of outgoing mail.

To check on the status of outgoing messages in Eudora, open your "Out" mailbox. An "**S**" in the first column indicates that a message has been sent. A "**Q**" in the first column indicates that a message is waiting to be sent. Netscape mail (2.0 beta 5) has an "Outbox" folder for messages waiting to be sent and a separate "Sent" folder for those actually e-mailed. To send queued or "Outbox" messages, click "**File**" from the menu bar, then "**Send...**" from the pull down menu.

The message was sent, but a message came back saying it could not be delivered -- This means one of three things:

- The address you used was not quite accurate (computers are picky). Make sure there are no spaces or commas in the e-mail address, and double check spelling.
- The person's E-mail address has changed (this usually doesn't happen arbitrarily, but it is pretty common).
- The recipient's Mail server is having a really

bad day (not unheard of).

The best you can do is try to verify the address and try again. Your instructor may have more up to date addresses for classmates.

Some general hints for sending and receiving

Problems sending or receiving *large files* -- Make sure that neither the sender nor the recipient has a restriction on the size of messages that can be sent or received. The Netscape E-mail client has a setting for limiting the size of messages that can be received. Some online services restrict the size of messages users can send and receive.

-- ***Image and sound*** **file attachments** may travel better if you use "BinHex" encoding on them. Just remember that the person receiving the file must have a decoding program like "**StuffIt Expander**" in order to open the binhexed attachment file. You can BinHex encode an attachment file sent from the Eudora mail program this way:

1. Have the Eudora "Message" window open
2. Look at the third box from the left on the Message window tool bar:
   - if this box says "BinHex", than any file you attach to this message will be sent BinHex - you are all set.
   - if this box says "MIME", then click it. A drop down menu should show a "BinHex" option - click BinHex.
3. Address and compose your message, attach the file you wish to send, then queue and send the message.

Note: **The "*Prodigy*" online service** E-mail system may not handle attachments well.

Don't give up!

If you really get stuck, feel free to contact the CyberEd Staff for assistance.

Visit the Tips and Strategies Forum.

Download Software: (Winzip) or (StuffIt)

(Use your browser's "BACK" button to return to this page.)

Note: All of the compression programs mentioned on this page can be downloaded from the "Software" section the CyberEd Help Center - (see "Compression" page).

This is the end of the E-Mail Tutorial
Go to Tutorials Menu

Top of Page

UMass Dartmouth

CyberEd Help Center UMD Home

University of Massachusetts Dartmouth

CyberEd

E-Mail

Settings
How To Send
E-Mail Tips
Sending Plain Text
Sending Attachments
Receiving Attachments
TroubleShoot

Tutorials

Web Browsers
E-Mail
FTP
HTML Guide
Mailing Lists
Chat
Forms
Graphics

Main Menu

Software
Tutorials
TroubleShoot
HTML Guide
Help Staff

Help Desk

Call: **(508) 999-8501**

Sending E-Mail Attachments:

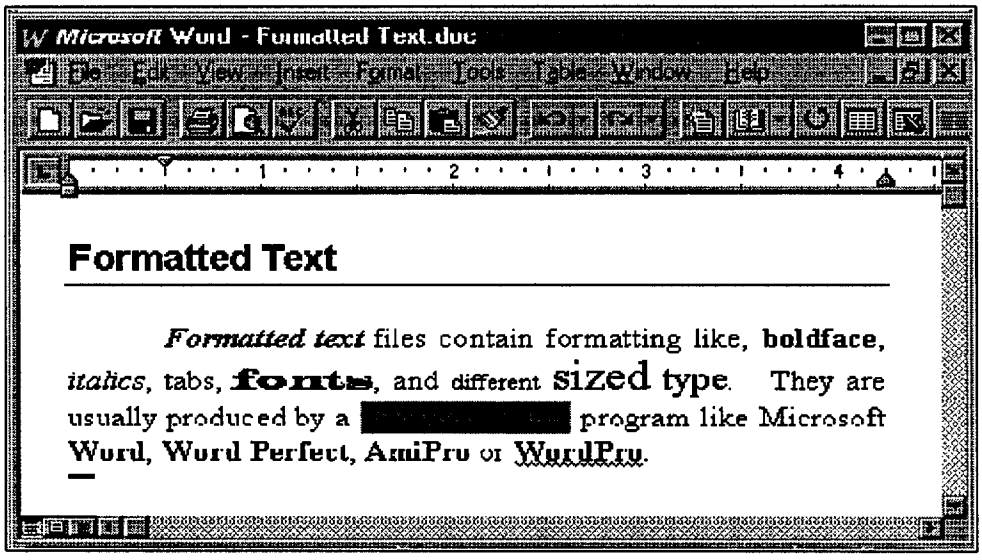
Formatted Text Files, Images, Audio, and Video Files

Any file that is not plain text must be e-mailed as an **attachment**.

This includes formatted text files, images, audio, and video files. The person who receives this attachment must have compatible software in order to open these files.

Formatted text files contain formatting like boldface, italics, tabs, fonts, and different-sized type. They are usually produced by a word processing program like Microsoft Word, Word Perfect, AmiPro or WordPro.

This is an example of a formatted text file:



E-Mail:
CyberEd Staff

Comments or questions about this site?

To send an E-mail attachment:

1. Open your E-mail program.
2. Create a **New Message**.
3. **Address** the message.
4. Use a **Subject line** to describe the contents of the file.
5. Use the **message body** to describe the type of file: **what word processor** (like "Word 6.0) was used to create the file or what type of image (ie. **.gif or .jpg**) or sound (ie. **.au, .wav** or **.ra**) file it is, and what type of mail **encryption** (mime, binhex, or uuencode) might have been used on the file.
6. Tell your E-mail program which file to attach:
   - **Eudora**:
     1. Select "**Message**" from the menu bar.
     2. Click "**Attach Document**".
     3. Use the dialogue box to find and **select the file** location in your computer system.
     4. Click "**OK**".
   - **Netscape Mail**:
     1. Click the button marked "**Attachment:**".
     2. Click the "**Attach file**" button.
     3. Use the dialogue box to find and **select the file** location in your computer system.
     4. Choose "**As Is**" (no conversion) unless you wish to send plain text from a formatted text file ("**Convert to plain text**").
     5. Click "**OK**".
7. **Send** the message.

Next:
Receiving
E-Mail Attachments

Top of Page

78

E-Mail: Miscelaneous

Mailing Lists

On the Internet, a mailing list is a discussion group that promulgates its member's messages via e-mail. This is accomplished by using a *listserver*, which is a computer that automatically receives messages from members of the discussion group, and sends all received messages to every member of the group at a specified time interval (hourly, daily, weekly, etc.). These messages are usually compiled and sent to each user as one large e-mail message, but they can also be sent individually. Most of the specific details can be set by the mailing list administrator, and often by each individual member of the list.

The topic of discussion on a mailing list varies from list to list. There are mailing lists that discuss everything from gardening to television shows to computer programming. Regardless of the topic, it is nearly always advisable to keep your posts on the assigned topic of that group. Most mailing lists are small in size when compared to Usenet newsgroups. Mailing lists are also usually more controlled than newsgroups. Mailing lists do have their disadvantages, however. Because all messages are sent as e-mail, one *must* read through every message, regardless of the subject.

Finding Mailing Lists

With thousands of mailing lists to choose from, it can be quite difficult to find the one you're looking for. If you know of any web pages devoted to the topic you are looking for, check those pages to see if a mailing list is mentioned. You can also ask other people on the Internet who are interested in the desired topic if they know of any mailing lists. The Massachusetts Institute of Technology FTP server, `rtfm.mit.edu`, has several lists of known mailing lists available to the public, which can be quite helpful when trying to find just the right mailing list.

Smiley's and Emoticons

Writing a personal letter using nothing but a standard alpha-numeric keyboard is an extremely difficult task. This is because people usually communicate using more than just words. We convey emotions, facial expressions, and other subtle body movements that help add "flavor" to our sentences. Believe it or not, but this can all be accomplished in the world of e-mail, as well.

To aid the art of e-mail communications, early Internet users developed a system of characters using different combinations of standard ASCII characters that represent human emotions. These characters are called *smiley's*, or emoticons (pronounced ee-MOTE-eh-cons). A smiley is read by leaning your head down toward your left shoulder and looking at the characters sideways, reading from left to right. For example, a simple happy face is:

:-)

Although you can use smiley's anywhere in your message, try not to over use these characters -- too many can make your message hard to read. Here are some common smiley's:
Descriptive

8-) Wears Glasses
:-# Wears Braces
:-? Smokes a Pipe
:-{ Wears a Mustache

Emotions and Comments

:-) Happy/Funny
;-) Winking/Sarcastic
:-\ Undecided
:-(Sad
:-o Oops!

Symbolic

:- Male
>- Female
|-O Birth
8-# Death

Remember, there is no "official" set of smiley's, so be creative! If you need help, check out the Unofficial Smiley Dictionary.

In addition to smiley's and emoticons, you can also add emotion to your actual e-mail text! For example, you can **SHOUT** on-line, or add **_emphasis_** to a word, if you like. Shouting is accomplished simply by typing the part to be shouted in all caps. Because typing in all caps is considered shouting in the Internet world, you need to be sure that you don't leave your caps lock key on while typing e-mail messages, because everyone will think that you're shouting at them. It's just not polite.

As previously mentioned, emphasis can also be placed on a word or group of words. This is done by placing an underscore (the _ character - typed by "shifting" your dash key on most keyboards) *before* and *after* the word or groups of words to be emphasized. For example, "I'm _only_ 43 years old." In this example, the word, "only," would be emphasized. If you were to say the example aloud, you would raise the pitch of your voice slightly on the word, "only." Although the "underscore-emphasis" technique isn't used as often as the "all-caps-shouting" method, both can be found quite frequently on the Internet.

Internet Abbreviations

Some abbreviations commonly used in e-mail and other messages on the Internet are as follows:

BTW - By the way
c-ya - See you later
FAQ - Frequently Asked Questions
FWIW - For what it's worth
IMHO - In my humble opinion
LOL - Laughing out loud
OTOH - On the other hand
RTFM - Read the @%&!^ manual! (Read the FAQ)
TIA - Thanks in advance

By the way (BTW), the abbreviation RTFM gives us the name of the largest Usenet FAQ archive on the Internet, `rtfm.mit.edu`.

SURF POINT A Better Place To Surf

Choosing Web Conferencing Software

November, 1996

Copyright © 1996 by David R. Woolley
Portions copyright © 1995 Sams.net Publishing

This article was written for the 1996 International University Consortium Conference on WWW Course Development & Delivery. Portions of this article were originally published in the book ***World Wide Web Unleashed****.*

Contents:

- Introduction
- What is Web Conferencing?
- Categorizing the Products
- Key Considerations
- What Makes a Good Conferencing System?
- Universal Problems
- Conclusion

Links to Web Conferencing Software

Introduction

The field of Web conferencing software is growing at a breathtaking pace. In the summer of 1994 there were exactly two products in this category, both of them rather primitive freeware packages. Today there are well over 60 commercial and freeware products, many of them quite sophisticated, that support conferencing on the Web in one form or another.

With so many products available, the choice can seem overwhelming. But with a methodical approach, you'll probably find that you can quickly whittle the list down to just a few candidates.

What is Web Conferencing?

First, let's define our terms. For our present purposes, conferencing is a form of group discussion that uses text messages stored on a computer as a communication medium. It does *not* include various types of real-time, or synchronous, communication, such as "chat rooms", voice-based teleconferencing, or video conferencing.

A conferencing system is Web-based if it uses Web browsers and servers to provide most of its functionality. This is not as clear a distinction as it might sound. Most developers of conferencing software are hurrying to adapt their products to the Web, and the result is a lot of hybrid products that use the Web to a greater or lesser extent. Hence, the boundary between Web and non-Web conferencing software is a bit blurry.

Systems that work with unmodified Web browsers and servers are of greatest interest, because they are the most easily accessible to the great mass of Web and intranet users. Any Web software that requires users to install a browser add-on, or even an entire proprietary browser, suffers a handicap, although such special-purpose software might give it a significantly better user interface.

Categorizing the Products

Five Great Rivers

Web conferencing systems have widely varying designs, partly because they were built with very different purposes in mind. Hence, an across-the-board comparison of all available products would be meaningless. It makes more sense to group them according to the different traditions from which they have grown.

Historically, there have been five "great rivers" of conferencing and conferencing-like software that have evolved more or less independently of one another:

- Centralized forums
- Groupware
- Bulletin board systems (BBSs)
- Usenet
- Mailing lists

All of these rivers are now converging on the Web, and in this new environment they are mingling in ways that are beginning to blur the distinctions between them. But most of the conferencing products available today still strongly show their origins.

Centralized Forums

Centralized forum software originated on mainframes in the early to mid-1970's with systems like PLATO Notes, Confer, and EIES. These were designed specifically for group discussion, and they treat messages as part of an ongoing conversation with some inherent structure. Discussions are stored on one central computer, and each new message is assigned a place in the discussion structure immediately upon being posted. Over the years this line of software has evolved sophisticated features for managing and participating in conversations.

Within this arena, there is another identifiable subgroup of products whose designs have been derived from Confer, a system originally developed in 1975 by Robert Parnes. I call these products "WELL-style" conferencing systems, because the WELL has been very influential in spreading this design. There are a number of features that tend to appear in WELL-style conferencing software, but the most readily identifiable feature is that it structures discussions as linear chains of responses, and displays each discussion as a continuous stream of text.

Examples of WELL-style Web conferencing software include:

- Backtalk
- Caucus
- COW
- Motet
- Web Crossing
- WELL Engaged
- YAPP

Examples of other centralized forum software for the Web include:

- Allaire Forums
- Big Mouth Lion
- HyperNews
- NetForum
- Podium
- Post-on-the-Fly Conference

- TALKaway
- WebBoard
- WebNotes
- WebThread (by Emaze)

Groupware

Groupware, or workgroup collaboration software, was defined as a new software category by the introduction of Lotus Notes in 1989. Lotus Notes evolved out of PLATO Notes, so in a sense this category is an offshoot of centralized forum software. But whereas forum software is focused primarily on group discussion, groupware products support a wide variety of other activities, such as scheduling and document sharing. Some groupware products are suites of ready-made applications; others are toolboxes for creating collaborative applications, with customizable templates included.

As a group, these products tend to be both powerful and complex. They are marketed mainly to corporate customers for internal use by workgroups, where conversation is generally deemed less important than an efficient work flow. Indeed, in some of these products, group discussion seems to be an afterthought, while others handle discussions quite well right out of the box. But in any case, many of these products offer tools that let you customize a conferencing environment to your heart's content, if you have the skills and time to do so.

Groupware products for the Web include:

- InTandem
- Livelink
- Lotus Domino
- Oracle InterOffice
- TCBWorks
- TEAMate
- WebShare

Bulletin Boards

BBSs were pioneered by microcomputer hobbyists in the late 1970's. These systems were designed mainly for swapping files, but also featured areas where users could post notices. Each message was treated as an independent entity with no relationship to any other message, and all were posted on one big "bulletin board" with no organization. Later, features began to appear for categorizing messages, responding to specific messages, and carrying on threaded discussions. But in general, BBS software is not as well adapted to conversation as the centralized forum software is.

Web BBS software includes:

- Spinnaker
- WebLines
- Worldgroup

Usenet

Usenet arose in the early 1980's. Like BBS software, Usenet was designed to handle individual messages, although it provides separate newsgroups to sort messages by broad subject areas, and facilities for responding to specific messages. Usenet has two main distinguishing characteristics: first, it uses standardized protocols to format and transmit messages, and second, messages are passed from one news server to another and thus replicated at many places around the world, rather than being stored at one central location.

The most popular Web browsers, including Netscape Navigator and Microsoft's Internet Explorer, have

built-in news readers. Probably for this reason, few standalone Usenet products have been developed for the Web. (Forum News Gateway is the only one I know of, although Web Threads by inTouch Technology is designed to have a "news reader-like interface.")

Some argue that with Web browsers supporting the Usenet standard, there is no need for any other conferencing software on the Web. I won't get into that argument here, except to point out that the thriving market for other varieties of Web conferencing software would tend to indicate otherwise.

Nevertheless, it is certainly true that this is a fairly straightforward and cheap way to do conferencing. Just set up a news server using free, standard software, create some local newsgroups on it, have your users access your server with their favorite news-capable Web browser (or any other newsreader, for that matter) and voila! a conferencing site.

Mailing Lists

Mailing lists have probably been around in some form as long as e-mail has existed. E-mail is the least structured form of conferencing -- so much so that it's a stretch to call it conferencing at all. Yet it is an asynchronous, text-based, many-to-many medium, and can be used for some of the same purposes as other forms of conferencing.

E-mail does have certain advantages. It is the lowest common denominator of Internet services, and therefore reaches more people than any other avenue. Also, e-mail messages simply show up in your mailbox; you don't have to go looking for them. On the other hand, e-mail is not organized by topic, and threading is difficult or impossible. For this reason, mailing lists are not as good at supporting multiple simultaneous discussions as are true conferencing systems.

Several Web interfaces to mailing lists have been developed:

- HyperMail
- MHonArc
- LWGate

All of these support browsing of a mailing list archive through a Web browser. With very little effort, it's possible to automate updating of the archive so that new messages appear on the Web as soon as they are posted. None of these software packages have built-in message posting capabilities, but perhaps this doesn't matter much, considering that messages can be posted to a mailing list with any e-mail client (including the ones built into many Web browsers).

Key Considerations

After considering which of the categories of conferencing software best suits your needs, there are many other things to take into account in choosing a product. The following are likely to be key "make or break" considerations for many people.

Price. This is still a young field, and prices are all over the map: they range from free to several thousand dollars. Don't assume that a higher priced product is better. To a certain extent, you get what you pay for, but a few of the freeware products are actually stronger than some commercial products. Even if price is no object, the most expensive product is not necessarily the one that best suits your specific needs.

Operating System Support. Operating system platform might also be a key determining factor, especially if circumstances require you to run conferencing from an existing Web server. Many choices are available for Unix servers and many for Windows servers, but relatively few products support both. If you run a Macintosh server, your choices are more limited.

Compatibility with Other Environments. If all access to your conferencing system will be made via the Web, then compatibility with other environments is not an issue. But in some cases there is a requirement that discussions be accessible by some other means, and this limits your choices. For example, Caucus and YAPP are the only two Web conferencing products that also support access via a text-only telnet connection. WebNotes discussions can be accessed through a proprietary Windows-based client. And of course, Lotus Notes has proprietary clients for a number of platforms.

Administrative Capabilities. If you have limited access to your Web server, you'll want to choose a product that can be installed and administered easily with whatever level of access you have been granted. Conversely, if you are running a server yourself and want to be able to delegate discussion administration chores to others, you'll need a product that lets you give limited administrative capabilities to designated users.

Browser Support. Some Web conferencing systems rely on advanced HTML extensions such as frames or Javascript. A few require special browser add-ons. Consider whether all of your users will be able to access your conferencing system given these dependencies.

Customizability. Virtually all Web conferencing products are customizable to some extent, but some are much more so than others. In some cases, the customizability is limited to simple things like plugging a logo into a designated location on the page. But the most flexible products provide ways of significantly modifying or extending not only the displays, but the functionality of the system. This is done in a variety of ways. Caucus and Web Crossing provide macro languages that can be used to modify or completely redesign their user interfaces. Allaire Forums and TALKaway are built on top of general-purpose toolsets for development of Web database applications (Cold Fusion and WebDBC, respectively) and can be easily extended with those toolsets. Some conferencing systems, particularly freeware products, come with full source code, allowing you to hack them into anything you desire.

Various conferencing systems offer dozens of other features that might or might not be important, depending on your intended use. If there are still several candidates left after your key selection criteria have been satisfied, try to prioritize your feature wish list, and then compare each product against it to find the one that best matches your needs.

What Makes a Good Conferencing System?

Ask 100 experienced conferencers what makes a good conferencing system, and you'll get 100 different answers. As with any kind of software, people tend to like whatever they are used to. But almost anyone who conferences regularly will readily point out flaws in their own favorite system.

There is no single perfect solution for all people and all purposes. But having used a variety of systems over the past 20 years, I can make a few generalizations about what seems to work well.

Separate conferences for broad subject areas. This is a nearly universal feature. Whether the discussion areas are called conferences, forums, newsgroups, or notesfiles, they provide a basic level of organization. Besides focusing on different subjects, different conferences often have very different atmospheres and social conventions. People become "regulars" only in the conferences that most interest them.

Threaded discussions within conferences. This sometimes takes the form of a tree structure, in which each topic is the starting point for a branching tree of responses. Usenet is structured this way, as are many Web conferencing systems. But although a hierarchical tree is a good way to organize static information, it does not work as well for conversation. It is easy to get lost in the tree, and it's often hard to figure out where to attach a response. Discussions tend to fragment and dissipate. I prefer a linear structure, in which each topic

has a simple chain of consecutive responses attached to it. This form is easily understood by most people because it closely resembles "real life" conversation. On the Web there is an additional reason to use this structure: displaying a discussion as a continuous stream of text keeps interactions to a minimum. Since you don't have to click a button on every response, there are fewer delays while reading messages. All of the WELL-style systems are designed this way. WebNotes and several others use a linear structure but display each message on a page by itself.

Informative topic list. A reader should be able to easily see a list of the topics in a conference. At minimum, the list should show each topic's title and some indication of the amount of activity in the topic: the number of responses, date of the last response, or both. The topics should be sortable both by topic start dates and by last response dates.

Respect for the integrity of topics. A reader should always be able to go back to the beginning of a topic and follow it all the way through to the most recent responses. Of course, it is necessary to clear out obsolete material to avoid clutter (and because nobody has infinite disk capacity), but pruning should be done by deleting entire topics after they have fallen into disuse. Some systems (notably Usenet) throw away older messages even if they are part of an active discussion.

Support for both frequent readers and casual browsers. A browser wants to choose a conference manually and scroll through the list of topics, dipping in here and there, moving backward or forward sequentially through topics, returning repeatedly to the topic list. A frequent reader wants to cycle automatically through a customized list of conferences, skipping topic lists entirely and getting immediately to the new, unread messages. Most conferencing systems are biased toward one type of reader or the other; few support both well.

Search and filter tools for readers. A reader should be able to search messages by date, author, or keyword. Word searches on both topic titles and message texts should be possible. Frequent readers should also have tools for controlling what they see; for example, a way to "forget" topics so that any subsequent responses are skipped automatically.

Access control. Both public and private conferences are useful in different situations. A conference host or moderator should have flexible control over who can access the conference and what level of access each participant has. For example, it should be possible to give some participants read and write permission, others read only, and others no access.

Host tools. The host of a conference should have good tools for managing topics: for example, weeding out obsolete topics, archiving those that are worth saving but no longer active, and moving a divergent thread of a topic to a new topic of its own.

Speed. Frequently used functions such as advancing to the next message should require only one keypress or pointer-click and should happen instantly when selected. If the system is slow or cumbersome, people simply won't use it much.

Universal Problems

Although Web conferencing software has improved enormously in the past two years, in a sense, all of the products available today are fundamentally crippled. The problems are not the fault of the conferencing software, some of which is quite well designed. They are inherent in the architecture of the Web itself. The worst problems lie in two areas:

Performance. The Web is lousy for highly interactive applications because of the overhead involved in moving from place to place. Every time you click on a link, you have to wait. Even if the average wait between pages is only two or three seconds, the delays become

annoying when you're trying to navigate quickly through a large amount of material.

User interface. The only way to navigate through a Web conference is to click on buttons embedded in HTML pages. This is the only method that HTML supports. There are several problems with this. First, keyboard navigation is impossible; you are forced to aim your mouse at buttons on the screen. Second, the buttons don't stay put! They float around and even disappear from the screen as you scroll through a page. Nobody would tolerate such a user interface in any application outside of the Web. Imagine a word processor whose menu bar disappears whenever you scroll down through a document. Such a product would be laughed off the market. Yet that's the current state of the art of Web applications. As an added insult, the text editing capabilities built into today's Web browsers are incredibly lame.

Solutions for the Web's performance problems are in the works. Future versions of HTTP (the HyperText Transfer Protocol used in all communication between Web browsers and servers) will allow a Web browser to maintain an open session with a server while it requests multiple items. This should drastically reduce the delays involved in moving from page to page.

The user interface problems are tougher, given the structure of HTML. It's even difficult to imagine reasonable extensions to HTML that would give software developers sufficient freedom to create a good user interface. Some Web software developers are using HTML frames and Javascript to attack these problems. This approach has merit, but it's only a partial solution, and it comes at a cost: not all Web browsers support these features. The ultimate solution probably lies in bypassing HTML entirely, and writing the user interface in some other language -- possibly Java.

Conclusion

No conferencing system available excels at everything. There is no single "best" product that is the ideal choice for every situation. The field of Web conferencing software is rich in variety, and many good products are available, each with its own strengths and weaknesses. But a careful analysis of your needs will help you to choose the product best suited to your application.

A comprehensive list of Web conferencing software, with links to information about each product, is available at: http://freenet.msp.mn.us/~drwool/webconf.html

---

David R. Woolley (drwool@skypoint.com) created one of the first computer conferencing systems, PLATO Notes, the model for such conferencing software as Lotus Notes, DEC Notes, and the tin newsreader. Today he is a software designer, consultant, and writer, and is leading an effort to set up a Web-based community network in Minneapolis-St.Paul.

Internet Chat

Chat rooms have always been popular on the Internet, but not until recently have they become quite so popular with the general Internet public, previously frequented most often by "hard core" Internet users with a little too much time on their hands. Now, it seems everyone wants to take part in the online chatting experience. There are four major types of online chat that we will discuss: IRC Chat, one of the most popular forms of online chat, Web-based chat, chat rooms exclusive to commercial providers, such as AOL or Prodigy, and finally MUD chat rooms, which are somewhat less popular now than they were a couple years ago.

Internet Relay Chat

One of the most popular forms of online chat, **Internet Relay Chat**, or IRC, was developed in 1988 as a replacement for the old Unix program, *talk* (you don't need to worry about this). After being used extensively in the Gulf War of 1991 as a way to quickly disperse real-time information to many users at once, IRC is now used by thousands of people every day as a virtual meeting place in which to discuss various issues of the day. Users enter specific *channels* in which a specific subject or theme is usually predominant. Channels can be either public, where anybody on the Internet can join, or private, in which two people can carry on a private conversation. For more extensive information on the usage of IRC chat, feel free to refer to the Internet Relay Chat Help Site at `irchelp.org`.

In order to use IRC, you must have an IRC client (software). Popular IRC clients are mIRC for Windows and IRCle for Mac users. Once you have downloaded and installed this software, you will need to be able to provide the following information: your IRC server, your e-mail address, your name, and your nick name, or *nick*.

IRC Servers

In order to use IRC, you will have to tell your IRC client which IRC server to connect to. There are plenty of servers across the world, all connected to form one large IRC network. It is usually a good idea to choose the server geographically closest to you. This should provide for a good and fast connection, with minimal lag time (delays). IRC servers are individually operated by IRC operators (or ops, for short). In some cases, you may be denied access to an IRC server based on the decision of an IRC operator to deny access either to you personally (usually unlikely), or perhaps your domain (in which case you can really do nothing about it). If this happens, simply try another IRC server.

Nicknames

While using IRC, you will be referred to not by your real name or by your e-mail address. Instead, you will be known throughout the IRC network by a one-word IRC **nickname**, such as "coolguy" or "smartgal," for example. Although you can essentially choose any nickname that you want, it is usually not a good idea to pick a nickname which is likely to be already used, such as "john" or "mike," which are both very common names. Some IRC clients will ask for you to provide two nicknames, one being a backup in the case that your first choice is already being used.

IRC Channels

In order to provide some form of organization within the IRC network, many **channels** exist, in which a particular subject or theme is usually predominant. Channels are operated by *channel operators*, or channel ops for short. Channel ops have the final word on all matters within the channel: who can enter

the channel, who can talk, and so on. A channel can either be private, in which only specified users can join and the conversation is kept private from the rest of the IRC community, or public, in which anybody can join the channel (unless specifically banned by the channel op) and take part in the discussion. Names are given to channels that usually represent their topic of discussion or purpose. Within the IRC network, all channel names begin with the pound symbol (#). Examples of some channel names are #newbies and #hamradio.

Web-based Chat

There are many Internet chat rooms that exist right on the World Wide Web, run by various organizations and web sites. Web-based chat rooms sometimes offer real-time updates of chat activity, while others require that you reload the screen periodically to keep up with the discussion. Posting is usually entered through standard submission forms within your Web browser. For links to some of the Web-based chat rooms available on the Internet, check out a fairly comprehensive list maintained by Yahoo!.

Provider-Exclusive Chat

Some commercial on-line providers, such as American Online, give users access to various chat rooms exclusive to that on-line service. In other words, these rooms are not available to everyone on the Internet. Rather, they can only be accessed by members of that specific on-line service. For more information on any such chat opportunities, please contact your own commercial on-line provider for details.

MUD Chat

Although being somewhat replaced by IRC, ***M*ulti-*u*ser *D*ungeons**, or MUD's, still constitute a major portion of on-line chat usage. MUD's are actually quite similar to IRC, in that real-time chatting capabilites are provided, but MUD's are usually accessed by telnetting to a remote Internet site and logging in with a special nickname, which sometimes is assigned a permanent password. MUD's are most frequently used these days as homes to real-time games, which are usually somewhat like role-playing games. For some of the MUD's available on the Internet, feel free to visit a fairly comprehensive list maintained by Yahoo!.

SURF POINT A Better Place To Surf

 http://virtual-u.cs.sfu.ca/vuweb/tour.html

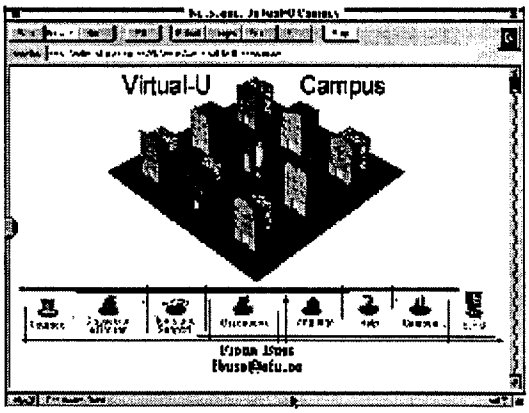
Welcome to the VIRTUAL-U community!

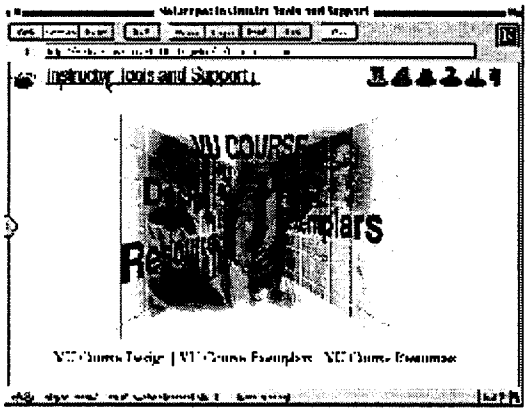
Request a Virtual-U guest pass!

Follow the tour below where we highlight our environment, tools, exemplars, and communities of practice.

Virtual-U is a server-based software system. Instructors and students log-on to a site and enter an ID and password.

Using the geographical metaphor of a campus, the student can enter a classroom which transcends the space and time of ordinary classrooms.





The instructor is supported by a series of instructional guidelines for online course delivery based on the principles of collaborative learning, a method of course delivery that is vitalized by the web environment.

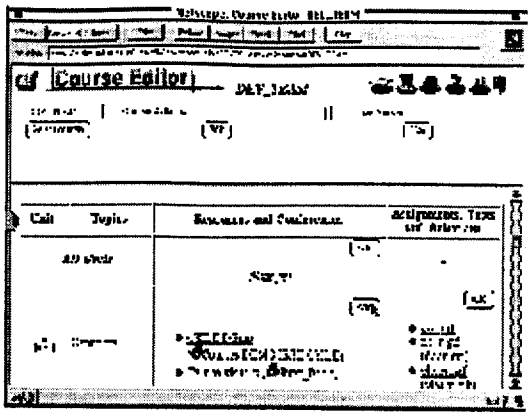
Instructors can also scan course exemplars for ideas on the multiple ways to customize online courses.

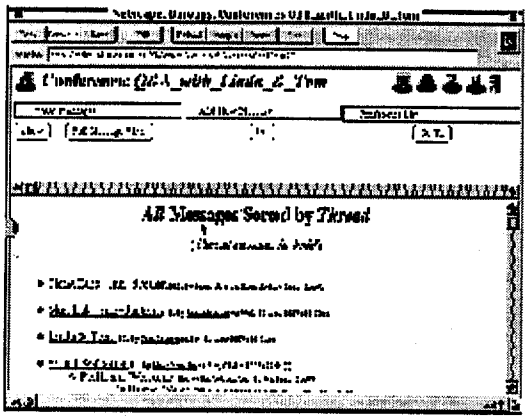
90

http://virtual-u.cs.sfu.ca/vuweb/tour.html

To structure a course, an instructor uses a course structure tool to set up course content and outline by providing links, files and instructions to students.

The student browses this Course Space for class assignments, notes and scheduling, often provided in the form of links to live pages.





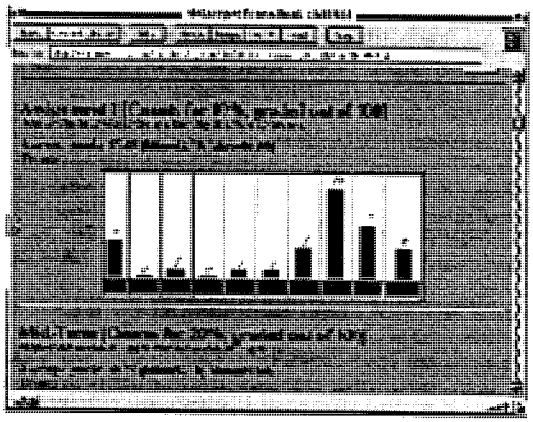
Classes take place in an asynchronous environment, adapting to the time, availability and schedules of the participants.

Independent learning is supported by online group conferencing which can be structured by the instructor or the student.

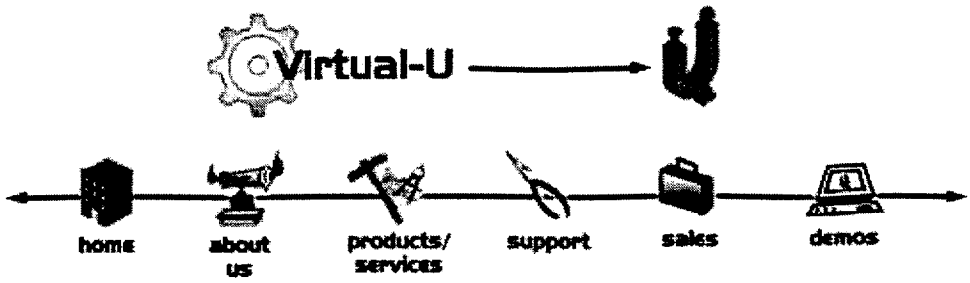
A student collaborates with other students and the instructor within VGroups, Virtual-U's conferencing tool.

Using the Virtual-U Gradebook, the instructor can calculate students marks for individual assignments and for the course overall. A student can view her mark as well as viewing where her mark falls within the class grade range.

Gradebook also provides space for free-style evaluative comments which can be used exclusively or in addition to numeric grades.



Return to Virtual-U



The Benefits of Virtual-U

- technology to maintain your organizations' leadership position in education and training
- proven and tested
- uses the principles of active learning, collaboration, and knowledge building
- a user friendly, flexible, dynamic learning environment
- no programming knowledge is required

The Components of Virtual-U (available in English and French versions)

Vgroups Conferencing System: Gives instructors the ability to easily set up collaborative groups and define structures, tasks and objectives. Any user can learn to moderate conferences and to create subconferences.

Course Structuring Tool: Enables instructors to create complete courses online without programming knowledge. Templates prompt the instructor for relevant information such as weekly overviews, required readings, grading standards and group conferencing assignments. The tool automatically places the course syllabus on the WWW for access by all students enrolled in the course.

Gradebook: Manages the database of students' grades for each course delivered with Virtual-U. The gradebook displays text and graphical representations of student performance including personal grades and distribution of marks for evaluated activities.

System Administration Tools: Assists the system administrators in installing and maintaining Virtual-U. These include functions such as creating and maintaining accounts, defining access privileges and establishing courses on the system.

The System Requirements for Virtual-U

| home | about us | products/services | support | sales | demos |

Copyright © 1997, Virtual Learning Environments Inc.
Comments on the site? Contact the Webmaster

VIRTUAL-U

RESEARCH PROJECT

@Simon Fraser University

Virtual-U publications:

download Adobe Acrobat reader
Virtual Times - Autumn 1997
Virtual-U 2.1 Fact Sheet

On-Line Learning Links:

Visit SNOW (Special Needs Opportunity Windows)!

Frequently Asked Questions about Virtual-U

What is Virtual-U?
Virtual-U is a server based software system that enables customized design, delivery, and enhancement of education and training courses delivered over the World Wide Web (WWW).

Who would use Virtual-U?
The technology is ideal for post-secondary institutions, K-12 schools, and businesses/corporations which are in need of a flexible, user-friendly, and integrated framework for delivering online learning.

How was Virtual-U developed?
Virtual-U is based on more than a decade of research in network learning and human-computer interaction and is developed by Drs. Linda Harasim and Tom Calvert of Simon Fraser University. The technology was officially launched on March 24, 1996, at Simon Fraser University, Burnaby, British Columbia. Mentors and instructors came from across the country to take part in a 4 day training session which marked the first national launch of a Virtual-U strategy anywhere in the world. From that group, fifteen educational and business organizations across Canada commenced online, web-based courses, in September 1996.

Can I take courses from Virtual-U?
No and yes. Virtual-U does not offer courses. However, any institution that has a license for Virtual-U can offer courses. So, yes, you could take courses using Virtual-U through a third party.

What institutions are using Virtual-U?

Virtual-U is being field-tested at 15 educational and business organizations across Canada.

What are the components of Virtual-U?

- ***Vgroups Conferencing System:*** Gives instructors the ability to easily set up collaborative groups and define structures, tasks and objectives. Any user can learn to moderate conferences and to create subconferences.
- ***Course Structuring Tool:*** Enables instructors to create complete courses online without programming knowledge. Templates prompt the instructor for relevant information such

as weekly overviews, required readings, grading standards and group conferencing assignments. The tool automatically places the course syllabus on the WWW for access by all students enrolled in the course.

- ***Gradebook:*** Manages the database of students' grades for each course delivered with Virtual-U. The gradebook displays text and graphical representations of student performance including personal grades and distribution of marks for evaluated activities.
- ***System Administration Tools:*** Assist the system administrators in installing and maintaining Virtual-U. These include functions such as creating and maintaining accounts, defining access privileges and establishing courses on the system.
- ***Upload Features.*** Allows instructors and learners to send multimedia files from their local machines to the Virtual-U server. Learners electronically submit their assignments, and the instructors organize and comment on these submissions

What are the system requirements for using Virtual-U?

The Server: A Unix workstation is required to serve Virtual-U (Solaris/Sun OS recommended) with at least 500 megabytes (MB) of free storage on hard disk and 24 MB or more of RAM.
Web server: NCSA HTTPD 1.4, 1.50a, 1.52.
Other Software: Perl 5.0 scripting language. * The ability to use an NT server for Virtual-U is currently under development.

End User (students and instructors): To use Virtual-U, students and instructors need access to a PC or Mac with access to the WWW. Browser software: Netscape 2.0 or later (Netscape 3.0 recommended) or Microsoft Internet Explorer 3.0.

How much does it cost to purchase a Virtual-U license?

- Virtual-U trial for 5 months (1 semester) - free - no limit on number of students.

- Graduated annual licensing fees based on a maximum number of course enrollees for a 12 month period (i.e.: 1 student enrollee over one year could equal 3 separate course enrollees for four months each.) Details:

  1. $3,500 US for up to 500 students ($7/student)
  2. $3,500 plus $3/student US for 500 to 1,000 students ($5/student)
  3. $5,000 plus $1.25/student US for 1000 to 5,000 students ($2/student)
  4. $10,000 US for over 5,000 students (price per student diminishes as numbers increase)

- All licenses (including the free trial) include email and telephone support and all upgrades for the current version of the system; completely new versions will be priced separately.

- Training will be provided for technical and instructional staff.

- Initial training for new clients will be provided by Dr. Linda Harasim, Dr. Tom Calvert or their close associates. To arrange details of training please contact vuguide@sfu.ca.

- Mini-package - $500 US/year for up to 50 students (also available in six month terms for half the price) - ideal for an individual instructor.

http://virtual-u.cs.sfu.ca/vuweb/faqs.html

How do I purchase a Virtual-U license?
To purchase a Virtual-U license, contact us at vuguide@sfu.ca.

Do you provide training or consulting service on Virtual-U?
Yes; online course consulting and training are available for an additional cost to assist your organization in this new and effective mode of learning.

Return to Virtual-U

95

Distance Education at a Glance
Guide # 11
September 1996

Engineering Outreach
College of Engineering
University of Idaho

Guide #11
Interactive Videoconferencing in Distance Education

- Why Interactive Videoconferencing
- The Technology of IV
- Advantages of Interactive Video
- Limitations of Interactive Video
- Types of Videoconferencing Systems
- Designing Instruction for Interactive Video
- Instructional Strategies
- Training for Instructors and Students
- References
- For Further Information

• Why Interactive Videoconferencing?

Interactive Videoconferencing (IV) is an effective tool that may be used in distance education settings. This system can be integrated into the distance education program with minimal adaptation to the curriculum and course and is designed to support two-way video and audio communication between multiple locations.

• The Technology of IV

Most IV systems utilize compressed digital video for the transmission of motion images over data networks such as high capacity Integrated Services Digital Networks (ISDN). The video compression process decreases the amount of data transmitted over the lines by transmitting only the changes in the picture. By minimizing the bandwidth required to transmit the images, video compression also reduces the transmission cost.

Interactive videoconferences are often transmitted on dedicated T-1 phone lines. These high speed lines are very effective for videoconferencing, but they are typically leased circuits with an expensive monthly cost. The fixed monthly charge is usually based on distance, not usage. Therefore, the cost effectiveness of IV systems increases with use. Interactive videoconferencing systems can operate at different data rates, at various fractions of T-1 capacity, enabling the transmission of multiple simultaneous videoconferences over the same T-1 circuit. An IV system can also share a T-1 circuit with other digital data uses such as Internet transmissions or file transfers.

Point-to-point

Interactive videoconferencing is commonly used to connect two locations using sophisticated computer technology. The core of IV is the codec (coder/decoder). This is the electronic device that transmits and receives the video signals that the class members will see on their television monitors (Galbreath, 1995). It may be easier to think of the codec as an extremely sophisticated modem. A modem takes digital data and transmits it over regular phone lines. The codec takes analog signals, compresses and digitizes them, and transmits the signals over digital phone lines (Woodruff and Mosby, 1996).

Other types of equipment, such as television monitors, are needed to make IV successful. In addition, various forms of instructional technology can be incorporated into IV, including video cassette recorders/players, microphones, cameras, and computers (Reed and Woodruff, 1995).

recorders/players, microphones, cameras, and computers (Reed and Woodruff, 1995).

Point-to-Multipoint

Some systems are also capable of simultaneously connecting more than two sites through the use of a multi-point control unit, or MCU. Multi-point conferencing can be effective although the scheduling, technical, and logistical dimensions of MCU conferences can be imposing.

Dial Out Capability

A relatively new "dial out" feature, allows the use of multiple telephone lines to connect two or more sites in the same conference. Simultaneously accessing multiple lines may be difficult in small areas. In addition, the cost of the telephone line usage may be prohibitive since the cost of the call would be multiplied by the number of lines utilized in the conference.

• Advantages of Interactive Video

Interactive video can be effective because it:

- Allows "real time" visual contact between students and the instructor or among students at different sites.
- Supports the use of diverse media (Reed and Woodruff, 1995). Blackboards, handwritten documents, and videos may be incorporated at all sites.
- Enables connection with experts in other geographical locations (Reed and Woodruff, 1995).
- Can provide access to at-risk or special needs students (Woodruff and Mosby, 1996).
- Provides additional access to students at remote sites.

• Limitations of Interactive Video

As with any technology, interactive video has its limitations:

- The initial cost of the equipment and leasing the lines to transmit conferences may be prohibitive.
- Companies which produce codecs have each developed unique methods of compression which are incompatible, although protocols have been established to allow communication among brand names. However, this "universal standard" compromises resolution and quality to a certain degree.
- Unless a strong effort is made by the instructor, students not located with the instructor may remain uninvolved in the course.
- If visuals, like handwritten or copied materials, are not properly prepared, students may have a difficult time reading them.
- If the "pipe" that carries the transmission among sites is not large enough, the students may observe "ghost images" when rapid movement occurs in "real time" (Reed and Woodruff, 1995).
- If the system is not properly configured, class members may observe an audio "echo" effect (Reed and Wooduff, 1995). The result is audio interference that detracts from the learning environment.

• Types of Videoconferencing Systems

- Small room videoconferencing. This system is designed primarily for small groups (1-12 participants) at all sites seated around a conference table (Woodruff and Mosby, 1996).

- Classroom videoconferencing. This type of system usually uses high quality AV components, codecs, and an interface that allows all participants to be seen on the monitors.

- Desktop videoconferencing. This system utilizes a personal computer and videoconferencing software. These systems are less expensive, but offer limited resolution. They are most effective for individual and small group use (Woodruff and Mosby, 1996).

• Designing Instruction for Interactive Video

When designing instruction to be delivered over IV, the instructor should focus attention on all students, not just those at the "home" site. Lessons should incorporate a variety of activities for all students at the various sites. Use small group activities, student presentations, and an occasional break to add variety to the lesson. As a rule of thumb, instructors should change instruction methods every 10-15 minutes. In other words, switch from lecture to question-answer to small group activity on a regular basis.

It is often helpful to bring guest lecturers into the classroom. It may also be helpful to have guest speakers at one or more of the distant sites. This will encourage involvement of the distant students, as well as allowing the students at the origination site to "see what it is like" to have the teacher at another location.

When preparing class visuals, keep in mind that small fonts and light colors do not show up well over the monitors. A variety of formatting will also assist in maintaining student interest and attention. When formatting visuals, be sure that they will fit on the television monitor (Reed and Woodruff, 1995).

• Instructional Strategies

Establish Class Expectations

In the distance education classroom, some students may adopt the "TV" attitude, expecting the course to be entertaining, not educational (Reed and Woodruff, 1995). Address this attitude through well planned and focused presentations with emphasis on teacher-student interaction.

Reduce Distractions

Students should also be forewarned to minimize extraneous noise and activity (Reed and Woodruff, 1995). Both detract from the quality of the course. Use Variety and Interaction

The instructor should begin the course by preparing the learners for an active experience. Interactive videoconferencing is interactive, unlike regular television, and students can make the class much more interesting by being actively involved.

Encourage Dialogue

By asking questions and noting body language, instructors can ascertain the interest and comprehension of the students at both all sites. This kind of attention will make all students feel more comfortable.

• Training for Instructors and Students

It is important that an instructor be taught how to use all features of the equipment. A short session (30 minutes) should be sufficient to give the instructor a "hands-on" overview of the equipment features. It would also be helpful to provide the instructor with a quick reference sheet outlining major functions.

Some of the critical operations that an instructor should be capable of performing are:

- Turning on the codec and the monitors.

- Dialing the distant site(s) to establish a link.

- Dialing the distant site(s) to establish a link.
- Controlling camera focus and field at the origination site and at the distant site(s).
- Adjusting the volume to an acceptable level.
- Dialing out to a remote location.
- Selecting the appropriate data rate.
- Re-setting "echo canceling" capability.
- Switching to and from the document camera.
- Switching to and from the computer output.
- Utilizing a computer to generate and display multimedia presentations.
- Using the VCR to broadcast a video for all locations.
- Terminating the link with the distant site(s).
- Shutting down the equipment.

Some institutions have technicians who will assist the instructor in setting up or monitoring the videoconference. However, the instructor should still be aware of the process because the technician may not always be available.

Student training may also be critical since they may be called upon to operate the equipment if the instructor is at another site, is unavailable, or if a guest speaker needs assistance.

Interactive videoconferencing can be an effective instructional tool for the distance educator. As with other technologies, its usefulness is directly related to the instructor's understanding of its benefits, limitations, and utilization strategies.

• References

Galbreath, J. (1995) Compressed Digital Videoconferencing. Educational Technology, 35(1), 31-38.

Glossary of Terms. (1996). http://www.ctcnet.com/tips/glossary.htm.

Reed, J. and Woodruff, M. (1995). Using compressed video for distance learning. http://www.kn.pacbell.com/wired/vidconf/Using.html.

Woodruff, M & Mosby, J. (1996). A brief description of videoconferencing. Videoconferencing in the classroom and library. http://www.kn.pacbell.com/wired/vidconf/description.html#what.

• For Further Information

This guide is one in a series entitled **Distance Education at a Glance** developed by University of Idaho Engineering Outreach staff. Other guides in this series include:

#1 Distance Education: An Overview
#2 Strategies for Teaching at a Distance
#3 Instructional Development for Distance Education
#4 Evaluation for Distance Educators
#5 Instructional Television

PACIFIC BELL

Videoconferencing in the Classroom & Library

Instructional Strategies

Effective use of videoconferencing technology for interactive learning requires practice and planning as well as attention to a few important instructional strategies. The teacher in the videoconferencing classroom must know how to use the components of a conferencing system, manage local and remote classrooms, and connect to and collaborate with remote experts or guests. Two-way video works best as an interactive medium, but because we all have years of experience **watching** video rather than communicating with it, instructors must make extra effort to involve and engage learners.

Keep in mind that, as an educator, you already possess a wealth of knowledge and experience in curriculum design and instruction. The following list should remind you of strategies to considered when designing two-way video instruction.

- Focus on Learning
- Set Expectations
- Provide Supporting Materials
- Engage Students with Variety and Interaction
- Reduce Distractions During Learning Activities
- Encourage Dialog

Videoconferencing Video Guestbook Glossary

Focus on Learning

To begin with, educators should think about the learner and outcomes first -- the who, what, why, where and how questions of learning -- before leaping into preoccupation with logistics or technology. The spotlight should fall on the conditions, dynamics and outcomes of the learner activity, in ways that motivate students and encourage active learning behaviors.

Inspiring learner motivation is important in any learning environment, but it's critical in a distance

learning situation. While designing instruction, take into consideration **Keller's ARCS model of motivation**, which emphasizes:

- **Attention**. Increase perceptual arousal with the use of novel, surprising, incongruous and uncertain events. Increase inquiry arousal by stimulating information seeking behavior; pose or have the learner generate questions or a problem to solve. Maintain interest by varying the elements of instruction.

- **Relevance**. Emphasize relevance within the instruction to increase motivation. Use concrete language and examples with which students are familiar. Provide examples and concepts that are related to learners' previous experiences and values. Present goal orienting statements and objectives. Explain the utility of instruction for both present and future uses.

- **Confidence**. Allow students to develop confidence by enabling them to succeed. Present a degree of challenge that allows for meaningful success under both learning and performance conditions. Show the student that his or her expended effort directly influences the consequences. Generate positive expectations. Provide feedback and support internal attributions for success. Help students estimate the probability of success by presenting performance requirements and evaluation criteria.

- **Satisfaction**. Provide opportunities to use newly acquired knowledge or skill in a real or simulated setting. Provide feedback and reinforcements that will sustain the desired behavior. Maintain consistent standards and consequences for task accomplishments. Manage reinforcement: keep outcomes of learner's efforts consistent with expectations.

▪ Set Expectations

Because of vast experience watching television, students may not expect to actively participate in videoconferencing. Use your role as facilitator to help students understand that you expect interaction and active learning.

A simple way to challenge the television preconception issue is to communicate expectations to the learner prior to instruction. A brief letter or a few comments at the beginning of a lesson can go a long way toward helping learners understand differences between broadcast television and two-way compressed video. Consider explaining the difference in audio/visual quality along with a few suggestions to optimize that quality. One might, for example, encourage learners to keep background noise and motion to a minimum and explain ways to deal with the audio delay. A teacher should also prepare learners for an active experience. Assign a pre-session activity or begin the lesson with a discussion. Actively involve learners early and often, using small group or hands-on activity, reading, writing, discussion, and questions to get them out of the passive "viewing" mode.

Here are some additional ideas for communicating expectations:

- At the beginning of each conference, remind students that they are to participate actively.
- Model different types of active learning behavior.
- Remind the students this is two-way video, not one-way TV.
- Discuss etiquette required for two-way video.
- Pre-assign activities to get the students more involved.
- Allow students to participate in equipment operations. This will help you delegate tasks so that you are able to facilitate and monitor interactions as well as manage the classroom.

▪ Provide Supporting Materials

Here are a few suggestions to help improve communication and encourage learner involvement.

- Create and distribute an agenda so participants at both sites will know what to expect.
- Distribute a student guide with clear learning objectives to both the local and distant sites before the conference. Provide sections with key words or phrases left blank for the student to fill in. Allow space for note taking.
- When feasible, include graphics shown during the videoconference in the student guide.
- Sequence all materials in the order presented during class.
- Send a roster of names from your local site, and obtain one from the distant site before the conference so that you may call on specific students to promote interactive discussions.
- When explaining a learner activity or assignment, display a slate with simple, bulleted instructions. Leave the slate displayed during the activity for reference.

Engage Students with Variety and Interaction

Incorporate variety into instruction to keep interest and motivation high. Use relevant visuals or sounds to illustrate points, and if possible, bring in a guest speaker to share a different perspective, answer questions, or provide real-world feedback on student projects. Even with thrilling visuals and instructors, nobody wants to watch a talking head for hours, so make sure learners have an opportunity to focus attention away from the screen. Assign small group activities with a task that can be discussed later. Tag a break onto an activity to give students a chance to stretch and talk. Highly motivated learners in a tightly focused lesson can tolerate lengthy lectures, but as a rule of thumb, don't lecture for more than 15 minutes at one time. Instead, alternate lectures with activities or discussions.

To promote interactivity:

- Include the participants in the conference within the first 5 minutes. Involve them early so they don't turn away. Try a name game, or ask a compelling question that taps their affective domain.
- Devote 30%-65% of each hour to student activity.
- For group work, select individuals at each site to participate on inter-site teams.
- To encourage interactivity, remember the rule: no more than 10-15 minutes of instructor talk without some learner-centered response. This will enable you to put the responsibility of learning back in the learner's hands.
- Using the pre-obtained roster, call on students at both sites by name. Encourage discussion.
- Take as many questions from the distant site as you take from the local site. To answer questions:
  1. look into the camera and answer the person who asked the question
  2. ask the student asking the question a couple of questions to see if it can be answered by that student or another student
  3. if there is more than one site, try to get a discussion going or answer between the remote locations
- Model verbal and visual interaction:
  - interact early and often
  - move and gesture normally rather than wildly; avoid swaying, rocking or pacing
  - avoid interrupting

To increase variety:

- Change the pace to keep learners' attention. Slow the pace for new or different content. Increase the pace for reviewing content.
- For discussions, employ any of the following:
  - **Instructor-directed discussion** to clarify content, define terms, identify assumptions, motivate participation, recognize contributions.
  - **Group-centered discussion** to build on experience, explore hypotheses, strengthen relationships, raise questions, formulate ideas, examine assumptions.

    - **Collaborative discussion** to solve problems, share responsibilities, compare alternatives, test hypotheses, modify assumptions.
- Use others to teach. Vary in format, using:
    - Participant presentations
    - Small and large group work
    - Participant and guest speaker demonstrations
    - Role plays
    - Debates
- Use different methods to deliver content:
    - Instructor-centered to learner-centered teaching
    - Alternate between new content and review
    - Simulations and games
    - Case studies
    - Questions, both factual and complex. Avoid yes-no questions. Instead, ask a question, pause to allow time for student to respond, and call on specific student. Increase attention with perceptual and inquiry arousal questions.
- Use a variety of complementary media to support instruction. Here are some ideas:
    - book illustrations
    - cartoons
    - diagrams or charts
    - photos
    - semantic maps (to minimize text and present relations graphically)
    - slates- single screen displays
    - PC-generated graphics (these can be shown on many units through a scan converter)
    - brief video clips (discuss relevance before and after showing the clip)
- Use silence to have learners read or write. Use a slate to explain what to do (e.g. read page 10, and complete the short answer questions).

▪ Reduce Distractions During Learning Activities

Since variety is so engaging, reduce the potential distraction of the screen by posting a still image or slate during a class activity. Don't be afraid to use silence. Though we expect a "busy" screen, music or chatter can distract students from learning.

▪ Encourage Dialog

Asking a question can be daunting for students, especially if it means they must get the attention of a remote teacher and talk to a TV screen. Teachers can help by noting the body language of remote students and taking the time to query when students seem puzzled or disinterested. Eye contact and use of names both help make students feel more comfortable. These people skills are obvious and natural in a "live" classroom, but may seem awkward in a distance learning situation. "Eye contact" means looking at the camera and the monitor rather than local students, and teachers might have to make a special effort to attend to remote learners. To help out introverted students, consider alternative modes for questions and comments. Make a fax machine available or solicit e-mail for questions and comments. Consider holding videoconference office hours or paying a visit to the remote site. Use resources creatively to establish rapport and help all learners participate.

Credits

Created by Merry Woodruff and Jennifer Mosby, Graduate Students at San Diego State University's

Department of Educational Technology, with guidance from faculty members Dr. Bernie Dodge and Dr. Farhad Saba

Last revised May 30, 1996
By Jodi Reed, jreed@mail.sdsu.edu
Applications Design Team/Wired Learning
URL:
http://www.kn.pacbell.com/wired/vidconf/instruct/instruct.html

Copyright © 1996 Pacific Bell -- All Rights Reserved

White Pine Software is proud to announce the Preview release of CU-SeeMe Version 3.1 for Windows 95/NT 4.0. With CU-SeeMe Video Chat Software, you can make new friends, expand your social networks, find people with similar interests, watch entertaining cybercast events and much more!

Important: Please view the Read Me file before downloading. Please send us your comments and any problems you may encounter with this Preview release by using our Feedback form.

Table of Contents for this page:

- About this Preview Release
- Technical Support
- CU-SeeMe V3.1 Preview for Windows 95/NT 4.0 Download
- New Features in Version 3.1
- CU-SeeMe for Mac OS

About this Preview Release:

CU-SeeMe Version 3.1 for Windows 95/NT 4.0 is currently available as a *Preview* only. This special Preview release is available as a download only; it is not for sale. When the final version is released, you will be able to purchase it online.

Pricing Information: Registered users of CU-SeeMe Version 3.0 for Windows will be able to get free upgrades to Version 3.1 for Windows when they become available. Registered users of Enhanced CU-SeeMe Version 2.1.1 or earlier may upgrade for a price to be determined. Watch this page for pricing updates.

Technical Support:

Note that is is a Preview release. This means that it is not fully tested nor is it final. Because it is a Preview release, White Pine is *not* offering technical support for this product. When CU-SeeMe Version 3.1 is final, registered users who purchase the software will be entitled to technical support.

Preview Download:

Important: This Preview release of Version 3.1 will not coexist with Version 3.0 of CU-SeeMe. If you currently have Version 3.0 of CU-SeeMe installed on your computer and you then install the Preview release, the Preview release will replace Version 3.0. Please view the Read Me file for more information before downloading and installing.

Download Now!
Please view the **Read Me file** first!

We invite you to try the Preview release of CU-SeeMe Version 3.1 for Windows 95/NT 4.0. This Preview software will expire on November 30, 1997. **Download now**.

Your Feedback is Requested:

White Pine is pleased to have you participate in the Preview evaluation of Version 3.1 for Windows 95/NT 4.0. Your comments are very important to us so please send us your feedback using our Web-based **feedback form**.

Return to Top

New Features in Version 3.1

General:

- CU-SeeMe now complies with the H.323 videoconferencing standards when used with the new MeetingPoint conference server from White Pine. MeetingPoint lets any standards-based client (including CU-SeeMe Version 3.1) communicate with each other. This means that users of Microsoft's NetMeeting, Intel's Internet Video Phone, CU-SeeMe V3.1, and others can all join together in group videoconferences. The White Pine Cafe uses MeetingPoint software so users of other H.323 clients can now join this conference. Use your CU-SeeMe Phone Book to connect to the White Pine Cafe. (Note that cross-client connections **cannot** occur in a CU-SeeMe point-to-point conference. The MeetingPoint conference server must be used.)
- New video and audio codec have been added to allow communication with videoconferencing clients other than CU-SeeMe. If you are in a MeetingPoint conference and you want to exchange video and audio with CU-SeeMe users, as well as with other H.323 clients, then you must choose the following codecs:
  - Video: White Pine H.263
  - Audio: G723 (6.4 Kbps)
- There have been many video and audio performance enhancements added to this Preview release of Version 3.1. Additional improvements will be added before the final release.
- You can manually dial an IP address by clicking the **Manual Dial** button in the Phone Book window. New features have been added to the Manual Dial dialog box allowing you to enter a conference ID and password, as well as setting your tranmission and reception rates.
- The default transmission and reception rates have been changed to provide you with the best conferencing experience "right out of the box." You can still modify these rates if you choose. The new default rates are as follows:

Your Network Connection	Minimum Send (Kbps)	Maximum Send (Kbps)	Minimum Receive (Kbps)	Maximum Receive (Kbps)
Modem 28.8 Kbps	1	20	1	20
Modem 33.6 Kbps	1	20	1	20
Modem 56 Kbps (*new*)	5	40	5	40
ISDN 64 Kbps	5	40	5	40
ISDN 128 Kbps	10	80	10	80
LAN 256 Kbps	10	80	10	150
LAN T1 and more	10	80	10	300

Video:

- New **Copy To Clipboard** menu item on each video window (local and remote) allows you to copy the video image to the clipboard. (Click the right mouse button on a video image to see this menu item.)

Audio:

- New G.723 standards-based audio codec has been added.
- CU-SeeMe supports sending G.723 audio over real-time transmission protocol (RTP) when doing point-to-point conferencing or when communicating with MeetingPoint Conference Servers. This reduces the network overhead and provides for better audio.
- New improved Voxware audio codec produces better quality audio and uses less bandwidth.

CU-SeeMe for Mac OS:

The CU-SeeMe Version 3.1 Preview for Mac OS is also available. For more information, click here. For information on the current shipping version of CU-SeeMe for Macintosh (Version 2.0) click here.

Return to Top

Download Demo Store Front In The News Support Guides Home

13805

CU-SeeMe® Customer Support

What is Chat?

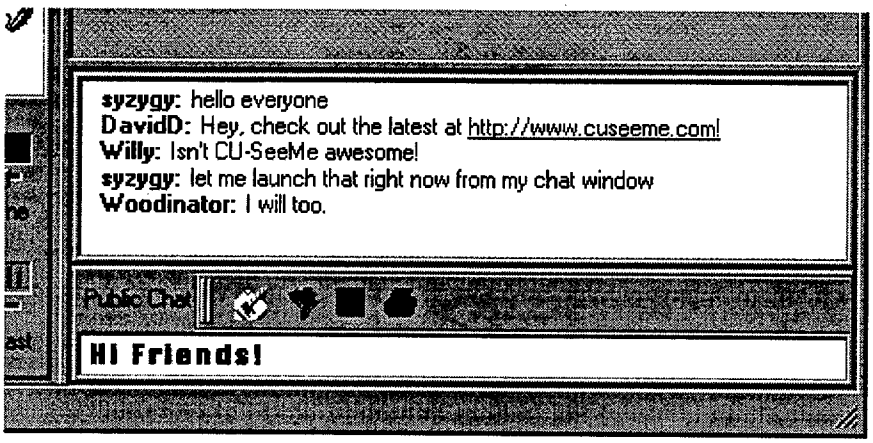
Chat lets conference participants type messages to each other.

For true videoconferencing, you'll want to use video and audio. However, you can also use the Chat Window to type messages to other participants. This is especially helpful if either you or the remote user with whom you wish to conference don't each have a camera or microphone, or if your bandwidth connection is too limited to carry audio.

Details: CU-SeeMe V3.0 Enhanced CU-SeeMe V2.*x*

CU-SeeMe V3.0

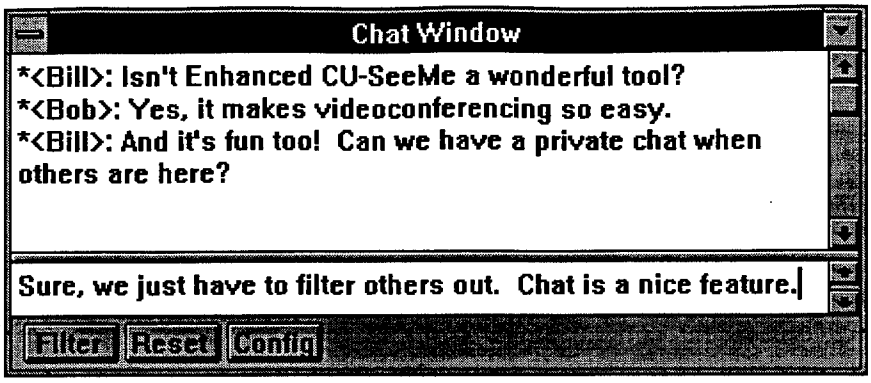
In CU-SeeMe V3, the Chat window is displayed in the conference window at the lower right section by default.



Enhanced CU-SeeMe V2.*x*

To use the chat window:

1. Choose Chat from the Conference menu (or click the Chat icon on the main button bar in windows). The blank Chat Window appears.
2. Type a message in the lower portion of the Chat Window and press the Enter key to send your message. Your message now appears in the top portion of the window with your name, as it appears in the title bar of your local video window. Anyone who has a Chat Window open will see your message. The figure below shows an example of how a "chat" conversation appears in the window.



You can modify the appearance and use of the Chat Window.

Published 27 May 1997

Return to FAQ index
Ask a question

All material copyright © White Pine Software

Home Page	Download Demo	Product Info	FAQs & Support	Store Front	In the News	Contact Info	Partners Page	Awards	White Pine Software

CU-SeeMe® Customer Support

What is WhitePineBoard?

WhitePineBoard lets people in a conference to view and make notes on their work over the network. It allows you to share and sketch out your ideas on an electronic markerboard. You can discuss things in a teleconference, starting from scratch or going over documents, spreadsheets, graphics, and other types of applications.

As you make the transition from conference table meetings to teleconferences, your document communication must evolve as well. It is no longer practical to sketch ideas on a markerboard because the markerboard is out of view of most of your colleagues. It is no longer practical to photocopy a document and pass it around the table as there is no table. WhitePineBoard replaces markerboards and photocopies and provides the medium for document communication in teleconferences. WhitePineBoard allows you to present your ideas and review documents electronically.

Return to FAQ index
Ask a question

All material copyright © White Pine Software

Home Page	Download Demo	Product Info	FAQs & Support	Store Front	In the News	Contact Info	Partners Page	Awards	White Pine Software

CU-SeeMe® Customer Support

What's a Reflector?

A **Reflector** is **Conference Server** software that delivers multimedia group interaction across IP networks. It is available for UNIX or Windows operating systems. A conference server is the *server* program in a client/server videoconferencing solution. (CU-SeeMe is the client program.)

A **Reflector** can be setup to provide multiple conferences on the same system. The conferences can be setup for group conferencing (try out White Pine Cafe at IP address 199.94.217.135) or broadcasting events (like NASA TV at IP address 139.88.27.43), much like TV stations do. The Reflector accepts multiple CU-SeeMe connections and reflects the video, audio, text, and graphics to all other participants connected to the Reflector.

For more details about Reflectors, see Reflector Product Information.

For IP addresses of many Reflectors, click here.

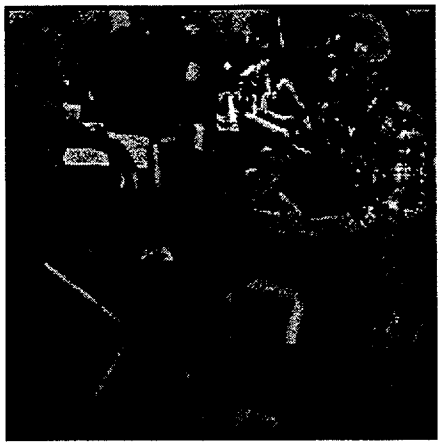
Published 27 May 1997

Return to FAQ index
Ask a question

All material copyright © White Pine Software

PictureTel

VENUE 2000 MODEL 30 GROUP VIDEOCONFERENCING SYSTEM

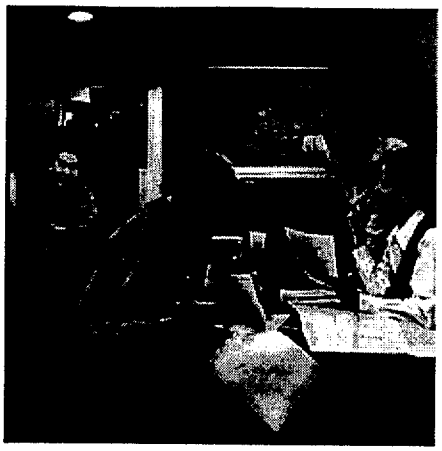


The Venue 2000 Model 30 is a complete, standards-based videoconferencing system that's as easy to afford as it is to upgrade. With the Model 30, companies can afford to deploy group videoconferencing enterprise-wide, linking departments, facilities, and remote sites anywhere around the world.The Model 30 offers greater value than any "basic" videoconferencing system. Unique PictureTel technology makes it possible to offer standards-based video and audio with above-standard quality and performance. Customers can install it in virtually any telecommunications networking environment. Its easy-to-use interface and QuickPad™ remote control make it simple for even novice users to operate. As needs change, users can add options, such as a high resolution graphics monitor, 30 frames-per-second for improved video quality, or the Virtuoso™ audio package for superior audio quality.

FEATURES AND BENEFITS

- Enables users to start with a complete videoconferencing system that they can customize and upgrade with options and peripherals
- Ensures convenient installation by supporting a variety of high and low speed network connections and remote diagnostics
- Delivers FM-like quality sound using PictureTel's PT724 Wideband Audio Algorithm
- Uses PictureTel's 320plus™ technology to deliver high-quality, industry-standard videoconferencing and enables users to upgrade to 30 frames-per-second for more lifelike motion handling
- Provides exceptional ease-of-use with an intuitive, icon-based user interface, QuickPad™ remote control, and context-sensitive online help
- Enables participants to share information using a variety of meeting tools--document cameras, GroupShare™ PC application sharing software, and GroupView™ overhead document projector

PRODUCT SPECIFICATIONS CLICK HERE



By offering an enhanced, electronic whiteboard and flipchart, GroupBoard facilitates greater spontaneity and collaboration in video meetings. With GroupBoard, videoconferencing participants have the freedom and flexibility to present, brainstorm, sketch ideas, mark up visuals, and print the results at multiple sites.

Anyone who can use a traditional whiteboard can use GroupBoard without prior training: its stylus and eraser work like an ordinary whiteboard marker and eraser. Users can write in four colors and even highlight information. An intuitive user interface is also provided to help users get the most out of all GroupBoard functions.

But GroupBoard offers much more than just a simple printing whiteboard. It can also import PC graphics and presentations, and scan paper documents for mark-up and revision. It includes MultiBoard™ Windows™-based software, which enables PC users to connect their PCs directly to GroupBoard to view, annotate, highlight, sort, and edit PC files and presentations. Because GroupBoard lets users create and save multiple "pages," it can function as an electronic flipchart. It can even act as a dual monitor to display video images, sparing users the expense and space requirements of an additional display device.

For maximum flexibility and interaction, participants at multiple sites can use GroupBoard simultaneously using a T.120 conference server, such as PictureTel's Montage™ system. When a meeting is over, GroupBoard users can save the shared contents to a file or print them - ensuring that all participants at all locations get a copy.

GroupBoard is ideal for product development conferences, marketing presentations, budgeting meetings, sales talks, employee training, project management, and many other applications. It makes video meetings more like in-person meetings - enabling distant colleagues to interact more naturally for greater collaboration, improved decision-making, and increased group productivity.

PictureTel Meeting Tools

GroupBoard is a member of PictureTel's growing family of Meeting Tools. PictureTel Meeting Tools are designed to enhance the richness and naturalness of video meetings by replicating familiar, easy-to-use information-exchange tools of in-person meetings. Other PictureTel Meeting Tools include the GroupView ™ Document Conferencing Projector. All PictureTel Meeting Tools support the ITU T.120 standard for worldwide interoperability of data collaboration tools.

FEATURES AND BENEFITS

- Brings all the functionality of an electronic whiteboard and flipchart to the group videoconferencing environment
- Enhances multi-site data- and videoconferences by facilitating collaboration, brainstorming, and information-sharing among participants
- Enables videoconferencing participants to import, display, mark up, copy, annotate, scan, and print graphics, electronic files, and paper documents
- Offers real-time, multi-site interoperability with any T.120-compliant server
- Enables users to share PC files in a videoconference via MultiBoard software
- Offers high-quality data and video images under all lighting conditions
- Works with all PictureTel group videoconferencing systems and the GroupView™ Document Conferencing Projector

PRODUCT SPECIFICATIONS CLICK HERE

CLICK HERE FOR LINK TO PRODUCT INDEX

CLICK HERE FOR LINK TO PICTURETEL FIELD OFFICES

PictureTel

Products Support News & Events Contact Us SEARCH

Company Info Partners Applications User Groups

Copyright © 1997 PictureTel Corporation 1-800-716-6000. All rights reserved.
Trademarks and disclaimer. Hosted by Onward Technologies, Inc.

What is the MBONE?

The MBONE is an outgrowth of the first two IETF "audiocast" experiments in which live audio and video were multicast from the IETF meeting site to destinations around the world. The idea is to construct a semi-permanent IP multicast testbed to carry the IETF transmissions and support continued experimentation between meetings. This is a cooperative, volunteer effort.

The MBONE is a virtual network. It is layered on top of portions of the physical Internet to support routing of IP multicast packets since that function has not yet been integrated into many production routers. The network is composed of islands that can directly support IP multicast, such as multicast LANs like Ethernet, linked by virtual point-to-point links called "tunnels". The tunnel endpoints are typically workstation-class machines having operating system support for IP multicast and running the "mrouted" multicast routing daemon.

How do IP multicast tunnels work?

IP multicast packets are encapsulated for transmission through tunnels, so that they look like normal unicast datagrams to intervening routers and subnets. A multicast router that wants to send a multicast packet across a tunnel will prepend another IP header, set the destination address in the new header to be the unicast address of the multicast router at the other end of the tunnel, and set the IP protocol field in the new header to be 4 (which means the next protocol is IP). The multicast router at the other end of the tunnel receives the packet, strips off the encapsulating IP header, and forwards the packet as appropriate.

Previous versions of the IP multicast software (before March 1993) used a different method of encapsulation based on an IP Loose Source and Record Route option. This method remains an option in the new software for backward compatibility with nodes that have not been upgraded. In this mode, the multicast router modifies the packet by appending an IP LSRR option to the packet's IP header. The multicast destination address is moved into the source route, and the unicast address of the router at the far end of the tunnel is placed in the IP Destination Address field. The presence of IP options, including LSRR, may cause modern router hardware to divert the tunnel packets through a slower software processing path, causing poor performance. Therefore, use of the new software and the IP encapsulation method is strongly encouraged.

115

MBONE, the Multicast BackbONE

Mike Macedonia and Don Brutzman

Naval Postgraduate School

Introduction.

The joy of science is in the discovery. It was a year ago when we heard that the JASON Project, an underwater exploration educational program supported by Woods Hole Oceanographic Institution, was showing live video over the Internet from an underwater robot in waters off Baja, Mexico. Our group here at the Naval Postgraduate School (NPS) furiously tried to figure out how to receive that video signal. We worked for several days to gather the right equipment, contact the appropriate network managers, and get hardware permissions from local bureaucrats, only to find that an antenna uplink on the JASON support ship had flooded a few hours before we became operational. Despite this disappointment we were not discouraged because we had discovered how to use the Internet's most unique network, MBONE.

MBONE stands for Multicast Backbone, a virtual network that has been in existence for about three years. The network originated from an effort to multicast audio and video from the Internet Engineering Task Force (IETF) meetings. MBONE today is used by several hundred researchers for developing protocols and applications for group communication. Multicast is used because it provides one-to-many and many-to-many network delivery services for applications such as videoconferencing and audio that need to communicate with several other hosts simultaneously.

Multicast networks.

Multicasting has existed for several years on local area networks such at Ethernet and FDDI. However, with Internet Protocol (IP) multicast addressing at the network layer the service group communication can be established across the Internet. IP multicast addressing is an Internet standard developed by Steve Deering (Request For Comment RFC-1112) and is supported by a number of workstation vendors, including Sun and Silicon Graphics Inc. Categorized officially as an IP Class D address, an IP multicast address is mapped to the underlying hardware multicast services of a local area network.

The reason that MBONE is a virtual network is that it shares the same physical media as the Internet, though it must use a parallel system of routers that can support multicast (e.g. dedicated workstations running with modified kernels and multiple interfaces) augmented with "tunnels". Tunneling is a scheme to forward multicast packets among the islands of MBONE subnets through Internet IP routers which typically do not support IP multicast. This is done by encapsulating the multicast packets inside regular IP packets.

Bandwidth.

The key to understanding the constraints of MBONE is thinking about bandwidth. The reason why a multicast stream is bandwidth-efficient is that one packet can touch all workstations on a network. Thus a 125 Kbps video stream (1 frame/second) uses the same bandwidth whether it is received by one workstation or twenty. That is good. However that same multicast packet is prevented from crossing network boundaries such as routers or bridges. The reasons for this restriction are religious and obvious: if a multicast stream which can touch every workstation could jump from local network to local network, then the entire Internet would quickly become saturated by such streams. That is very bad! Thus the MBONE scheme encapsulates multicast streams into unicast packets which can be passed as regular Internet protocol packets along a virtual network of dedicated multicast routers (mrouters) until they reach the various destination local area networks. The use of dedicated mrouters segregates MBONE packet delivery, protecting standard network communications such as mail and telnet from

116

MBONE packet delivery, protecting standard network communications such as mail and telnet from MBONE experiments and failures. Once properly established, an mrouter needs little or no attention. Given this robust distribution scheme, responsible daily use of the MBONE network consists only of making sure you don't overload your local or regional bandwidth capacity.

Networking details.

When a host on an MBONE-equipped subnet establishes or joins a group it announces that event via the Internet Group Management Protocol (IGMP). The multicast router on the subnet forwards it the other routers in the network. MBONE sessions use a tool developed by Van Jacobson of Lawrence Berkeley Laboratories called sd (session directory) to display the announcements by multicast groups. sd is also used for launching multicast applications and for automatically selecting an unused address for any new groups.

Groups are disestablished when everyone leaves, freeingup the IP multicast address for reuse. The routers occasionally poll hosts on the subnets to determine if any are still group members. If there is no reply by a host, the router stops advertising that hosts group membership to the other multicast routers.

The routing protocols for MBONE are still immature andtheir ongoing design is a central part of this network experiment. Most MBONE routers employ the Distance Vector Multicast Routing Protocol (DVMRP) which is commonly considered inadequate for rapidly changing network topologies because routing information propagates too slowly. A multicast extension to the Open Shortest Path (MOSPF) link-state protocol has been proposed by John Moy of Proteon Inc. that addresses this problem. However, with both protocols each router must compute a source tree for each participant in a multicast group. MBONE is currently small enough that this restriction is not a problem. However, for a large network with constantly changing group memberships such routing techniques are expected to be computationally inefficient.

Topology and Scheduling.

The MBONE topology and the scheduling of multicast sessions must be actively managed by the MBONE community to minimize congestion. Approximately 400 sites worldwide are currently MBONE members. MBONE protocol developers are currently experimenting with automatically pruning and grafting subtrees, but for the most part uses truncated broadcasts to the leaf routers. The truncation is based on the setting for the time-to-live (ttl) field in a packet which is decremented each time the packet passes though a router. A ttl value of 16 would limit multicast to a campus, as opposed to a value of 100 which might send it to every subnet on the entire MBONE (about thirteen countries).

These issues can have a major impact on network performance. For example, a default video stream consumes about 128 Kbps (kilobits per second) of bandwidth, which is almost 10 percent of a T1 line (a common site-to-site link on the Internet). Several simultaneous high-bandwidth sessions might easily saturate network links and routers. This problem is compounded by the fact that general purpose workstation routers typically used by the MBONE are normally not as fast or as robust as the dedicated hardware routers used in most of the Internet.

Protocols.

The magic of MBONE is that teleconferencing can be done in the hostile world of the Internet where variable packet delivery delays and limited bandwidth play havoc with applications that require some real-time guarantees. It is worth noting that only a few years ago puting audio and video across the Internet was considered impossible. Development of effective multicast protocols disproved that widespread opinion. In this respect MBONE is like the proverbial talking dog: it's not so much what the dog has to say, it's more that the dog can talk at all that is amazing.

In addition to the multicast protocols, MBONE applications are using the Real Time Protocol (RTP) on top of User Datagram Protocol (UDP) and IP. RTP is being developed by the Audio-Video Transport Working Group within the IETF. RTP provides timing and sequencing services; permitting the

Working Group within the IETF. RTP provides timing and sequencing services; permitting the application to adapt and smooth out network-induced latencies and errors. The end result is that even with a time-critical application like an audio tool, participants normally perceive conversations as if they are in real-time, even though there is actually a small buffering delay to synchronize and sequence the arriving voice packets. Protocol development continues. Although operation is usually robust, many aspects of MBONE are still considered experimental.

Data Compression.

Another aspect of this research is the need to compress a variety of media and to provide privacy through encryption. Several techniques to reduce bandwidth include Joint Photographic Experts Group (JPEG) compression and the ISO standard H.261 for video. Visually this translates to velocity compression: rapidly changing screen blocks are updated much more frequently than slowly changing blocks. Encodings for audio include Pulse Coded Modulation (PCM) and GSM. Ouside of the concerns for real-time delivery, audio is a difficult media for the MBONE and teleconferencing in general because of the need to balance signal levels for all the parties who may have different audio processing hardware (e.g. microphones and amplifiers). Audio also generates lots of relatively small packets, which are the bane of network routers.

Application Tools.

Besides basic networking technology, MBONE researchers are developing new applications that typify many of the goals associated with an "information superhighway." Video, audio, and a shared drawing whiteboard are the principal applications, provided by software packages called nv (net video), vat (visual audio tool) and wb (whiteboard). The principal authors of these tools are Ron Frederick of Xerox Palo Alto Research Center (PARC) for nv and Van Jacobson of Lawrence Berkeley Laboratory for vat and wb. Each of these programs is available in compilable or executable form without charge from various anonymous ftp sites on the Internet. Working versions are available for Sn, SGI and VMS architectures with ports in progress for HP-UX and Macintosh. No DOS, OS-2 or Windows versions are currently available although ported tools can be found for 386 boxes running the (free) 386bsd Unix. Pointers to all public application tools are included in the FAQ.

Additional tools are also available or under development. Winston Dang of the University of Hawaii has created imm (Image Multicaster Client), a low-bandwidth image server. It is typically used to provide live images of planet Earth from geostationary satellites at half-hour intervals in either visible or infrared (IR) spectra. Article author Mike Macedonia has ported the IEEE Distributed Interactive Simulation (DIS) protocol to enable live interaction between virtual worlds as an MBONE communications tool. Other researchers are experimenting with using graphics workstation windows as image drivers. Future network news distributions may be multicast to reduce overall network loading and speed news delivery.

Events.

Many of the most exciting events on the Internet appear first on MBONE. Perhaps the most popular is NASA Select, the NASA in-house cable channel broadcast during space shuttle missions. Be warned that this might be a work stopper! It is hard to describe the excitement of seeing one astronaut hold another astronaut by the boots to repair a satellite, all live from 150 miles above the earth. Conferences on supercomputing, Internet Engineering Task Force, scientific visualization and many other topics have appeared, often accompanied by directions on how to download PostScript copies of presented papers and slides from anonymous ftp sites. Radio Free VAT is a community radio station whose DJ's sign up for air time via an automated server (vat-radio-request@elxr.jpl.nasa.gov). Xerox PARC occasionally broadcasts lectures by distinguished speakers. Internet Talk Radio (Carl Malamud, info@radio.com) has presented talks by Larry King and "Geek of the Week." Remote learning has brought expertise over long distances and multiplied training benefits. Default MBONE audio and video channels are available for new users, experimentation and advice from more experienced users.

Groupwork on groupware.

Groupwork on groupware.

The MBONE community is active and open. Work on tools, protocols, standards, applications and events is very much a cooperative and international effort. Feedback and suggestions are often relayed to the entire MBONE mailing list (as an example, this article was proofed by that group). Cooperation is essential due to the limited bandwidth of many networks, in particular transoceanic links. So far no hierarchical scheme has been necessary for resolving potentially contentious issues such as topology changes or event scheduling. Distributed problem solving and decision making has worked on a human level just as successfully as on the network protocol level. Hopefully this decentralized approach will continue to be successful even in the face of rapid addition of new users.

Cost of admission.

The first thing you need to get on MBONE is the willingness to study and learn how to use these new and fast-moving tools. The second thing you need is bandwidth. Here at NPS we run MBONE tools on workstations connected via Ethernet (10 Mbps). Off-campus links are via T1 lines (1.5 Mbps). We have found that bandwidth capacities lower than T1 will result in network crashes and thus appear unsuitable for MBONE.

Given adequate network bandwidth, you now need a designated MBONE network administrator. It typically takes one to three weeks for a network-knowledgeable person working part-time to establish MBONE at a new site. Setup is not for the faint of heart, but all of the tools are documented and help is available from the MBONE list. Read the Frequently Asked Questions (FAQ) a few times and ensure that software tools and multicast- compatible kernels are available for your target workstations. Subscribe to the mail list in advance so that you will be able to ask questions and receive answers. Figure 1 shows the various worldwide MBONE list subscription request addresses. After subscribing, read the FAQ again.

To receive multicast packets on your local area network, you will need to configure an mrouter which strips off packet encapsulation. This can be a dedicated router. A more popular approach is to take an old slow cast-off workstation and equip it with two Ethernet cards. Two network cards are needed, one to receive the upstream tunnel, and the other to distribute downstream multicast packets. Obtain and load the application software tools. You are now ready to put multicast on your local area network.

Note that these tools can also work in isolation between workstations on a single local area network without any mrouter. We recommend that you test the application tools locally in advance (before going through the mrouter effort) to see if they are compatible and match your expectations.

Once you are connected, pass along any lessons learned to the tool authors or the MBONE list. Later show your overall network site administrator something spectacular on MBONE (such as a live spacewalk) and then make sure that your site is programming funds to increase your network bandwidth. Demands on network bandwidth are significant and getting more critical. You might consider Tengdin's First (and Only) Law of Telecommunications: "The jump from zero to whatever baud rate is the most important jump you can make. After that everyone always wnts to go straight to the speed of light."

Caveats.

Some problems still exist and a lot of work is still in progress. The audio interface takes coaching and practice. Leaving your microphone on by mistake may override everyone else since only one person can talk at a time. You will need a video capture board in your workstation to transmit video, but no special hardware isneeded to receive video. One frame per second video seems pretty slow (standard video is 30 frames per second), but in practice it is surprisingly effective when combined with phone-quality voice. One user blasting a high-bandwidth video signal (greater than 125 Kbps) can cause severe and widespread network problems. Controls on access to tools are rudimentary and security is minimal; for example, a local user might figure out how to listen through your workstation mike (unless you unplug it). Audio broadcast preparations are often just as involved as video broadcast preparations. Network

monitoring tools are not yet convenient to use. Internet bandwidth is still inadequate for MBONE in many countries. On one occasion a local topology change at our school caused a feedback loop that overrode the NASA Select audio track. Although plenty of people were willing to point out the symptoms of our error (!) it was not possible for the rest of the network to cut off the offending workstation cleanly. More situations will undoubtedly occur as the MBONE developers and users learn more and continue to improve the tools. Expect to spend some time if you want to be an MBONE user.

The future.

It is not every day that someone says to you "Here is a multimedia television station that you can use to broadcast from your desktop to the world." These are powerful concepts and powerful tools that tremendously extend our ability to communicate and collaborate. These tools are already changing the way people work and interact on the net. See you later!

Further reading

1. Casner, Steve. "Frequently Asked Questions (FAQ) on the Multicast Backbone," 6 May 1993, available via anonymous ftp from venera.isi.edu:/mbone/faq.txt

2. Casner, Steve and Schulzrinne, Henning. "RTP: A Transport Protocol for Real-Time Applications," IETF Draft, 20 October 1993.

3 Casner, Stephen and Deering, Stephen. "First IETF Internt Audioast," ACM SIGCOMM Computer Communication Review, San Diego California, July 1992, pp. 92-97.

4. Comer, Douglas E. Internetworking with TCP/IP, volume I, Prentice-Hall, New Jersey, 1991.

5. Deering, Stephen. "Host Extensions for IP Multicastig", RFC 1112, August 1989.

6. Deering, Stephen. "MBONE-The Multicast Backbone," CERFnet Seminar, 3 March 1993.

7. Moy, John. "Multicast Extensions to OSPF," IETF Draft, July 1993.

8. Perlman, Radia. Interconnections: Bridges and Routers, Addison-Wesley, New York, 1993, p. 258.

9. Curtis, Pavel, mbone map, available via anonymous ftp from parcftp.xerox.com:pub/net-research/mbone-map-big.ps

The final article will be available electronically as taurus.cs.nps.navy.mil:pub/mbmg/mbone.hottopic.ps

Major Michael R. Macedonia USA is a Ph.D. student. Lieutenant Commander Donald P. Brutzman USN is an instructor and Ph.D. candidate. Both can be reached at Computer Science Department, Naval Postgraduate School, Monterey California USA 93943-5000; e-mail addresses are macedoni@cs.nps.navy.mil and brutzman@cs.nps.navy.mil.

THE TEN MOST COMMONLY ASKED QUESTIONS ABOUT IRI

1. What is Interactive Radio Instruction (IRI)?

IRI is a method of using *radio* for effective education. IRI emphasizes *active* learning and meaningful *interaction* between the radio, the teacher and the listening students.

2. Is IRI different from traditional radio education programs?

Yes. Traditional educational radio programs often were didactic and required that students do little more than listen. IRI programs are based on sound pedagogical principles, with a strong emphasis on cognitive learning. Throughout each program, students are actively engaged in responding to or working with the radio teacher, the classroom teacher.

3. Does the classroom teacher have a role in IRI programs?

Yes. The classroom teacher has a most important role to play in the successful use of IRI in the classroom. At the same time, IRI programs can be designed to be effective in situations where there are no teachers.

4. Can IRI be used with different subjects and age groups?

Yes. IRI can be used in a variety of radio program formats to teach diverse subjects to many different audiences.

5. Does IRI complement existing educational systems?

Yes. IRI has a wide variety of applications. In most cases it is used to support and strengthen existing educational strategies through a) in-service teacher training; b) improving academic performance of students, or c) providing alternative formal school systems when there is a lack of schools, teachers or resource materials.

6. Is IRI widely used?

Yes. Some 20 IRI projects around the world have successfully taught a range of subjects, including mathematics, language, literacy, health, environment and early child development.

7. Does IRI get results?

Yes. IRI has been successful in teaching a variety of subjects to a large number of students around the world. Details are contained in the chart *IRI Around the World* and in the section *Experiences in IRI* on pages 7-11.

8. Is IRI cost effective?

Yes. When IRI is correctly used to assist with an identified educational need, it has been shown to be a highly cost-effective answer. Depending on the educational goal, IRI can be extremely cost-effective.

9. Are any particular resources needed to start an IRI project?

Yes. Apart from a radio station with a good signal, and radio receivers for the student group, there are a number of resources which should be in place before commencing an IRI project.

10. Are there any essential elements to a successful IRI program?

Yes. The successful IRI program depends on a blending of 4 elements: a) appropriate use of radio; b) sound pedagogical principles; c) appropriate radio format, and d) a solid and well-structured delivery systems.

121

IRI: Interactive Radio Instruction

Excerpt from Naidoo, Gordon. "Educational Transformation And Open Learning Possibilities In South Africa" in UNESCO's *Learning Without Frontiers: Beyond Open and Distance Learning.* <http://unesco.uneb.edu/educprog/lwf/doc/icde/ICDEnaidoo.html>

Teacher Capacity Development And INSET

The Open Learning Systems Education Trust, a non-governmental organization formed in the heady days of imminent change in South Africa, represented local efforts at employing Interactive Radio Instruction (IRI) as a means to affording Junior Primary Teachers in under-resourced and remote rural schools, concretized classroom based support and teaching strategies tantamount to a shift in daily classroom practice. In the context of an inordinately high over representation of Junior Primary teachers in the un- and under qualified categories, OLSET's IRI initiative focused upon three critical and high failure areas for the black learners, English Language, Mathematics and Science. To date, English Language and Mathematics programmes have been developed, the latter not beyond the pilot stage.

A low threat intervention, Radio Learning serves as an appropriate technology vehicle for shifting orthodox pre servicing methodologies to more relevant approaches in keeping with the demands of a new educational dispensation. OLSET's teaching methodology, premised upon the new national curriculum, aimed at innovative learner centered approaches to improving instructional quality as well as teacher effectiveness in the classroom situation. Pupil teacher ratios remain high in schools throughout South Africa, a situation further impacting the already poor outcomes and high failure, repetition and drop-out rates. Admittedly, research findings indicate that class size might be overplayed in pointing to causality in failure rates. However, ratios as high as 120:1, as many OLSET schools attest to, cannot be entertained as having no bearing on quality of educational instruction.

Unlike several Latin American instances, South African Radio Learning does not represent a supplementary or enrichment strategy in introducing new curricular objectives. It constitutes a core curriculum alternative delivery and practice, where teachers are inadequately trained for effective teaching of communication skills, often in spite of the regulatory pre servicing period. Radio Learning in this instance, offers an invaluable entry point to teacher inservicing and support, regardless of distance from center. For many thousands of teachers, this radio access remains the sole significant professional contact with current mainstream developments in educational reconstruction. Given the embryonic status of the newly instituted provincial educational authorities, it is plausible that they would otherwise remain marginalized for a considerable time in the foreseeable future, in a country where some 60% of population still reside rurally.

Measurable gains are being attained by way of learner outcomes and teacher upgrading via inservicing strategies such as Teacher Support Group mechanisms and daily classroom lesson

observation and monitoring. Elaborate but uncomplicated user friendly Teacher Guides outlining daily radio program content, aims and objectives, serve as an indispensable guide to all project teachers and necessarily their unqualified peers, more so. Extra mural Teacher Development modules by radio/audio, are seen as potentially powerful inservicing modalities, with work already in progress. The impact of such strategies on development might ultimately depend on the extent to which they are employed in conjunction with other systemic strategies in the provinces. Positive evaluation findings regarding the IRI initiative in seven of South Africa's nine provinces, continue to inform and encourage further work and innovation within the field of distance education by radio. It is clear that the open learning modalities of IRI in South Africa, especially in Teacher Upgrading and Inservicing, have yet to be exploited to their full potential. Such an approach could effectively link levels of capacity and learning and enable learners to move to higher skills levels, from any starting point. An open learning strategy of this sort, might prove a timely and immensely powerful channel for educational skills development and enhancement.

Equity And Access

"The system must increasingly open access to education and training opportunity to all children, youth and adults, and provide a means for learners to move easily from one context to another, so that the possibilities of lifelong learning are enhanced..... Levelling the playing fields in education and training, so that the States resources are used to provide the same quality of education to all... Equity and access must be linked to quality improvement of education and training services..."

That Radio Learning already offers daily access to all but two provinces of South Africa's nine provinces in a relatively short period of development, is not fortuitous. Daily rural outreach is unsustainable by most other means, given the expanse and isolated nature of rural communities. In anticipation of this provisioning concern, OLSET embarked upon an instructional design, portable across the provinces in terms of content, curricular approaches and methodology, easily accessible by the prevalence of radios in most communities in the country.

Access issues, however, have not been narrowly confined to 'availability on the air'. Acknowledgement of various learning styles and media preferences within the radio instructional design (all not being able to be accommodated of necessity) imputes more generous construction consensus around the notion of equity of access. Learners are offered an array of approaches to lesson content and structures, in order to accommodate learning style preferences as much as possible. Story, song, motion, music, rhyme, peer teaching, print and graphics, radio, teacher interaction, face to face, total physical engagement, etc., are deployed in imaginative combinations encouraging greater active participation in the learning process. Evaluations show several aspects of learner performances have been impacted positively, and 'equity of access' of content by considerably more pupils within the learning situation, is seen as contra distinct to 'as many as possible accessing the program.'

IRI: Interactive Radio Instruction

Similarly, teacher development and inservicing by radio, print and audio and face-to-face combinations, are perceived as potential viable routes to open learning configurations, whereby access is addressed meaningfully through voluntary entry and exit points and not solely through physical outreach connotations.

WHAT MAKES *IRI* WORK?

The ability of IRI programming to make a valuable contribution to education depends on well-integrated management, delivery and evaluation systems and the successful blending of these 3 essential elements:

1. USING RADIO IN AN APPROPRIATE ROLE:

- to improve the quality of instruction
- to reach disenfranchised learners
- to reach a remote audience of learners
- to update teaching practice
- to update curriculum content
- to provide a teacher
- to diversify and support teaching/learning styles

2. USING SOUND PEDAGOGICAL PRINCIPLES

- active learning
- creative and critical thinking
- curriculum design
- distributed learning
- formative evaluation
- interactivity
- modeling and structured learning
- research and pacing
- positive role models
- reinforcement
- meaningful and engaging content
- a well-balanced lesson

3. USING A FORMAT SUITED TO AUDIENCE AND SUBJECT

- actuality
- drama
- drill
- interview
- lecture
- physical activity
- serial (soap opera)
- short story
- songs and music

(Examples of these formats can be found in the script samples on page 51).

(A definition of each format can be found in the Glossary on page 91)

125

1. USING RADIO IN AN APPROPRIATE ROLE:

Radio can enhance an existing education system. It is important, however, to be clear about the precise role radio is to play in the overall educational system, so that it can be used to its best advantage.

Radio can be used as part of an educational system where there is a need to:

Improve the quality of instruction

In situations where student achievement is low, there is a shortage of well-trained teachers, or where there is "biased" teaching favoring some groups over others, **radio** can deliver a uniformly high standard of instruction to all students in all parts of the country.

Reach disenfranchised learners

Radio is a universal medium that is available at minimal cost to a wide and diverse audience. It can, therefore, reach out to groups of people for whom access to typical education outlets is difficult or impossible (traditionally such groups include women, girls, poor laborers, older citizens, and illiterates).

Reach a remote audience of learners

In places where students are so far from an educational center that they can not attend lessons regularly, **radio** can take the lessons to them—either as stand-alone broadcasts, or with printed support materials.

Update teaching practice

Where changes in instructional methodology and educational practice must be disseminated among a large number of teachers—particularly those in inaccessible areas—**radio** can bring lively, accurate demonstrations of new methods to all teachers at the same time.

Update curriculum content

Where changes in the curriculum content of a particular subject leave many teachers out-of-date, **radio** can be used to bring the newest information and methodology to teacher and students at the same time.

Provide a Teacher

In situations where there is no teacher (eg., informal community groups; remote areas; a multi-grade classroom group; heavily populated areas), **radio** can initiate the education process, later to be continued when a teacher becomes available.

Radio can stimulate learning by enlivening and varying classroom formats and providing teaching support activities for the teacher, such as:

Diversify and Support Teaching/ Learning

- **demonstration:** e.g., musical instruments and performers; institutions at work (parliament; law courts; etc).
- **visiting expert:** e.g., leading experts in a subject like environmental science can be brought into the classroom, individually or in group discussion, via **radio.**
- **dramatization:** e.g., famous literary works; aspects of history; problem-solving situations; community problems and their solutions; role-playing for behavioral-change models.
- **songs, music, games:** e.g., the addition of special activities which stimulate and enhance children's learning.

2. USING SOUND PEDAGOGICAL PRINCIPLES

Interactive Radio Instruction is based on **sound pedagogical principles.** IRI programs serve as a pedagogical prototype from which classroom teachers can gain experience with good teaching methods while their students are increasing their subject knowledge. These pedagogical principles include:

Radio teachers engage listening students in a variety of **learning activities.** Students who take an **active** part in learning are much more successful at internalizing, recalling, and applying what they learn.

Active Learning

IRI programs encourage **creative and critical thinking** through the use of open-ended questions, and "build-on," "re-enactment," and "what if?" activities.

Creative and critical thinking

All IRI program content is derived from sound, researched and culturally appropriate curricula. Program content is checked consistently by curriculum content specialists. Where the IRI programs are designed to teach a pre-determined curriculum (as in the case of an existing school subject), the needs of that curriculum control the extent and depth of the content.

Curriculum Design

The format of IRI programs allows for the learning of a concept to be spread over several exposures, both within one program, and throughout a number of programs. Such **distributed learning** has been proven to encourage and enhance learning.

Distributed learning

Formative Evaluation

IRI programs employ a reliable **feedback mechanism** to ensure that programs can be adjusted if learning is not taking place as expected. This type of **formative evaluation** compensates for the fact that the radio teacher cannot interact personally with students in the same way that a classroom teacher can.

Interactivity

Interactive learning is encouraged by carefully planned spaces for **interaction**—verbally, physically, or with other activities—throughout the program. Activities to be completed after the program encourage **interactive** learning to become part of the regular classroom.

Modeling and Structured Learning

IRI programs present teachers and students with clear **models** of procedures to be used in given learning situations. **Modeling**, the radio equivalent of the demonstration used by the classroom teacher to show students what is required, may involve two or more "radio characters."

Research and Pacing

IRI programs are based on carefully researched information about the target audience: their previous knowledge; their learning environment; their habits and attitudes. The combination of this research with frequent formative evaluation makes it possible for lessons to be precisely **paced** to match the learning abilities and needs of the student audience.

Positive role models

In accordance with good teaching practice, IRI programs use **positive** behaviors, attitudes, and models in stories and activities.

Reinforcement

IRI programs use forms of **reinforcement**. In most IRI models, the immediate right answer is given each time the students are asked a fact-finding question. When open-ended questions are used, strong **reinforcement** is provided in the form of a discussion of several possible answers.

Meaningful and engaging content

IRI programs use content that is meaningful and relevant to the learners so that learning is engaging and the knowledge learned can be integrated into the students lives.

Balance

Learning follows a logical and effective rhythm so that intensive learning is balanced with relaxation and cognitive information is balanced with values or physical activity.

3. USING A FORMAT SUITED TO AUDIENCE AND SUBJECT

Radio, as the medium of the imagination, lends itself to a wider variety of formats than perhaps any other medium. Because it does not require expensive sets and costumes, live orchestras, or hours of script learning, radio can roam freely and inexpensively from one setting to another, from one time to another, and from one culture to another. It is a medium that can be used to meet almost any educational need.

The following are some of the **formats** that can be used for Interactive Radio Instruction:

Actuality

The on-air presentation of an event while it is **actually** taking place, such as, a national election. Simulations within a dramatic context are also effective. **Useful for:** programs on civics, environmental education, community affairs.

Drama

The presentation of a narrative in dramatized form, using actors to play the parts of supposedly "real" people. **Useful for:** the presentation of "real-life" situations or case studies. Drama encourages the audience to believe they are looking in on other people's lives from which they can gain insights relevant to their own. (See Demonstration Lessons #5)

Drill

A type of "conversation" between the radio teacher and the listening audience. The drill models the concept to be learned and then offers students repeated practice in it with a series of questions, pauses for responses, and immediately-reinforcing correct answers. The drill often follows an inverted triangle shape, with questions being shorter and more frequent as concept familiarity increases. **Useful for:** programs where repetition is an important attribute of learning, e.g. mathematics and basic language skills.
(See Demonstration Lessons #1 and #2)

Interview

A program in which an "expert" discusses a particular topic with the radio host or teacher. **Useful for:** subjects in which up-to-the-minute information is necessary; e.g. health, law, environment, agriculture, business programs.

Lecture

Many programs in the early days of radio education were presented in the **lecture** format, which easily became dull and non-motivational. The **lecture** format can still be useful if it is made **interactive**, and offers opportunity for audience reaction and discussion. **Useful for:** advanced education where the audience is sufficiently experienced to absorb fairly long "blocks" of knowledge; e.g., politics, law, medicine, teacher education.

Physical Activity

This format engages the listeners in learning and allows them to practice activities—such as using a worksheet, manipulating objects, or taking part in exercises and games. **Useful for:** any learning that requires hands-on experience; young learners; relaxation segments.

☯ Serial (Soap Opera)

A serial is a drama in which the story line is continuous from one episode (or program) to the next. The success of this format relies heavily on the writer's ability to do two things well at the same time: create and develop a plot and characters that motivate listeners to listen to every episode; and blend lesson objectives naturally into this plot. **Useful for:** motivating the listeners. A good serial is possibly the most motivational format of all. When listeners are "hooked on" the story, they will do anything to avoid missing the next exciting episode. The serial is an excellent medium for persuading listeners to change their attitude or behavior. (See Demonstration Lesson #5)

☯ Short story

A narrative told by one person. A well-told story follows a definite pattern, and for purposes of radio education, a short story should have few characters and be restricted in time and place. The short story is most effective when used with questions that encourage students to listen, think, and respond. **Useful for:** encouraging comprehension and critical thinking. It can be a highly motivational format because a well-told story appeals to both child and adult audiences. The adaptation of well-known traditional stories can be especially beneficial to learning.(See Demonstration Lesson #4)

☯ Song

A song is a group of words set to music; the words can be purely entertaining, or they can contain important information. A well written song can be an effective means of learning and remembering an important lesson. (See Demonstration Lesson #3)

OVERVIEW OF THE VIP

Credit Courses

In 1974 the College of Engineering at the University of Massachusetts Amherst, in conjunction with industry partners, developed the Video Instructional Program (VIP). As a distance learning facility, the VIP addresses continuing education and advanced degree needs. The VIP videotapes and broadcasts courses as they are taught by resident graduate faculty members before an on-campus student audience. The videotapes are then delivered to VIP students across the country and the world - the quality of a university education without the sacrifice in time.

Through the VIP, the same University instruction and academic credits available on campus are accessible to students, regardless of their geographic location. The VIP offers over 50 credit courses each semester in addition to a summer session of over 40. Three graduate degree programs can be completed through the VIP - a Master of Science degree in Electrical and Computer Engineering, Engineering Management, and Computer Science.

Video-based learning provides the flexibility and convenience of receiving instruction at a time and place that fits any work schedule. Credit courses operate on a schedule which parallels the on-campus semester. While VIP students have considerable flexibility in when they view courses, they are expected to complete them within a provided schedule. This ensures the academic integrity of each course and replicates the actual classroom experience. VIP students have easy access to the faculty member teaching a course. The faculty have reserved telephone office hours to answer questions and share ideas. Faculty are also accessible through electronic mail or fax. Many courses are supported by websites. VIP courses are also delivered by Ku-band satellite transmission in cooperation with the National Technological University (NTU). Through NTU, many VIP courses can be viewed during actual class time. A two-way audio bridge allows interaction between the faculty and off-campus students during the live broadcast.

In addition to video and satellite delivery, the VIP offers certain courses via interactive compressed video (ICV). ICV technology compresses the audio and video elements and digitally delivers them through fiber optic telephone lines for a real-time, interactive educational experience. Compatible equipment at each site is required. For more information about course availability and cost, please contact the VIP.

The VIP also operates microwave transmission systems for course distribution.

By eliminating time and distance factors, the VIP is an extremely cost-effective educational alternative. The basic fee for a three-credit course is $1,225. International students are assessed additional charges (see Program Logistics, for details).

All semester-length courses can be taken on a noncredit basis or for regular University of Massachusetts' credit. Ten (10) academic departments in five schools and colleges participate in the VIP:

- Chemical Engineering
- Chemistry
- Civil & Environmental Engineering

131

- Computer Science
- Electrical & Computer Engineering
- Mathematics & Statistics
- Mechanical & Industrial Engineering
- Polymer Science & Engineering
- Public Health
- School of Management

How the VIP Works

Credit courses are taught by resident graduate faculty members before an on-campus student audience.

Tape Delivery	Broadcast
The courses are recorded onto SVHS and VHS videotapes.	The courses are broadcast over NTU's Ku-band satellite network directly to the company.
Videotapes and course materials are shipped weekly.	Printed course material is shipped weekly to the company.
View classes at a convenient time and place.	Take the course during actual class time.
Communicate directly with faculty during reserved phone hours, via electronic mail or via fax.	Communicate directly with faculty during reserved phone hours, during live broadcasts, via electronic mail or via fax.

Training and Short Courses

Other learning options include a variety of VIP training and short courses. These courses are taught by College of Engineering and other faculty, but do not carry academic credit. They are designed to provide quick, topical training in a variety of disciplines. VIP short courses are available for rental or purchase. Semester-length courses are also available on a noncredit basis for rental or purchase and are effective, on-site training options (see Training and Short Courses for details).

Text Version Best viewed with Netscape 2.02 or better

TEAMS Distance Learning brings exemplary learning opportunities to K-8 students, teachers, and parents across the United States through nationally televised satellite broadcasts and the Internet. Learners use instructional technologies to access a combination of the best features of time-dependent (synchronous) video-based instruction along with time-independent (asynchronous) computer access to multimedia and the Internet. TEAMS Distance Learning is one component of the LT&T (LACOE Telecommunications and Technology) division, a service of the Los Angeles County Office of Education (LACOE). Funded in part by Star Schools legislation through the U.S. Department of Education's Office of Educational Research and Improvement (O.E.R.I.).

We welcome your active involvement in TEAMS Distance Learning.
Contact us at:

TEAMS Distance Learning
phone: (562) 922-6103, fax: (562) 922-6486

See you on the airwaves!

Laura Sutton, TEAMS sysop, sutton_laura@lacoe.edu

You are the 010563 person to visit our site since July 16, 1997.

Los Angeles County Office of Education TEAMS Distance Learning
http://teams.lacoe.edu

Program Descriptions & Schedules

via Satellite:

- **Chronological Schedule (Sept, 1997 - May, 1998)**
  A complete chronological schedule of all TEAMS programs.

via TV in Los Angeles Area:

- **KLCS-TV Broadcast Schedule (Oct - Dec, 1997)**
  A broadcast schedule of TEAMS programs shown on KLCS.

Individual Program Descriptions & Schedules:

- Orientation Programs
- Mathematics Programs
- Science Programs
- History-Social Science Programs
- Reading / Language Arts Programs
- Technology Programs

Staff Orientation:

1997-98 TEAMS Orientation	Program Description	Program Schedule

Return to the top, or Go on to Mathematics

Mathematics:

Turn On to Math		
Teaching Geometry Concepts	Program Description	Program Schedule
Turn On to Geometry	Program Description	Program Schedule
Primary Geometry	Program Description	Program Schedule
Geometry In My World	Program Description	Program Schedule
Middle School Geometry	Program Description	Program Schedule

Return to the top, or Go on to Science

134

Science:

Science		
Electricity	Program Description	Program Schedule
Earth Processes	Program Description	Program Schedule
Fast Plants	Program Description	Program Schedule
Putting on a Science Festival	Program Description	Program Schedule

Return to the top, or Go on to History-Social Science

History-Social Science:

History-Social Science		
Student as a Media Evaluator	Program Description	Program Schedule
Student as a Citizen	Program Description	Program Schedule
Student as an Historian	Program Description	Program Schedule
Student as a Geographer	Program Description	Program Schedule

Return to the top, or Go on to Language Arts

Reading / Language Arts:

Primary Literacy (Grades K-3)		
Windows to Reading (Grades K-1)	Program Description	Program Schedule
Windows to Reading (Grades 2-3)	Program Description	Program Schedule
Language Arts		
Letters From Rifka	Program Description	Program Schedule
Shiloh	Program Description	Program Schedule
Reading in History-Social Science	Program Description	Program Schedule

Return to the top, or Go on to Technology

Technology:

135

Technology For Teachers		
Getting Started on the Internet	Program Description	Program Schedule
Communicating on the Internet	Program Description	Program Schedule
Successful Web Searching	Program Description	Program Schedule
Tour the TEAMS Homepage	Program Description	Program Schedule
Collaborative Internet Projects	Program Description	Program Schedule
The Magic of Multimedia	Program Description	Program Schedule
Technology For Parents		
TEAMS Homepage Tour for Parents	Program Description	Program Schedule
Keeping Students Safe on the Web	Program Description	Program Schedule

Return to the top.

Los Angeles County Office of Education TEAMS Distance Learning
http://teams.lacoe.edu

Program Descriptions & Schedules

Teaching Geometry Concepts

Professional Development: Two - 60 minute programs

These staff development programs help teachers understand geometry and the instructional strategies for effectively teaching geometry concepts. Developmental stages of student learning as it relates to understanding geometric concepts are examined from grade 1 through grade 8. The informal explorations begun in primary grades are linked to the more formalized processes studied at advanced levels. The expanding logical capabilities of students in grades 4-6 allow them to draw inferences and make logical deductions from geometric problem situations. A selection of specific grade appropriate activities from the student programs are demonstrated. Program design, teacher guides, and online opportunities for students, teachers, and parents, are explored. Strategies and resources are presented for helping teachers learn how to use technology as a tool for processing information, visualizing and solving problems, exploring and testing conjectures, accessing data, and verifying solutions.

Teaching Geometry Concepts Schedule
TEAMS Math Program Descriptions & Schedules

Los Angeles County Office of Education TEAMS Distance Learning
http://teams.lacoe.edu

Program Descriptions & Schedules

Earth Processes Program Description

Staff Development: One - 60 minute program

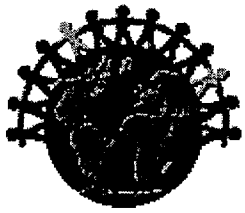
This staff development program introduces the Earth Processes module in preparation for the student programs. The teaching strategies emphasized in the module are discussed and several of the hands-on activities are reviewed along with an overview of the module content. Tips for successful completion of the lessons are included.

Student Programs: Grades 5 - 7
Eight - 45 minute programs

In this module, students investigate the processes which build and reode land forms and materials, emphasizing cycles and interactions. Students explore geology, land forms, sedimentation, weathering and erosion, rock and soil cycles, mapping, and ways these earth processes influence each other.

Earth Processes Schedule
TEAMS Science Program Descriptions & Schedules

138



Heritage OnLine

On-Line Courses for K-12 Educators

Exploring the Internet for Teaching and Learning

- About Heritage OnLine
- Go To On-line Courses

Search the WWW	K-12 Resource Links	Course Registration	Extend/Cancel a Course
Policies	Instructors	Class Enrollment list (registrants only)	On-Site Programs
Lesson Plans by HOL Students	Send us E-Mail	FAX Registration Form	Transcript Request Form

Welcome to **Heritage OnLine**. We specialize in Internet-assisted distance education for teachers.

Our Vision is to see teachers and students across America using the Internet for learning in all subjects. Our current program has twenty active courses in a variety of subjects such as art, assessment, classroom management, education, foreign language, literature, math, science, social studies, writing and technology. All courses are available for Antioch University credit.

Teachers enjoy the opportunity in our courses to explore the Internet for learning and to benefit from listserv discussions with other educators from around the country. With the recent addition of eight new on-line courses, educators now have Internet access to a variety of non-technical courses that are also offered by The Heritage Institute as Guided Independent Study (correspondence) courses. Teachers also appreciate our practical academic approach that brings coursework into their actual classroom teaching.

Courses may be started at any time, are self-paced and are taught by instructors who combine expertise in their subject area with a knowledge of technology and the Internet. Most course information is accessible via the World Wide Web, and many courses may be completed by those with only e-mail capability.

Antioch University is accredited by the North Central Association of Schools and Colleges and offers quarter credits (3 quarter credits = 2 semester credits) appropriate for salary advancement and certification needs. Please consult with your school district prior to registration.

Heritage OnLine is brought to you by The Heritage Institute of Seattle, Washington, a provider of continuing education for K-12 educators.

If you would like to see a particular course offered, send e-mail describing the course to mail@hol.edu

---

139

Contact Us At:

The Heritage Institute
2802 E. Madison Ave., Suite 187
Seattle, WA 98112
1-800-445-1305
mail@hol.edu

Heritage OnLine Courses

(Registrants click on the ● by course name to go directly to class materials)

Art	• **Crayola Art:** *Integrating Art in the Curriculum* NEW
Assessment	• **Emerging Models of Assessment** NEW • **Portfolio Assessment:** *Making It Happen* NEW
Classroom Management	• **Connecting With At-Risk Students:** *Kids Who Get to Us* NEW
Education	• **How to Use the News Media Across the Curriculum** NEW • **Research in the Classroom:** *Enhancing Student Problem-Solving & Thinking Skills* NEW
Foreign Languages	• **Foreign Language Learning with the Internet**
Literature	• **Current Children's Literature** NEW
Math	• **Real World Math via the Internet**
Science	• **Astronomy and the World Wide Web (WWW)** • **Science Study on the World Wide Web**
Social Studies	• **Museums in the Classroom:** *A Model for Learning*
Technology	• **E-Mail Learning Across the Curriculum** • **On-Line Projects for Schools:** *How to Review, Evaluate and Join Them* • **Multimedia Across the Curriculum** • **Using the Computer to Enhance Your Classroom Curriculum** NEW • **WWW Page Construction:** *Student Learning in Action*
Writing	• **Grant and Proposal Writing for Technology Enhancement** • **Teaching Writing On-Line** • **Using the Web to Enhance Student Writing and Publishing**

• See the **Educational Passport Options** site for information about selected off-line travel and on-site courses offered through The Heritage Institute.

• See the **Marine Ecology** site for information about an Oregon Coast summer course in Marine Ecology offered through The Heritage Institute.

University of Florida Continuing Medical Education Learning Modules

Physicians and other health care professionals are invited to visit the Shands WWW Site. Shands Hospitals at the University of Florida and the College of Medicine have developed a series of continuing medical education learning modules addressing a range of important and current topics in clinical medicine. Modules provide an introductory case or prologue, learning objectives, educational materials including references and graphics, and an assessment of learning. Physicians and other health care professionals may complete the post-test and submit their answers to the UF Department of Continuing Medical Education for CME Category 1 credit or CEU credit. All modules have been reviewed by peers for scientific accuracy and completeness, and freedom from bias. **There is no charge for completing the modules or earning CME credit.**

Authors of the modules invite questions or comments on the topics or cases. Please send these to the authors directly through the e-mail addresses provided. Questions requiring immediate attention should be accompanied by a telephone call directly to the physician author or to the UF Clinical Consultation Center.

Participants are urged to complete evaluation questionnaires included with each post-test. Information provided is vital to the maintenance and improvement of the educational modules. If you do not complete the post-test, please email us your comments.

Suggestions on additional modules are also welcome. Physicians interested in authoring and producing an educational module should contact Dr. Timothy VanSusteren. Technical support and programming are available.

Completed Modules

- Geriatric Education
- HIV/AIDS Primary Care Guide
- Influenza: A to B
- Internal Medicine Case Studies
- Post-menopausal Osteoporosis: Key Issues

Geriatric Education

Catherine Schell, M.D., George Caranasos, M.D., David Lowenthal, M.D., Ph.D., & Richard Rathe, M.D.

Mrs. Geri Ann Smith is a 72-year-old woman who has just moved to your area. Her daughter, who has lived here for many years, brings her to you because she is concerned that her mother is slower and more sedentary compared to a year ago. Mr. Gerald McCann is a 90-year-old man who

142

lives at home with his wife. They are both native Floridians and have been married for 65 years.

Participate in the Geriatric Education learning module and interact with five teaching cases. The module includes an outline of the major geriatric topics and a list of drugs used in the cases. **Note: Once you have completed the module, come back to this page and click here to take the post-test.**

HIV/AIDS Primary Care Guide

Joseph W. Shands, Jr., M.D. & Karen L. Bentrup, M.S.H.S.E.

This module discusses overall treatment goals for treating HIV and AIDS patients. Information is included on the pros and cons of early therapy, monitoring antiretroviral therapy, antiretroviral agents, interacting drugs, and more.

Learn about treating different patients and then take the quiz in our HIV/AIDS Primary Care Guide learning module.

In addition, health care professionals can earn credit by completing *HIV/AIDS Update*, our self-study program.

Influenza: A to B

Parker A. Small, Jr., M.D. & Bradley S. Bender, M.D.

Why does influenza virus variously eventuate in mild upper respiratory tract infection, bacterial pneumonia, or rapidly fatal viral pneumonia? The depth of infection is important. So is competence of immunologic effectors-local antibody (secretory IgA) for preventing URI, systemic antibody for preventing pneumonia, and cellular immunity for recovery from either.

Learn the answers to these and other questions about the flu virus by participating in our Influenza: A to B learning module. Four teaching cases are included.

Internal Medicine Case Studies

Stephen Sandroni, M.D.

Participate in this module by completing all four internal medicine case presentations. Cases include:

- A Dangerous Local Pathogen: Vibrio Vulnificus
- Right Heart Failure and Carcinoid
- Decision Analysis: An Asymptomatic Meningioma
- Ovarian Teratoma Presenting as Massive Ascites

Click here to participate in the Internal Medicine learning module. **Note:**

Once you have completed the module, come back to this page and click here to take the post-test.

You will need the Shockwave plug-in to participate in this module. Click on the icon for a free download.

Post-menopausal Osteoporosis: Key Issues

Simon Kipersztok, M.D.

Osteoporosis affects more than 25 million people in the United States and results in 1.3 million fractures per year. What new therapies are available and how can we determine who can benefit from them?

Learn the answers to these questions and more as we discuss the epidemiology, pathophysiology, diagnosis and treatment of Osteoporosis in our Post-menopausal Osteoporosis: Key Issues learning module.

You can also obtain information about our Continuing Medical Education Programs.

Click here for our favorite links.

The University of Florida College of Medicine is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

The University of Florida College of Medicine designates each continuing medical education activity for one (1) hour in Category 1 of the American Medical Association's Physician's Recognition Award.

These educational modules were prepared in accord with the ACCME Standard on Enduring Materials.

Date of Original Release: January, 1997.

Updated: September 10, 1997
Version: Continuing Medical Education / Copyright © 1997 by the University of Florida
Contact: webmaster@dean.med.ufl.edu
Location: http://www.med.ufl.edu/cme/cme.html

Please read our disclaimer and permitted use statement for information about the pages we publish and how you may use them.

UF HSC Home Page | UF HSC-Jacksonville Home Page | CME Homepage

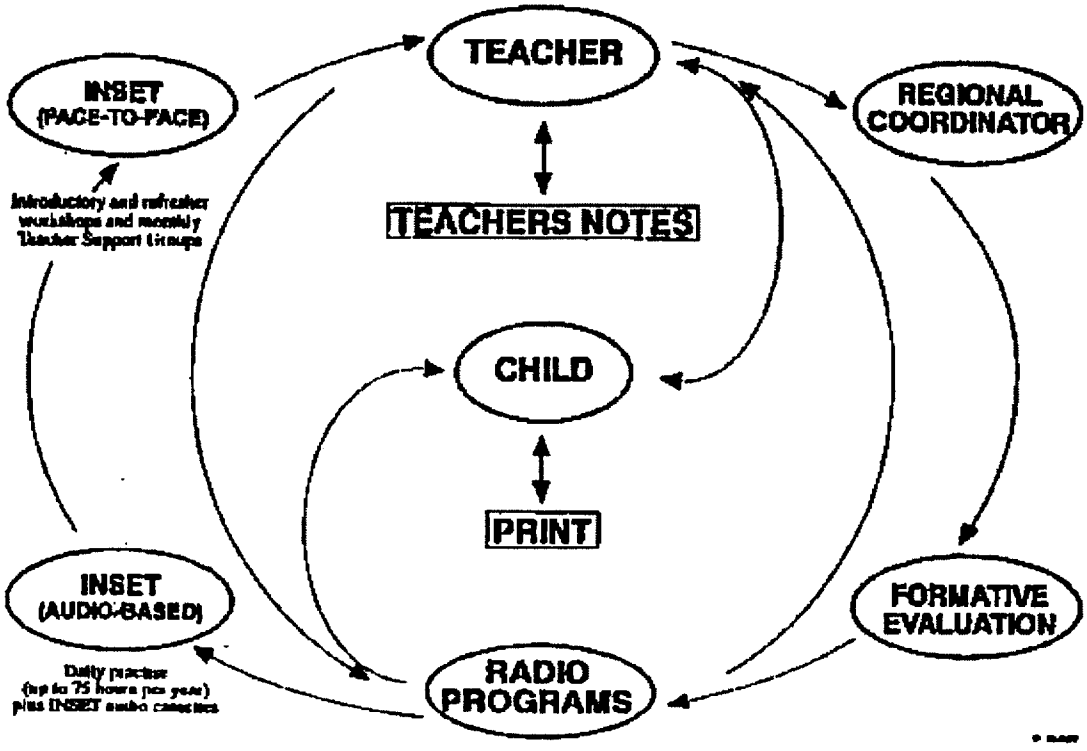
OLSET

English in Action

Introduction

Short paragraph

Diagram: OLSET's "English in Action" Instructional System



Activities

English Second Language Curriculum.

Level One:

The South Africa Radio Learning Project

These evaluations reflect the South Africa Radio Learning Project and its system of audio-assisted English as a Second Language instruction for primary school pupils and for teacher development. In early 1992, in an effort to provide a future democratic government with some practical and effective options for basic education reform on a national scale, the Open Learning Systems Education Trust (OLSET) asked the LearnTech Project (1) to provide technical services in instructional design, writing and media production. OLSET's intention was to apply various learning technologies, including Interactive Radio Instruction (IRI), to improve basic education in the most disadvantaged communities. The South Africa Radio Learning Project (SARLP) focused on junior primary English as a Second Language (ESL) and to a lesser degree on mathematics. The project resulted in significant innovations in the use of audio in classrooms to simultaneously support pupils "learning and teachers" professional development (2). Its ESL work is called English in Action (EIA).

Since March 1992 the SARLP has designed, written, produced and evaluated 130 half-hour audio/print based lessons for Grade 1 English (EIA 1); 130 half-hour audio/print based lessons for Grade 2 English (EIA 2) linked to 130 lessons supported only by print; and a ten-week print/audio (cassette) based school readiness programme (EIA Teacher Resource Kit). All audio programmes include integral print for students and teachers. There are also audio and video programmes for teacher training.

These materials are provided and embedded within a flexible system of workshops and schools-based in-service support for teachers. The project also encourages reflection and professional development in teachers, principals and project workers by engaging them in evaluation processes such as drafting contributions to case studies and participating in focus group meeting.

Most of the efforts of the SARLP have been in developing instructional materials and teacher support programmes for primary ESL (English in Action). They are the focus of the evaluations included here. In addition, the project has collaborated with other NGOs to produce and evaluate a series of 30 twenty-minute audio/print programmes for Grades 3 and 4 math each designed to accompany forty minutes of follow-up instruction supported only by print (*My Maths: Many Times*); and a separate model series of three 25 minute audio/print programmes for Grade 7 math (*Math Time*) (3). Evaluations of these approaches to audio assisted primary mathematics instruction are available as separate documents.

To date the SARLP has reached over 35,000 pupils in 600 classrooms in 6 of the country's 9 provinces (4). After over two years of distribution by audio cassette, in May 1995 the project began national broadcasting by FM radio. With much wider service now a possibility, the external evaluations assembled here have an important and timely role to play. They examine the nature of the project, the usefulness of the EIA materials, the effects of the integrated teacher development system the learning gains for pupils attributable to the entire EIA intervention, and the project's effect on the wider school community.

The Evaluations

This collection of independent external evaluation reports provides a complete view of the evaluations for English In Action done during its first 2 years of field implementation. These reports offer a view of the project in its first year of operations (1993) at the Grade 1 level, and in its second year of operations (1994) at both Grade 1 and 2 levels, with special attention to Grade 2.

- **Second Interim Evaluation - 1994**, by Charles Potter;
- **Test Results - Level 2 - 1994 Listening/Reading/Comprehension)**, by Angela Arnott, John Mansfield, and Mandia Mentis;
- **Test results - Level 2 - 1994 (Speaking)**, by Ishbel Hingle and Viv Linington;

- **Materials Review - 1994**, by Letta Mashishi;
- **Economics Report - 1994**, by James Cobbe;
- **Annex 1 - OLSET Curriculum Statement - 1994**;
- **First Interim Evaluation - 1993**, by Charles Potter;
- **Test Results - Level 1 - 1993 (Listening Comprehension)**, by Angela Arnott, John Mansfield, and Mandia Mentis;
- **Focus Group Report - 1993**, by Sbongile Nene.

Case Studies

- **"English in Action", Case Studies of Interactive Radio Learning in Schools in Four Regions of South Africa - 1993-1994**, by Ruth Dube, Nomfundo Mpondo, Joe Ndlovu, Stephanie Parker, Lindi Tshabalala, Sbongile Zwane.
  The case studies provide views of the project from teachers and principles as well as from the project's Regional Coordinators.

Responses to Evaluations

Because the SARLP treated evaluation as involving both formative and summative dimensions, it has incorporated an ongoing process of adjusting and revising its plans and productions based on assessments. This has been based on both internal and external (see the Summary and Potter's 1994 Interim Report). At the time of this writing (June 1995), the project has undertaken further adjustments that are not captured in the reports collected here, since these provide assessments of the materials and programmes as they were at the end of 1994. Based on these evaluations, other consultations, and on the desire to further strengthen the materials for wider future distribution via radio, the project has revised materials for both Grade levels during the first six months of 1995. These newly revised materials are being implemented during the 1995 school year.

Appreciations

From the moment that the project adopted a local multi-level approach to evaluation, it has been strengthened through the excellent contributions of a number of independent South African evaluators. since our first conversations in December 1992, Dr. Charles Potter has been instrumental in helping shape the project's vision of evaluation as both a means of assessment and a tool for strengthening project workers and systems. Over the same period, Angela Arnott, John Mansfield and Mandia Mentis have developed and produced critically important test based evaluations of receptive language skills. In 1994, Ishbel Hingle and Viv Linington developed a new test of speaking skills. Letta Mashishi provided a critique of the EIA materials in use. An finally, Sbongile Nene was a vital aid to the project in its first year, bringing focus group methodology to bear on the project, grounding it in and assessing it through the views of the communities it was attempting to serve.

The project and tits materials have also been enriched by a number of consultants who, while not authoring any of the reports collected here, were influential in it's planning and development. The initial views of some can be found in a first project evaluation report that (because it was authored by the project's technical advisor) falls outside this collection of independent external evaluations (5). An incomplete list of additional ESL advisors includes Vanessa Francis, David Langhan, Martha Mogkoko,

Teboho Moja, Paul Musker, Mervyn Ogle, Esther Ramani, Vic Rodseth, Marlene Rousseau and Albert Weideman. The work is certainly stronger for their contributions and those of others unnamed.

Finally, I would like to note the contributions of hundreds of teacher, principals and tens of thousands of pupils and parents, many of whom have offered useful feedback throughout the more than three years of formative work to date. In addition to helping shape the materials and in-service programmes they have received the project with enthusiasm and let its workers know that what we have been doing has value and promise.

Stuart Leigh
SARLP Technical Advisor
Real World Productions/LearnTech
New York, June 29, 1995

ENDNOTES

1. From 1990-1995 the Learntech Project, funded by USAID and managed by the Education Development Center, explored worldwide. One of the Learntech consortium groups Real World Productions (RWP), was responsible for providing OLSET and the South African Radio Learning Project with technical assistance in design, writing, production, and evaluation. RWP provided Stuart Leigh as Technical Advisor to the project and Rebecca Kalin as Scriptwriting Consultant.

2. For more extensive discussions of design issues see Leigh, Stuart, *"Changing Times in South Africa: Remodeling Interactive Learning LearnTech Case Study No, 8, Education Development Center"*, **USAID**, June 1995; and Leigh, Stuart, Gordon Naidoo and Lebo Ramafoko, *"South Africa: Designing Multi-channel Options for Educational Renewal"*, to appear in the book, *"Multi-channel Learning: Connection All to education"*, a joint publication of the **Commonwealth of Learning, the Learntech Project, and IMAGE**, available through LearnTech, July 1995.

3. See Gordon, Adele, Cyril Julie, Charles Potter and Letta Mashishi, evaluation of OLSET/LearnTech, 1995. While these maths-specific evaluations deserve special attention, certain of the discussions in the current set of documents related to English In Action are very relevant to media assisted maths instruction. In fact, many of the same basic tenants have informed the SARLP's approaches to designs for both math and ESL instruction.

4. English In Action has focused on four provinces, Gauteng, Eastern Cape, KwaZulu/Natal, and Orange Free State.

5. See the contributions of Langhan, Moja, Musker, Rodseth, and Weideman in Leigh, Stuart, *"The South Africa Radio Learning Project, Final Report, English in Action, A Pre-Pilot Study"*, **Learntech**, June 1992.

Abstract 8

Telesecundaria, Mexico

(Lower Secondary School Learning with Television Support)

Mexico is a large and diverse country of scattered communities and vast distances. Out of the 150,000 rural and far-flung communities, more than 100,000 have less than 100 inhabitants. Until relatively recently it has been impossible, in economic and human terms, to provide secondary education along conventional lines to these communities. The Telesecundaria project (lower secondary school learning with television support) has been instrumental in changing this situation and Mexico's communications infrastructure is now opening up to different forms of education and learning.

Telesecundaria was launched in Mexico in 1968 as a means of extending lower secondary school learning with television support to remote and small communities at a cost inferior to that of conventional secondary schools. The early model was pretty simple; lessons corresponding to grades 7 to 9 were transmitted live, through open public channels to television sets placed in distant classrooms where students listened and took notes in the presence of a teacher. These lessons were transmitted 6 hours per day, Monday through Friday, for the length of a school year. Each hour of class was made up of 20 minutes of television and 40 minutes of discussion on what had been seen with the teacher. The system was inexpensive because the airtime was donated to the Ministry of Public Education by public networks and required one teacher per grade whilst the conventional system needed eight or nine.

The system has gone through various stages of improvement to reach its present level. As the system evolved, the design of television programmes was handed over to specialised teachers who had the sole and specific task of producing scripts and materials. Teaching roles also had to adapt. Classrooms became more interactive places with the teachers becoming facilitators of pupil learning rather than just dispensers of information. The TV programmes moved away from the idea of "talking heads", towards more interactive modes with charismatic speakers and simple use of language. Student books also adopted a more targeted approach, corresponding precisely to the television programmes in detail and content. The programme writers particularly built on the way the students could use their products to the maximum whether it be alone or in group sessions. Textbooks serve to encourage individual study topics, homework and sound methods of studying. By the end of 1993, Telesecundaria was being offered in more than 9,000 schools throughout the country to nearly 600,000 students (some 15 per cent of the lower secondary school population). Each received 1 or 2 books per subject. In 1994, a more powerful and advanced satellite was launched, capable of covering further territory. The new system was named EDUSAT and was made up of 6 channels capable of transmitting 24 hours a day.

Telesecundaria requires four main groups of people to function. These interrelated, yet independent, components can be briefly summarised as follows:

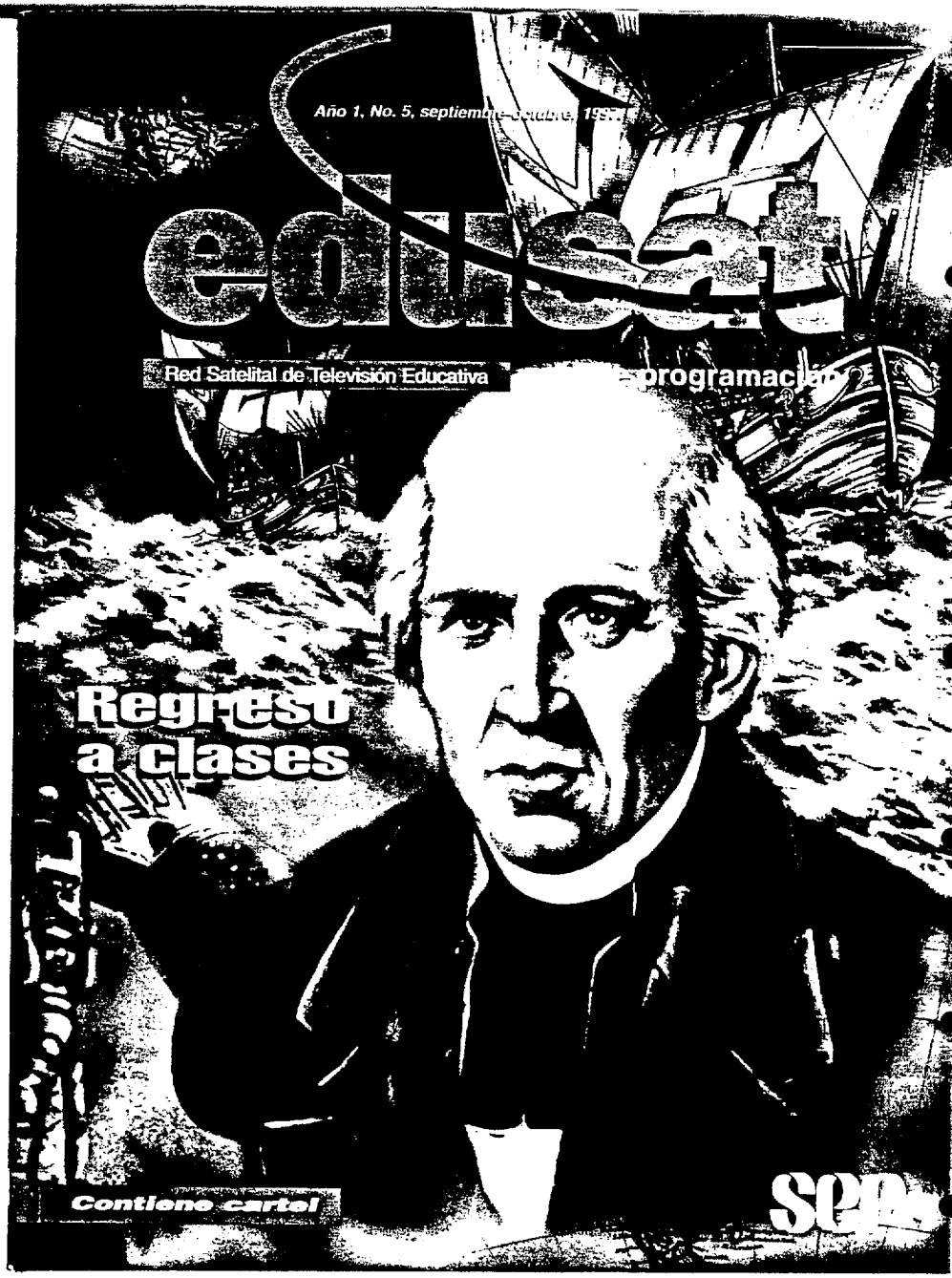
-the generators of educational content : selected from the various parts of the educational system, adult, elementary, secondary, higher and technical;

-the producers of videos - professional producers and script writers;

-the programming and transmission council: this group is made up of representatives of the audience. The council decides which television programme goes into which channel, the number of repetitions, and transmission time. It also develops programming charts for all channels;

-the users themselves - individual users, teachers, schools, families, work centres, homes. The programmes can, accordingly, be adapted to suit perceived or expressed needs. The success of the programme depends on this precise targeting of particular audiences at school level.

The curriculum takes its programmatic contents from the nationwide Study Plans and Programmes designed for the lower secondary school level. Three main didactic aids are schemed to support the



A sample *EDUSAT* programming schedule.

television system. The Learning Guide is the textbook for the activities covering the main issues of the learning process. The student uses it to go through the different stages of knowledge acquisition from the very beginning of the session up to the evaluation phase.The Book of Basic Concepts is a thematic encyclopedia where the pupil can find information given during the television sessions and students may consult it at any stage during the programme. The Didactic Guide is a book with technical-pedagogical orientations for the exclusive use of the teacher, which he or she uses in the planning and facilitation of the learning process. The book contains information for dealing with learning problems which may arise in class, as well as alternatives or solutions which are useful in helping learners overcome their difficulties.

Today, Telesecundaria lessons contain twenty minutes of interactive, dynamic and action-oriented learning. They can be watched live on TV or can be recorded on video, depending on availability of machines in schools. Each teacher follows a basic pattern but is free to adapt the TV programmes to his or her style, learner needs or student characteristics. This flexibility to mould the programme to specific circumstances depends very much on the individual competence of the teacher, but the programme's materials encourage such use.

When the Ministry of Education announced a new study plan for basic education in the early 1990s, focusing on the needs of individual students, their families and communities, Telesecundaria responded by further developing its methodology. It decided to increase the interactivity between learners, community and teaching source. This approach required a new effort on the part of the programme developers, opening up to intergenerational learning and community action, but it also meant that teachers had the task of informing schools and communities. The aim was to link the community to the programme around the teaching method. The strategy meant combining community issues into the programmes offering children an integrated education, involving the community at large in the organisation and management of the school and stimulating students to carry out community activities (poster campaigns, communal actions, meetings). Within the actual teaching methodology this meant merging the three roles of the teacher, the printed materials and the TV programmes into a convincing whole for the students. Currently, Telesecundaria is building on the possibility of communities producing their own material, extending the concept of learning beyond the classroom.

Contact information:
General Coordinator, Telesecundaria
Ministry of Public Education. Fax/Tel: 95 594 96 83

Index of Abstracts | Portfolio Index | LWF Homepage

151

User Interface Design and Evaluation Guidelines

Screen design, or user interface design, is the critical communication link between programmers and end users; the interface is the user's "white cane" enabling safe and logical exploration of a program or website. Through meaningful icons, consistent layout, and graceful use of screen space, an interface guides, interprets and makes sense of data so that it can be understood and interacted with by the user. What determines the quality of that interaction is not the complexity or perfection of the code logic, it is the quality of the screen design. The four main considerations to make in interface design are: 1) Ease of use; 2) Navigation; 3) Media integration; and 4) Aesthetics. Whether a software developer, website builder, or an educator or parent making decisions about software purchases, the following questions and guidelines for interface design will help in the development and evaluation process of multimedia programs and websites.

Questions for Evaluation

Ease of use

Does the interface make the program (or website) easy to use? Are the symbols and icons intuitive? Is the information laid out logically? Are interface elements like tool bars or menu bars consistent from screen to screen? Does the interface lead the user's eye to the right area? Or do button colors and screen layout distract the user from the primary information viewports?

Navigation

Does the interface make clear how to move forward, backward and nonsequentially through the program? In the case of a website, is there a site map? Does the user have a means of tracking progress, e.g. a record of screens visited already, and those not yet visited? Is the user held captive by video or audio, or are there controls to stop, replay and fast forward through audio and video?

Media integration

Does the interface organize and integrate text, video, graphics, and sound well? Is the capability of the computer to appeal to a wide range of users with multiple intelligences well used? Is there balanced and thoughtful use of each media? In the case of a website, are "glitzy" graphics overused? What is the ratio of download time to value of time spent retrieving useful information from the site? Will the graphics and text print well?

Aesthetics

Is the interface pleasing to the eye? Do colors clash? Does text blink? In the case of websites with streaming audio and video, is the site gaudy or garish?

Guidelines for Design and Development

1. Stick with established conventions. Menu bars conventionally include a "File" option in which users will expect to find such features as Save and Print functions. Do not get creative and put

152

those function under the "Help" menu option.

2. Unlike a page in a book, a screen is dynamic. New elements can appear and other elements can disappear. Not all information must be displayed at once, it can be presented gradually allowing user to progress with presentation.

3. White space on a screen is free. Use it! Don't cram screens full of graphics and text. Instead, make another screen.

4. Divide screen into "viewports," or specific areas where the user will look for specific information, e.g. a "main" area for a user to find substantive information, an area for user feedback, an area for computer feedback to the user, and an area for navigation and control buttons.

5. Be consistent.

6. Consider the readibility of your type:
* Don't make lines or blocks of text too long.
* Use legible fonts.
* Use headers and bullet lists to make text more lean.

7. Select content carefully:
* Avoid chit chat; users want to get information *now*.
* Wording should be concise and simple. Messages should be clear.

8. Use highlighting to differentiate between important and less important information:
* Use large fat fonts.
* Use boldface fonts.
* Underline (avoid using this convention when building a website because user will expect a hyperlink).
* Change point size.
* Use different, contrasting colors.
* **Do not** use blinking text - it makes websites inaccessible to braille interpreters and besides that, is obnoxious.

153

* **Do not** use all caps - it reads as though the computer is SHOUTING.

154

Using Computer Simulations for Training and Education

Computer simulations "approximate, replicate or emulate the features of some task, setting or context. Typically simulations are used when the costs of alternative teaching systems are prohibitively high, when it is impossible to study the concepts of interest in "real time," or when the risks are considered sufficiently high to require demonstration of competence in a controlled, relatively risk-free environment." (Hannafin and Peck, 1988). In certain professions or content areas, simulations are the best tool for developing learner skills and expertise through practice. Among those areas are many forms of engineering, aviation, medicine, some chemistry and physics, and "soft" skill professions that require polished interview techniques.

However, as either a potential learner or an educator, it is critical to determine exactly what outcomes can be expected from using a good simulation. It is critical to be able to distinguish well-designed simulations from poorly designed ones. Though there is some disagreement as to specific attributes of "good simulations" in CAI (Computer Assisted Instruction) literature, common sense can corroborate the assertion that *no* simulation can truly mimic reality; virtual reality is fundamentally *virtual*. The crucial measurement of a computer-based simulation program is not how faithful the simulation is to a "real" situation, but how well the simulation accomplishes the learning objectives for which it is designed.

In some simulations, such as flight simulators or medical diagnostic simulations, the purpose of the program is to actually practice the skills of aircraft operation and assessment and treatment of patient conditions, respectively. Other simulations resemble a spreadsheet in function as a predictor of results given different variable values and are therefore less a forum for learners to refine skills, and more a tool to inform action. An example of such a simulation might place students in the role of presidential advisors and development workers in a third world country, requiring students to work together to alleviate poverty. The objective of the lesson is not to teach students "poverty alleviation skills," but instead to provide some perspective on the process and potential results of particular courses of action. A more pragmatic application of this model might be a simulation of a healthcare system that can assist in decision-making as it applies to establishing telemedicine networks, rennovating a hospital or hiring more specialized physicians based on numbers of patients and anticipated income.

15

In simulations of highly visual tasks, one necessary element is image fidelity. Whether the objective is to diagnose a cancerous lesion or to distinguish between two compounds based on appearance, high image resolution can make the difference between accuracy and catastrophe. Other features to look for are believable circumstances, reasonable response options, and intelligent revision of circumstances based on interaction of the learner. It is also necessary to provide a framework of expectations for participants in the simulation: what is the purpose of the simulation? What skillset does it target? Are students made aware of the objectives of the simulation? Is the simulation meant to be part of a larger classroom context? Does the program "debrief" the student after the simulation? If not, what kinds of post-simulation activities might play this role? How can the experience with the simulation be *transferred* to daily practice?

Applying these criteria when evaluating a simulation, or online instructional module that uses a simulation model, will help to make an invaluable return on an investment in such technology: increased confidence, competence and expertise in the student population and workforce.

156

Resources *in Distance Education*

Selected Websites

Dial (Distance Instruction for Adult Learning)
A web-based distance education site offering asynchronous, interactive courses for adults.
http://www.dialnsa.edu/

Heritage Online
Online courses and resources for K-12 educators
http://www.hol.edu/

ILINC (Interactive Learning INternational Corporation)
This company produces a product called LearnLinc, which supports synchronous web-based "classrooms" where instructors and students can see one another through desktop videoconferencing equipment, and share documents and multimedia presentations.
http://www.ilinc.com/

Lucent Technology's Center for Excellence in Distance Learning
Over 20 research articles and guides treating various aspects of distance learning.
http://www.lucent.com/cedl/info.html

Merlin
Service offering Internet-based collaborative and individual distance learning with a human tutor.
http://www.hull.ac.uk/merlin/intro.html

National Center for Education Statistics
Statistical Analysis Report: Distance Education in Higher Education Institutions (October 1997)
http://nces.ed.gov/pubs98/distance/index.html

Project SCOPE - Specialized TeleCentres of Professional Education
This corporation seeks to meet basic needs in developing countries through establishing community-based telecenters that use ICT to support distance education, training, and commerce.
http://www.projectscope.org/

Real University
This is a resource for educators who wish to develop and deliver courses entirely online. Real University actually provides a course in online course development, as well as tools.
http://realu.realeducation.com/pub/index.real

SUCCEED (Southeastern University and College Coalition for Engineering EDucation) Team Distance Learning Demonstration Projects
http://www.visc.vt.edu/succeed/distance.html

TEAMS Distance Learning
The largest interactive distance learning provider for the elementary grades in the U.S. coordinates distance learning delivered via PBS, cable or satellite; teacher training; and online resources for K-12 educators.
http://teams.lacoe.edu/

Resources *in Distance Education*

United States Distance Learning Association
http://www.usdla.org/

Web Conferencing Resources and Examples
http://freenet.msp.mn.us/~drwool/webconf.html#netscapenews

E-mail Discussion Groups and Newsgroups

Generally, to subscribe to an email list, send a message to the address indicated with the following in the message body:

SUBSCRIBE <list name> Your Full Name

AACIS-L
American Association for Collegiate Independent Study
The American Association for Collegiate Independent Study's chief areas of interest are correspondence and independent study .
To subscribe send email to listserv@uregina1.uregina.ca

AEDNET
Adult Education Network
This group is a broad discussion group centering around all levels of adult education.
To subscribe send email to listserv@alpha.acast.nova.edu

ALTLEARN
Alternative Approaches to Learning Discussion
AALD talks about all levels of education and the affectiveness of non-traditional educational methods.
To subscribe send email to listserv@sjuvm.stjohns.edu

ASAT-EVA
Distance Education Evaluation Group
This groups interest is in evaluating all forms of distance learning and programs.
To subscribe send email to listserv@cln.etc.bc.ca

CAUCE-L
Canadian Association for University Continuing Education
This team prefers to limit discussion to university-level distance education.
To subscribe send email to listserv@max.cc.uregina.ca

CREAD
Latin American & Caribbean Distance & Continuing Education

158

Resources *in Distance Education*

Issues specific to Latin American and Caribbean distance learning.
To subscribe send email to listserv@vm1.yorku.ca

DECnews-EDU

This is an ad/catalog that goes out once a month from Digital Equipment Corp. to educational and business instutions that have expressed an interest.
To subscribe send email to listserv@ubvm.cc.buffalo.edu

DEOSNEWS and **DEOS-L**
Distance Education Online Symposium
A biweekly, international, electronic journal about distance education. DEOS-L is a free international discussion forum about distance education, established to facilitate discussions of the issues presented in DEOSNEWS, as well as other issues of interest to distance educators.
To subscribe send e-mail to listserv@lists.psu.edu

EDISTA
Educacion a Distancia
The University of Santiago (Chile) sponsors Education at a Distance.
To subscribe send email to listserv@nic.umass.edu

EDPOLYAN
Educational Policy Analysis
Less nuts-and-bolts than many lists, this large, active list addresses concerns of Policy Analysis.
To subscribe send email to listserv@asuvm.inre.asu.edu

EDSTYLE
The Learning Styles Theory and Research List
This is a theoretical list on different methods of learning.
To subscribe send email to listserv@sjuvm.stjohns.edu

EDTECH
Educational Technology
To subscribe send email to edutel@vm.its.rpi.edu

EUITLIST
Educational Uses of Information Technology
To subscribe send email to euitlist@bitnic.educom.edu

HILAT-L

159

Resources *in Distance Education*

Higher Education in Latin America
Research on Higher Education in Latin America. Most people write in English, but you will also see some Spanish and Portuguese.
To subscribe send email to listserv@bruspvm.bitnet

IPCT-L
Interpersonal Computing and Technology
This list focuses on computer assisted communication.
To subscribe send email to listserv@guvm.ccf.georgetown.edu

MEDIA-L
Media in Education
To subscribe send email to media-l@bingvmb.cc.binghamton.edu

NEWEDU-L
New Patterns in Education List
This is a general list that will discuss all styles, media, and delivery systems and distance education.
To subscribe send email to listserv@uhccvm.uhcc.hawaii.edu

NLA
National Literacy Advocacy List
This is a list primarily concerned with Adult Literacy in all its aspects, including, but not limited to, distance learning applications.
To subscribe send email to majordomo@world.std.com

POD
Professional Organizational Development
This is a network of faculty and adminstration dedicated to organizational development in post-secondary education.
To subscribe send email to listserv@lists.acs.ohio-state.edu

RESODLAA
Research SIG of the Open and Distance Learning Association of Australia
The purpose of this group is to encourage and facilitate discussion, symposia, and conferences on distance education.
To subscribe send email to listserv@usq.edu.au

SATEDU-L
Satellite Education List
To subscribe send email to satedu-l@wcupa.edu

160

Resources *in Distance Education*

STLHE-L
Forum for Teaching & Learning in Higher Education
These folks like to limit the discussion to post-secondary education.
To subscribe send email to listserv@unbvm1.csd.unb.ca

TUTOR-ANNOUNCE-L
This list is moderated and is set up voting on referendum issues relating to global tutoring.
To subscribe send e-mail to listserv@edie.cprost.sfu.ca

TUTOR-L
This list is for discussions and notices relating to the development and introduction of: (a) the new "global tutoring" concept, (b) the IT (International Tutoring) Project and (c) other alternative forms of learning.
To subscribe send e-mail to listserv@edie.cprost.sfu.ca

VOCNET
Discussion Group for Vocational Education
This list focuses on vocational education.
To subscribe: send email to listserv@cmsa.berkeley.edu

Relevant USENET newsgroups:

alt.education.distance
bit.listserv.edtech

Upcoming Conferences

DISTANCE Teaching and Learning
The 14th Annual Conference is scheduled to be held in Madison, Wisconsin on August 5-7, 1998.
http://www.uwex.edu/disted/distanceconf/deconf.html

ED-MEDIA / ED-TELECOM 98
World Conference on Educational Multimedia and Hypermedia and World Conference on Educational Telecommunications on June 20-25, 1998 in Freiburg, GERMANY
http://www.aace.org/conf/edmedia

Syllabus '98
The premier conference covering the use of technology in the curriculum July 25-31, 1998
Sonoma State University, Rohnert Park, California
http://www.syllabus.com/conf_page.htm

VIII International Conference on Technology and Distance Education

161

Resources *in Distance Education*

Distance Education in the 21st Century: Maintaining and Improving Quality
November 3-5, 1997 in San Jose, Costa Rica
http://www.fcae.nova.edu/pet/costa/1997/index.html

162

E-Mail Discussion Groups for Educators

EDUCOM-W@BITNIC.EDUCOM.EDU
Subscription Address: LISTSERV@BITNIC.EDUCOM.EDU
Owner: Sue Ellen Anderson <Anderson@EDUCOM.Bitnet>
EDUCOM-W is an unmoderated list to facilitate discussion of issues in technology and education that are of interest to women. The list is intended to promote discussion of how EDUCOM can help address those issues in its services to members.

CHILDRENS-VOICE@SCHOOLNET.CARLETON.CA
Subscription Address: LISTPROC@SCHOOLNET.CARLETON.CA
Owner: Michael McCarthy <mmccarthy@schoolnet.carleton.ca>
The singular purpose of the childrens-voice list is the publishing of children's writing from Junior Kindergarten to Grade Eight. Any classroom teacher may publish a child's writing on the list at their discretion to be shared with other subscribers. When a writer places their own personal experience within the elements of their story, we hear the voice of the author. Helping a child to bring their personal experience to their writing is a prime objective of the writing process. It is always easy to publish a child's writing when the voice is strong. It is the caring and sensitive teacher who publishes a child's work, when for the first time, the child incorporates an aspect of their own experience into their work. What should be published must, therefore, depend on the objectives of the classroom teacher. In this way, the classroom teacher is always the best judge of what should be published. In the writing process, publishing is more than the act of placing words between two covers. It is the affirmation of a child through listening to what the child has to say in their writing. The classroom teacher is, therefore, encouraged to bring back the writing of other children published in the journal to be read by the children in their classrooms. The broader community with its multiplicity of cultures and values frames the personal experience of a child. Languages other than English and French are encouraged.

NEWEDU-L@VM.USC.EDU
Subscription Address: LISTSERV@VM.USC.EDU
Owner: Greg Swan, Paul Privateer <NPADMIN@mc.maricopa.edu>
This list is dedicated to experimenting with and exploring the way we educate. We ask: what are the new paradigms in education and how can they be implemented?

TIMSS-Forum
Subscription Address: majordomo@rbs.org
Owner: Peter Donahoe <donahoe@rbs.org>
The TIMSS-Forum is an electronic discussion forum focusing on information and issues related to the Third International Mathematics & Science Study (TIMSS). The Forum is sponsored by the Mid-Atlantic Eisenhower Consortium for Mathematics & Science Education, one of ten regional consortia funded by the U.S. Department of Education. With data on half a million students from 41 countries, TIMSS is the largest, most comprehensive, and most rigorous international study of schools and students ever.

Telecenter Chapter Overview

Simply put, a telecenter, or community technology center (CTC), is a publicly-accessible common that houses information technology resources. What several pilot telecenter projects in the rural US have discovered is that well-designed and administered telecenters can contribute significantly to a region's economic development through improved healthcare, education, and commerce. The Kentucky Science and Technology Council, which developed the Televillage Program, determined that a Televillage (a CTC) is an effective tool for "developing a strategic [region-wide] focus...organizing, pooling and managing resources that might not otherwise be practical or affordable...[and] extending the capabilities of schools, goverment, and businesses...and facilitating information access." (Kimel, 1996).

Through network technologies, a telecenter can be a place of learning for students in a distance education course or a resource for teachers who wish to supplement their curriculum with electronic "field trips," lesson plans, or materials available online. Rural physicians may consult with specialists in a metropolitan hospital or earn continuing medical education credit for taking an online course. Businesspeople can communicate with head offices and colleagues around the world, as well as develop electronic commerce initiatives. There are even municipalities establishing online voting facilities. Telecenters are the marriage of distance education, telemedicine, telecommuting, and telecommunications into a single cooperative entity.

This chapter includes the executive summary of a report on community technology centers as a tool for economic development in rural areas, a short list of benefits and applications of telecenters, two sample telecenter fprojects - one in Congo and one in the Arctic - and some online resources that specifically pertain to telecenters.

Community Technology Centers:

Exploring a Tool for Rural Community Development

(part 1 of 6)

by Christopher J. Campbell

The Center for Rural Massachusetts

University of Massachusetts, Amherst

© Copyright 1995 Center for Rural Massachusetts and Christopher J. Campbell

This document contains many links. If you find that one is no longer in existence please contact us at: *ruralma@larp.umass.edu*

AUTHOR'S NOTES AND ACKNOWLEDGMENTS

This document is based on a longer one, *An Exploratory Study of Community Technology Centers in Rural Massachusetts*, a thesis submitted by the author to the Graduate School of the University of Massachusetts, Amherst in partial fulfillment of the requirements for the degree of Master of Regional Planning. This thesis is available from the University of Massachusetts, Amherst Library.

The assistance and support of many people have helped me greatly. I'd like to thank Bruce MacDougall for constantly pushing me to "think big," and for funding this research, and Ann Forsyth deserves thanks for providing more time and constructive criticism than duty called for. I'd also like to thank the many people who took the time to speak with me on the phone, or faxed, e-mailed, and mailed me the information I needed, especially Jo Lowe, who seemed to have limitless enthusiasm.

Finally, thanks go to Elissa Sternberg for praise and encouragement.

EXECUTIVE SUMMARY

Rural regions face special challenges when they try to adopt information and communication technology. A rural community technology center is a central location within a rural community or region equipped with computer and telecommunication equipment and services shared by users from a variety of sectors. It is a young concept with considerable promise for facilitating the use of these technologies. This study develops an understanding of community technology centers, especially rural ones, and it also investigates and describes some of the factors that could influence the development of these centers in rural Massachusetts. It reviews some of the terms and concepts that are necessary for an exploration of community technology centers. It looks at existing operating and planned community technology centers and related centers around the world. This study broadens this base of information through case studies of two telecenters in the United States and seven representatives of potential user groups in Massachusetts, and through an overview of telecommunications networks in Massachusetts.

This research uncovered a number of potentially important roles for community technology centers in rural Massachusetts, including lowering barriers of technology cost, knowledge, and availability. A consulting and education role, with staff to perform it, is important. Rural community technology centers, as multi-purpose community centers where telecommunications and other forms of communication mix, can reinforce social ties, and they can be tools for keeping more of the activities of residents in the community.

165

residents in the community.

This research also indicates some general recommendations about how to develop community technology centers. Public and private users can complement each other if both are involved. Significant local ideas and participation are necessary to bring increased access to information and communication rural Massachusetts. Developing networks of support, advice and assistance for centers is useful. Many centers require up-front subsidies, though some can become financially self-sufficient. Rural community technology centers may start small, but they should have the capacity to grow as they serve the needs of diverse users. Larger anchor users can provide on-going support. Local educational institutions may provide a key source of this support.

INTRODUCTION

It was about 2:00 in the afternoon when Ms. Ng's fourteen fourth and fifth graders walked out of the video teleconferencing room as if nothing unusual had happened. She, however, was slightly amazed. She never would have thought it possible for the school budget to support such a rich elementary-school unit on pre-European Native American culture, what with the all the other requirements that they had to meet for their small school population and small school budget. Well, it didn't hurt that U. Mass. had an expert who was giving two-way video tele-classes for elementary school students this week. "Thank goodness the school district didn't have to cough up the money for the video equipment all on its own," she thought. "We never would have had access to it."

She waved to Angela as they passed the drop-in computer lab to let her know that they were on their way out. Angela stopped showing her fifth person of the day how to search the state-wide library database of holdings just long enough to smile back. Habitually, she thought of the next appointment in the video conferencing room. It was Orin Savitch, watching a national satellite broadcast on the new tax laws. Orin was an auditor for the IRS who had given up his early-morning, late evening commute to Boston three days a week and instead worked here, out of the Prescott, Massachusetts Community Technology Center, close to home. Tax time was coming up. "Won't he be popular," thought Angela sarcastically, as she reminded herself to order more paper for the fax and copier.

Angela was an Information Consultant, or, as she liked to call herself, "the on-ramp to the Information Superhighway." She liked to think that there wasn't any technology question she couldn't answer, but in fact she had to e-mail Doug in Virginia and Pat in Colorado every now and again to get her unstumped. Well, what were friends for, anyway?

Two-fifteen. Almost time for her meeting with Craig Grabowski. Even though his Reservoir Recycled Products, Inc. had left the Center's small business incubator six months ago, he still came in every time the Center got a new piece of computer hardware or on-line service "just to see if I need one for myself." Not that Angela minded, but he must have asked her a dozen times to show her how to make a World-Wide Web home page. "He'll never learn," she muttered.

From all the way down the hall, Angela could hear someone yelling at the town's attorney, who had arranged to use the all-purpose meeting room. It was something about a denied zoning variance. Well, it was obvious that not all communication needed technology.

The preceding description of a community technology center in rural Massachusetts is a work of fiction for the time being. However, the impact of information and communication technology on communities is not a work of fiction. There have been many examples in recent years of the applications of the distance-shrinking effects of telecommunications and computer technology. These technologies and developments have been used in the United States and other parts of the world as an aid to economic or community development in rural areas. In particular, recent years have seen the development of many forms of local and regional centers intended to facilitate the use of computers and telecommunications. There are few standard terms for these centers, but "telecenters" is a very general term that can be used

There are few standard terms for these centers, but "telecenters" is a very general term that can be used to refer to them.

The community technology center is a particular kind of telecenter, and represents an effort to bring together the different functions of telecommunications and computer technologies in locations where there are barriers to the successful adoption of these technologies by any single user or group of users. Rural areas and depressed urban neighborhoods are two examples. Community technology centers are so young as a concept that they are the subject of only a relatively small amount of analysis, and there are no community technology centers at this time in rural Massachusetts.

A rural community technology center, generally, is a building, office space or collection of offices in a central location within a rural community or region equipped with computer and telecommunication equipment and services superior to those that the users generally have themselves. These are shared by a number of users such as businesses, government entities, schools, and community members. It may or may not have additional equipment and services associated with it. It provides hardware, software, and support to a group of individuals and organizations that, alone, might find them unavailable, difficult to understand, or more expensive. Just a few of their possible uses are small-business technology cooperatives, remote work sites, government service sites, and education centers.

The community technology center is a young concept, but one with considerable promise. This study explores the community technology center concept and develops an understanding of them, especially rural ones: What are they? What are they like? What roles might they play in a rural community? Where have there been efforts to develop things like community technology centers? How have they developed in some locations, and how might they develop in other locations? It also investigates and describes some of the factors that could influence the development of community technology centers in the rural parts of the Commonwealth of Massachusetts: What functions does communication and information technology perform for various user groups in rural Massachusetts? What functions might a community technology center perform for them? What is the telecommunications network context in Massachusetts?

The overall economy is becoming more and more based on services and information. Telecommunications and computer technologies have the ability to lessen the importance of distance in the processing of information and the provision of certain services. The potential for rural communities to lag seriously behind in the spread of a new infrastructure is real. For example, in 1935 rural Massachusetts had less than five percent electrical service coverage, at a time when much of Europe and New Zealand had near universal service (Cisler 1994, 2). Rural communities also have special challenges that these technologies have the potential to ease. Their more dispersed population can make many forms of interaction more difficult; they are also more isolated (Kimel 1994). (This isolation can be simply the long commutes in an exurban region or the greater isolation of other rural regions.) In the past, many rural regions unserved by electrical power banded together to form rural electric cooperatives (Cisler 1994, 2). Community technology centers and related telecenters have been proposed by some and implemented by others as a way of overcoming the challenges presented by new technology and rural communities. In a sense, they are the new rural information infrastructure cooperatives.

The community technology center addresses the communication and information technology needs of rural regions. Rural regions face special challenges when they try to adopt information and communication technology. They lack economies of scale because of their smaller population size, and they generally have a smaller base of human and technological resources upon which to draw (Kimel 1994). There are many possible ways to define rural. The Center for Rural Massachusetts has found the population density of towns to be a useful indicator of rurality. It is a relatively uncomplicated measure and accounts for the wide differences in the areas of towns in Massachusetts. If 500 persons per square mile is used as the threshold of rurality, then there were 190 towns (or more than half) in Massachusetts that could be called rural in 1990 (MacDougall and Campbell 1995, 37). Low population density means ground-based telecommunications networks are more costly per user.

The word "community" is used here on purpose for its vagueness. This examination does not rule out the possibility that a rural community technology center could serve communities on a variety of different scales and in a variety of different forms. "Community" is also used here for another reason. In contrast

to years past, the physical isolation of rural places is more associated with social isolation than social cohesion (Cisler 1994, 5). There is a danger that telecommunications, deployed in certain ways, can exacerbate this trend. The community technology center is a way of mitigating some of the more destructive potential effects of technology on community.

The first section of this study looks at background information for community technology centers. The next section takes a more detailed look at existing information on community technology centers and related concepts. This study also includes two sets of case studies. One set profiles two telecenters, and another profiles seven representatives of potential user groups of a rural Massachusetts community technology center. This study looks at telecommunications networks in Massachusetts, examining state initiatives to promote networks and providing an overview of the telephone, cable TV and Internet infrastructure in rural Massachusetts. This section examines how these networks and these initiatives might affect the need for community technology centers and their form. The last section draws upon all of the preceding ones to lay out some preliminary conclusions on how the community technology center might apply to rural Massachusetts communities.

Next section

Table of Contents

Reference list

CRM Home Page

UMass Landscape Architecture and Regional Planning

Last updated July 22, 1995
by Christopher J. Campbell

© Copyright 1995 Center for Rural Massachusetts

E-mail comments to CRM at:
ruralma@larp.umass.edu

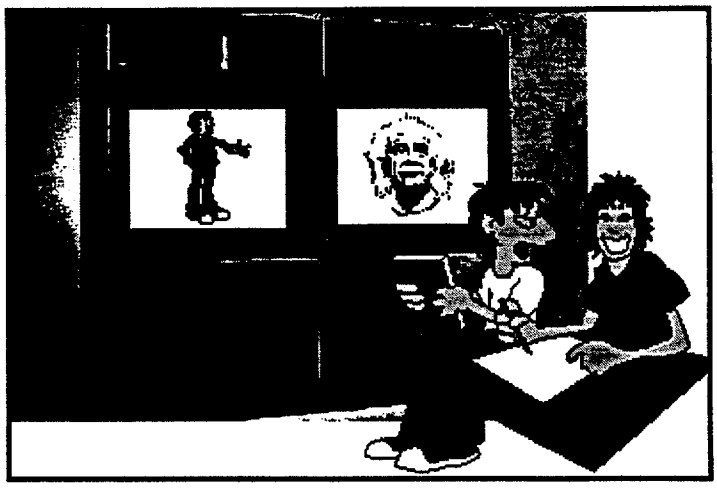
Please e-mail us if you establish links to this page or any of our other pages. This will allow us to keep you informed (to the best of our ability) of changes.

RURAL HEALTH FUTURES

Rural Telecommunity Center -- Impact on Education

So, how can the RTC enhance education? The RTC provides you as an educator provider with the ability to perform a number of applications including; distance learning, teleconferencing, and continuing education. It will allow you to link up to other educators, K-12 schools, community colleges and universities, trade schools and technical colleges. Enhanced access is also provided to libraries, health care providers, government agencies, and local and regional business expertise.

The result of the improved communication and access will be a more educated community and greater awareness within the community and the region of special needs and opportunities to share resources.



Benefits

1. Affordable Telecommunications
2. No Capital Investment in Technology
3. Improved Local Education
4. Reduce Isolation of Teachers, Administration and Students
5. Access to Schools, Colleges, Libraries
6. Ability to Share Staff
7. Improved Services to Public
8. Improved Education: Staff training, Continuing Education
9. Access to Additional Resources
10. Improved Teacher and Staff Recruitment
11. Record Sharing

Applications

1. Special Programs
2. Staff Training
3. Distance Learning
4. Interactive Videoconferencing
5. Guest Speakers
6. Consulting Services
7. Ability to Share Facility
8. Continuing Education
9. Offer Elective Courses; Foreign Languages, Multi-Culture
10. Multisite Conferencing
11. Internet Access/Bulletin Board
12. Interactive Classrooms
13. Adult and Continuing Education
14. Electronic Transfer of Transcripts

For additional information contact Kelli Schneider @ (970) 498-0233

169

Case Histories

Project SCOPE Zaire at Kinshasa and Nyangwe.

In early 1995, the President of UNAFEZA, Ngolela wa Kabongo, and the President of Project SCOPE, Carolyn Manjourides, met in Boston to discuss how the Project SCOPE concept might advance the efforts of UNAFEZA and the women in urban Kinshasa and rural Nyangwe, Congo. At that time, the decision was made to ultimately create a Project SCOPE telecenter in each location and work with the UNAFEZA organization to improve the civil and human rights for Congolese women.

To understand the origin and focus of UNAFEZA, Project SCOPE's partner in this very difficult Central African country, the following information is relevant.

- **Mission.** UNAFEZA's mission is to empower Congolese women to be proactive and initiate efforts to propel themselves into the political and economic mainstream of Congolese society.

- **Primary Goal.** UNAFEZA will implement programs leading to elimination of human rights abuses perpetrated against Congolese women, with a particular emphasis on those who are poor, disenfranchised or otherwise disadvantaged.

- **Objectives.** The three specific objectives of UNAFEZA are (1) promote economic autonomy for impoverished rural and urban women by providing hands-on instruction and entrepreneurial training, (2) engage in community organizing and mobilization activities geared for the advancement of civil and human rights of Congolese women focusing on voter registration and political power of women and (3) advocate for an increase in available adequate health care for women and children.

- **Background.** UNAFEZA was founded in 1994 by Dr. Ngolela wa Kabongo during a national tour of her homeland. During the tour, she observed Congolese women denied full participation in both the country's political and economic processes. Dr. Kabongo also noted that no organizations existed committed to securing equal status for women. Hence, UNAFEZA was established to serve and assist marginalized and impoverished women in Kinshasa and Nyangwe initially.

- **Program Activities.** UNAFEZA's activities include workshops in animal husbandry, personal hygiene, saltfish production, women's rights, adult literacy and importance of voting.

Clearly UNAFEZA had all the requirements to partner with Project SCOPE. Having decided that UNAFEZA's activities would benefit from the creation of a Project SCOPE telecenter to provide access to information and resources as well as a training center and enhance their current activities, Project SCOPE Congo at Kinshasa and Nyangwe became a reality with the following proposed Phase I goals:

- Provide telecommunications access to the global community for the two communities based on available infrastructure and funding.
- Implement basic education programs such as reading, writing and mathematics in the indigenous languages.
- Establish minimum access to medical resources to address the myriad of public health issues.
- Identify and pursue together possible funding sources for our project.

Based on the Phase I goals, an interim evaluation of progress has been slow but positive and continuing. Details of the final Phase I evaluation will be available soon and included in this case history along with

170

Phase II goals.

Online Telecenter Resources

Campbell, Chirstopher J. (1995). ***Community Technology Centers: Exploring a Tool for Rural Community Development.*** **The Center for Rural Massachusetts, University of Massachusetts, Amherst.**
Though focussed on telecenters in the rural US, this paper provides some anecdotal evidence supporting the theory that telecenters can catalyze community economic development through increased intra- and inter-community communications, as well as enhanced education and training opportunities.
http://www-unix.oit.umass.edu/~ruralma/CTC_ToC.html

Connecting Nunavik: A case study of the development of a digital communications network in Arctic Quebec.
This site describes in detail Taqramiut Nipingat Inc.'s Connecting Nunavik project and provides guidance on the process of establishing telecenters and digital networks in rural areas.
http://www.nunavik.net/tni/Industry_Canada.htm

ProjectSCOPE (Specialized teleCenters Of Professional Education) seeks to meet basic needs in developing countries through establishing community-based telecenters.
http://www.projectscope.org

Telecentres, IT and Rural Development: Bibliography and References
Center for Rural Social Research, Charles Sturt University, Australia
http://www.csu.edu.au/research/crsr/sai/saibiblo.htm

The Internet in the Classroom and Workplace: Pull and Push Technologies

Many professionals have been unable to tap the full potential of the Internet in supporting their work for lack of understanding the tools, strengths and weaknesses of the medium. Though touted as a tremendous resource for information gathering and research, that particular capability is not the most compelling reason to use the Internet. In fact, the glut of information on the WWW is it's greatest weakness. No doctor or executive has the time nor desire to follow each of the 1,456,998 links that are returned in a search for "pharmaceutical," for example. Further, there is no reliability check on the Internet; there are no gateways that preclude false or misleading information from being published on the web. The strengths of the Internet are that it permits access to current readings of dynamic data (e.g. seismic activity, stock exchange data, new research, weather patterns, current events); it allows interaction between users around the world; and it is a medium for publishing and collaboration.

Having said that, there are ways to sift through the vast sea of data available in cyberspace, and come up with useful information that can support professional activity, or enrich background knowledge on a particular subject.

Pull Technologies

"Search engines" are a user's first gateway to information on the Internet, and there are several to choose from including Yahoo!, AltaVista, Excite, DejaNews, WebCrawler, HotBot, Lycos, and Infoseek. Each search engine is slightly different, but the premise is this: when a user enters a query, the search engine will look through its index of websites and newsgroup messages, select closest matches, and return them to the user as a list of annotated hyperlinks. A query is a question to the search engine that translated into English might read, "I'm looking for information about sharks, but not whales." Each search engine has slightly different rules for how queries should be structured in order to find the information that most closely matches what a user is looking for. Knowing how to structure a query well is a critical Internet skill. In this section, there is a guide, provided by the AltaVista search engine, on how to form a query.

Push Technologies

The exponential growth of the WWW in the last two years has sparked the development of a new search

173.

technology. Search engines, as described above, are known as "pull" technologies, because the user must intentionally "pull" information from the web through a search. Push technologies, in contrast, automatically do the searching for the user. One example of a push technology software is PointCast. At the time PointCast is installed, a user specifies what types of information and news are of interest. From that point on, PointCast will search the web for websites and news pertaining to those specified interests, regardless of whether a web browser is open, or whether the user is even at the computer! When the user returns to the computer, all information that PointCast has located is organized on a single screen with hot links to those sites.. Because the content of a PointCast report is user-defined, rather than predetermined by a radio or TV producer , this kind of information dissemination is called "narrowcasting" and largely negates the old McLuhan adage, "the medium is the message." Of course, narrowcasting has it's drawbacks, and the adage may be reasserted as "the recipient is the message."

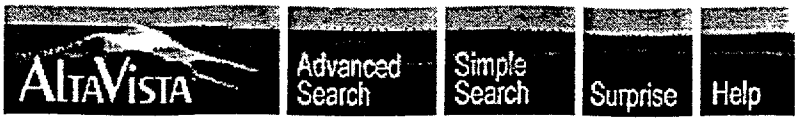
Regardless of whether information is "pulled" or "pushed" from the Internet, a key component of any Internet-based research is a critical eye for quality information. Some considerations to make are: What is the source of information? Is it a personal page? A corporate page? A university page? A government page? Are there references? Does it corroborate other sources? What kinds of interests might each source like to promote? Learning to be Internet-literate means much more than simply being able to locate information. Users must develop strong analytic skills enabling them to filter, classify, and *use* information for the purpose of building knowledge.

174

Locating Search Engines

Yahoo!	<http://www.yahoo.com>
AltaVista	<http://www.altavista.com>
Excite	<http://www.excite.com>
DejaNews	<http://search.dejanews.com>
WebCrawler	<http://query.webcrawler.com>
HotBot	<http://www.search.hotbot.com>
Lycos	<http://www.lycos.com>

175



Help for Advanced Queries Only. Not for Simple Queries!

(To reach the Help page for Simple Queries, click on Simple Query, then Help.)

Advanced Queries use operators and expression syntax to construct queries. The rules for defining words and phrases, capitalization and wildcards are, however, the same as for Simple Queries.

- You **must** use the binary operators **AND**, **OR**, **NEAR**, and the unary operator **NOT** to combine words and phrases. The operators can also be written in lower-case: **and**, **or**, **not**, **near**. Alternatively, you can use the symbols **&** for **AND**, **|** for **OR**, **!** for **NOT**, and **~** for **NEAR**.
- If you need to use any of these words as search words in a query, you must place them in quotes.
- You are allowed to use parentheses to group search expressions; in fact it's recommended as less confusing.

Using the binary operators AND, OR, and NEAR, and the unary operator NOT

kayak AND "San Juan Islands"
The operator **AND** ensures that **both** are present in the resulting documents. The operator **AND** binds less tightly than juxtaposition.

"Digital Equipment Corporation" OR DEC
The operator **OR** ensures that **at least one** is present in the resulting documents. The operator **OR** binds less tightly than the operator **AND**.

Louis NEAR Monier
The operator **NEAR** ensures that both are **within ten words of each other** in the resulting documents. The operator **NEAR** binds less tightly than the operator **NOT** and associates to the left. This query matches *Louis Monier*, *Louis M. Monier* and *Monier, Louis*.

vegetable AND NOT "brussel sprouts"
The operator **NOT** is used to exclude words or phrases from a query. The operator **NOT** binds less tightly than the operator **OR** . This query is equivalent to *vegetable and (not "brussel sprouts")*. Do **not** use *vegetable NOT "brussel sprouts"*; this query is syntactically illegal.

Examples showing the importance of parentheses
How searches work: Advanced Queries
Constraining searches in Web pages
Constraining searches in Usenet news
The META tag: Controlling how your page is indexed
Using AltaVista and other useful tips
Frequently Asked Questions about AltaVista and the Web
More about words, phrases, capitalization, accents and the *-notation

---

Examples showing the importance of parentheses

gold or silver and platinum
gold or (silver and platinum)
(gold or silver) and platinum
The first two queries are equivalent. They return documents containing both *silver* and *platinum*, together with documents containing *gold*.

If you want the search to find documents containing *platinum* and, in addition, in the same document, either *gold* or *silver*, you must use the third query pattern.

not gold and silver
(not gold) and silver
not (gold and silver)

The first two queries are equivalent. They return documents containing *silver* but not *gold*.
If you want the search to eliminate documents that contain both *gold* and *silver*, you must use the third query pattern.

gold near silver and platinum
(gold near silver) and platinum
(gold near silver) and (gold near platinum)

The first two queries are equivalent. They return documents containing *gold* located close to *silver*, and in addition, in the same document, the word *platinum*.
If you want the search to find documents containing *gold* located close to *silver* and, in addition, in the same document, *gold* close to *platinum*, you must use the third query pattern.

not gold near silver
not (gold near silver)
silver and not (gold near silver)

The first two queries are equivalent. They eliminate from the search all documents containing *silver* located close to *gold*.
If you want the search to find documents containing *silver* but want to eliminate those that contain *gold* located close to *silver*, you must use the third query pattern.

gold near silver or platinum
(gold near silver) or platinum

The two queries above are equivalent. They find documents containing *gold* located close to *silver*, together with documents containing *platinum*.

gold near (silver or platinum)
(gold near silver) or (gold near platinum)

The two queries above are equivalent. They find documents containing *gold* located close to *silver*, together with documents containing *gold* located close to *platinum*.

How searches work: Advanced Queries

To simplify the description that follows, we refer to the type-in field labelled Selection Criteria as the *search field*, and that labelled Results Ranking Criteria as the *ranking field*.

How AltaVista performs queries

Simple Queries and Advanced Queries are different interfaces to the same search engine. This being true, you might be surprised that, under certain conditions, apparently identical queries can produce slightly different results, depending on whether you submit them as Simple or Advanced Queries.

Compare, for example, a one-word Simple Query, say *plato*, with the same word submitted as an Advanced Query, but **with no ranking specified**. More specifically, this latter query has *plato* in the search field and nothing in the ranking field. Each of the two queries produces "about 20000" documents, but the ranking is different in each case.

The explanation for the difference in ranking is rather complex, but briefly, AltaVista implements Simple Queries as Advanced Queries. More specifically, a Simple Query gets transformed into a boolean expression together with a set of words to rank the results.

In the example above, AltaVista will implement the Simple Query consisting of the one word, *plato* as an Advanced Query with nothing in the search field, but *plato* in the ranking field. Recall that in this example, the Advanced Query had *plato* in the search field and nothing in the ranking field; in other words, the two queries were actually not identical, and hence the different rankings.

If you submit a different Advanced Query, this time with *plato* in both the search field and the ranking field, the rankings of the documents matched will also be identical to those produced by the Simple Query for *plato*.

To sum up, all three of the following queries produce the same matches and in the same ranking order.

Type of Query	fields	Query word
Simple	search only	plato
Advanced	search	---
	ranking	plato
Advanced	search	plato
	ranking	plato

The following query will give you the same matches as for the queries above, but in no particular ranking order.

Type of Query	fields	Query word
Advanced	search	plato
	ranking	----

How AltaVista ranks Advanced Queries

Use the type-in field labelled *Results Ranking Criteria* to enter words or phrases that will determine the ranking of the search results. Recall from the previous section that ranking an Advanced Query is equivalent to performing a Simple Query; the same scoring algorithm is used in both cases. Documents with a high score will appear at the head of the list. High scores are assigned if the selected ranking word appears in the first few words of the document (say, in the title of a Web page or in a header), or if the document contains more than one instance of the ranking word.

Here's an example query, starting with no ranking specified.

Search field	(gold near silver) and platinum
Ranking field	
Result	2000 documents found and listed in no particular order.

The 2000 documents found will contain the words *gold* located close to *silver* and in addition in the same document, the word *platinum*. If you now choose *platinum* to rank the search results, the query will produce the same 2000 documents, as you might expect, but ranked so that those with the highest scores for *platinum* are placed at the head of the resulting list.

```
Search field        (gold near silver) and platinum
Ranking field       platinum
Result              2000 documents found, ranked so that those with
                    high scores for platinum are listed first.
```

You might want to proceed further. On the assumption that documents containing matches for these metals also contain references to other metals, you might want to check for occurrences of another. But notice what happens now to the search results.

```
Search field        (gold near silver) and platinum
Ranking field       palladium
Result              200 documents found
```

In this case, the Advanced Query has not returned the 2000 documents that resulted from this search and reranked them so that any with matches for *palladium* are listed first. A second level of filtering has been applied to the search result; 1800 documents that do not contain matches for *palladium* have been discarded. In other words, when the ranking field is not empty, documents that contain none of the words in the ranking field are discarded.

Constraining searches

It is possible to restrict searches to certain portions of documents by using the following syntax. The keyword (link, title, image,...) should be in lower-case, and immediately followed by a colon.

Constraining searches in Web pages:

anchor:click-here
Matches pages with the phrase *click here* in the text of a hyperlink.
applet:NervousText
Matches pages containing the name of the Java applet class found in an applet tag; in this case, *NervousText*.
host:digital.com
Matches pages with the phrase *digital.com* in the host name of the Web server.
image:comet.jpg
Matches pages with *comet.jpg* in an image tag.
link:thomas.gov
Matches pages that contain at least one link to a page with *thomas.gov* in its URL.
text:algol68
Matches pages that contain the word *algol68* in any part of the visible text of a page. (ie, the word is not in a link or an image, for example.)
title:"The Wall Street Journal"
Matches pages with the phrase *The Wall Street Journal* in the title.
url:home.html
Matches pages with the words *home* and *html* together in the page's URL. Equivalent to *url:"home html"*.

Constraining searches in Usenet news articles:

from:napoleon@elba.com
Matches news articles with the words *napoleon@elba.com* in the **From:** field.
subject:"for sale"
Matches news articles with the phrase *for sale* in the **Subject:** field.
You can combine this with a word or phrase. For example, *subject:"for sale" "victorian chamber pots"*.
newsgroups:rec.humor

Matches news articles posted (or crossposted) in news groups with *rec.humor* in the name.

summary:invest*

Matches news articles with the word *invest*, *investment*, *investiture*, etc., in the summary.

keywords:NASA

Matches news articles with the word *NASA* in all caps in the keyword list.

More about Words, Phrases, Capitalization, Accents, and the *-Notation

Words

AltaVista treats every page on the Web and every article of Usenet news as a sequence of words. A *word* in this context means any string of letters and digits delimited either by punctuation and other non-alphabetic characters (for example, &, %, $, /, #, _, ~), or by *white space* (spaces, tabs, line ends, start of document, end of document). To be a word, a string of alphanumerics does not have to be spelled correctly or be found in any dictionary. All that is required is that someone typed it as a single word in a Web page or Usenet news article. Thus, the following are words if they appear delimited in a document: *HAL5000*, *Gorbachevnik*, *602e21*, *www*, *http*, *EasierSaidThanDone*, etc. The following are all considered to be two words because the internal punctuation separates them: *don't*, *digital.com*, *x-y*, *AT&T*, *3.14159*, *U.S.*, *All'sFairInLoveAndWar*.

Only the words in a document are significant to AltaVista. AltaVista does not index punctuation or white space, so you can use AltaVista to look only for words and phrases, not punctuation.

Phrases

A phrase is a string of words that are adjacent in a document, although they may be separated by any amount of white space or punctuation. They do not have to be grammatical in any human language--they just have to occur in a document as an adjacent sequence of words. Some examples:

President of the U.S.A. *(6-word phrase)*
http://www.election.digital.com *(5-word phrase)*

Since the punctuation and white space are insignificant to AltaVista (except that they delimit words), the phrases above are indistinguishable from the following variants:

President of the U S A
http www election digital com

There are two conventions for typing a phrase in a query. The best way, leading to the least ambiguity, is to type the phrase as "a sequence of words separated by spaces and surrounded by double quotes". However, as an alternative, you may type the words of the phrase with punctuation (and no white space) between each pair of words. For example, these are all equivalent as queries:

"President of the U S A"
President-of-the-U-S-A
President/of/the/U/S/A
President.of.the.U-S-A

The first is the one we generally recommend. Be aware that the punctuation characters & | ! and ~ have meaning in Advanced queries, and * indicates the *-notation used in both Simple and Advanced queries.

Capitalization

Capital letters are considered distinct from lower-case letters. When a word is found in a Web page or a news article, its case is preserved when it is stored in the index.

When you enter a word in a query, therefore, it is always safe, and generally recommended, to type it all in lower-case, because lower-case letters indicate a case-insensitive match. If you type any capital letters, you force an exact case match on the entire word.

Thus, the word *turkey* in a query will match any of *turkey*, *Turkey*, *tUrKeY* or *TURKEY* occurring in a document. But the capitalized word *Turkey* in a query will match only *Turkey* in the document, and not any of the other capitalization variants.

Accents

Accents are treated in the same way as capitalization. An accented word used in a query forces an exact match on the entire word. For example, if you use *éléphant* in a query, you will match only the French spelling for the pachyderm. However, if you do not care to enter accents in the search window (something which is browser, platform, and keyboard-dependent), you can always safely omit the accents, thereby matching both the French and English spellings.

The *-notation

To search for occurrences of any of a group of words with a similar pattern, AltaVista provides the *-notation. For example, you might want to search for matches of *sing*, *singer*, *singers*, *singing*. In this case, place the *-notation at the end of the word whose inflections you want to include in the search: *sing**. But, a word of warning. AltaVista will also match words lexically unrelated to your query word. So the query *sing** will also find matches for *singe*, *single*, *singular*, and for foreign words such as French *singulier*.

The *-notation cannot be used without restriction. To make such queries computationally feasible, AltaVista requires that the * be used only after at least three letters. The *-notation will match from zero up to five additional letters in lower-case only. Capital letters and digits will not therefore be matched.

The *-notation can sometimes be useful for finding variant spellings: for example, *cantalo** will find matches for *cantaloup*, *cantaloupe*, *cantalope*, and their plurals. But take care how you construct the query word. For example, if you want to find matches for both *color* and *colour*, a query of the form *col*r* is not the most efficient. This query will also find matches for *collector* and atomic *collider*. In this case, it is more efficient to submit the query *colo*r*, which will find matches for both *color* and *colour*.

Finally, if your search using the *-notation finds too many matches, AltaVista will ignore the query. The query *inte**, for example, produces the result,

```
Ignored  inte*: 4292323
```

No documents match this query

The META tag: Controlling how your Web page is indexed by AltaVista

In the absence of any other information, AltaVista will index all words in your document (except for comments), and will use the first few words of the document as a short abstract.

It is however possible for you to control how your page is indexed by using the META tag to specify both additional keywords to index, and a short description. Let's suppose your page contains:

```
<META  name="description"
content="We specialize in grooming pink poodles.">
<META  name="keywords" content="pet grooming, Palo Alto, dog">
```

AltaVista will then do two things:

- It will index both fields as words, so a search on either *poodles* or *dog* will match.
- It will return the description with the URL. In other words, instead of showing the first couple of lines of the page, a match will look like the following:

Pink Poodles Inc
We specialize in grooming pink poodles.
http://pink.poodle.org/ - size 3k - 29 Feb 96

AltaVista will index the description and keywords up to a limit of 1,024 characters.

Frequently Asked Questions about AltaVista and the Web

I know a page on the Web that matches my query, but AltaVista did not find it. Why not?

There are many reasons why AltaVista might not find a page that is in fact on the Web.

- The page you are looking for is new. AltaVista is constantly searching the Web for new pages to add to its index, but it is likely that it will not find a brand new page (or new version of an old page) for a few days.

- The page is behind a gateway or firewall. Some Web pages are on corporate servers that are not publicly accessible, and AltaVista does not attempt to access them. Likewise, any pages that require additional protocol beyond following a hyperlink (e.g. that require filling out a form, or registering, or providing a password, etc.) are not indexed.

  Some servers specifically request that they not be visited by automated systems (called *robots* in the parlance), and AltaVista respects that request.

  The page may be unreachable by a chain of hyperlinks from the main body of the Web. AltaVista starts with a few thousand known Web documents, and follows chains of hyperlinks to find all of the others. Some documents, however, while technically on the Web (i.e. available from some Web server and retrievable through the right URL), have no hyperlinks pointing to them from the main body of the Web. A set of Web documents that have hyperlinks to each other and hyperlinks outward, but that have no hyperlinks into them from the rest of the Web, cannot be found automatically by AltaVista.

- Sometimes AltaVista knows of the existence of a page because it has found a hyperlink to it, but every time it tries to retrieve the page to index it, the connection times out. This might indicate heavy congestion at the server or the server not being online at that moment.

AltaVista found some documents that do not match my query. Why?

AltaVista indexes the contents of a document as of the day it finds it. It is possible that the owner of the document has made some modifications since AltaVista retrieved and indexed it. Even though the original document matched the query, the new version might not. Eventually AltaVista will get around to retrieving the page again and indexing it on the basis of its new content.

In our experience, however, when AltaVista finds a document that does not appear to match the query, the most likely explanation is that it does indeed match, but in some way that is not very obvious. For example:

- Words and phrases in a simple query that are not preceded by a + or - sign need not all be present in a document to be considered a match; only one is required. Otherwise they affect only the order in which those documents are presented to you.

- Punctuation in a query and in a document are both generally treated as white space for matching purposes; also, lower case letters in the query are generally considered as matching the corresponding upper case letters as well. Thus, the simple query "John Smith", intended to look for references to this person, will match a document that by chance contains the string "John. Smith"; that is, a string with *John* at the end of one sentence, and *Smith* at the beginning of the next.

- The words matched by the query may be in hyperlinks or other textual parts of the Web page that are indexed by AltaVista, but that are not visible when the page is displayed by your browser. Even if your browser comes with a text search command, the search may not find the words that AltaVista does, because it may skip hyperlink fields, and other fields that the browser does not display.

  Most browsers have a command allowing you to view the document source, which is helpful in such cases.

- The words matched by the query may be in the URL of the page it found. For example, all pages with the words *digital.com* or *home.html* in their URLs are considered to contain the words *digital* and *com* (or *home* and *html*) respectively. If you want to avoid this, then search using the prefix *text:* before any words or phrases that you want to find in the visible text of a page.

AltaVista found a page I wanted to look at, but when I attempted to retrieve it, I got an error. Why?

This can occur when the status of the page, or the server it is on, has changed since AltaVista last retrieved and indexed it.

- The page may have been renamed or removed by the owner.
- The server containing the page that the user is trying to view may be down at the moment.
- Access restrictions may have been introduced at the server since AltaVista retrieved the page.
- The server containing the page may be so overloaded that attempts to connect to it time out.

It is also possible that your own internetworking infrastructure (routing tables, DNS service, security policies, proxies, and browser configuration), prevents you from making a connection to the server. The particular error message you get will give you more information.

---

digital Copyright © 1996 Digital Equipment Corporation. All rights reserved.

Click here
for 20 breaking news stories
Click here NEWS.COM

CNET.COM
home
Join now for free!

NEWS.COM
Radio

MENU
Reviews
Just in
All comparisons

Features
How to
Digital life
Techno

BUILDER.COM

Browsers!

Personalities

CNET TV
The shows
The hosts
Airtimes
CNET studios

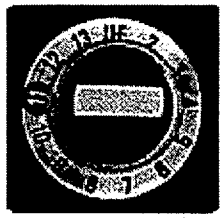
Community
About CNET
Feedback
Member services
Posting
Current poll
Conferences
CNET jobs
Permissions

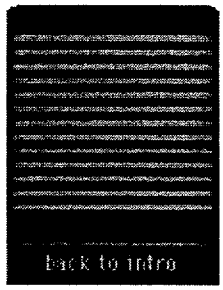
Resources
Software central
Glossary

push primer content

Currently, most people get access to Internet content by pulling it. When you use your browser to surf the Web, each time you click a link your browser sends a request to the Web server (a *pull*) asking for the relevant page, which your browser then downloads and displays. *Push* technology is different. With push, the server doesn't wait for you to request a page; instead, when the content you've signed up for or requested is ready, the server delivers or pushes it automatically to your computer so you can read (or hear, or watch) it whenever you desire. That's the theory behind push. (For more information on how push content is actually delivered, see "push me, pull you: how it *really* works.")

The push providers compare their content-delivery method with the television or radio broadcast model: customers subscribe to the content "channels" they wish to view, and that content is broadcast to them periodically. What gets lost in the broadcast metaphor is your power to customize channels: with push you can select the information that really concerns you instead of having to wait through an entire program to get to it. Another difference between broadcast and push is that your television doesn't have storage--a TV show is on when it's on, but content sent to your hard drive can be read at any time. (Of course, if you don't read it, it's just taking up space.) And by delivering the information to your desktop instead of making you request it, push has the potential to take these capabilities beyond what is now offered by services like My Yahoo and Personal News Page.





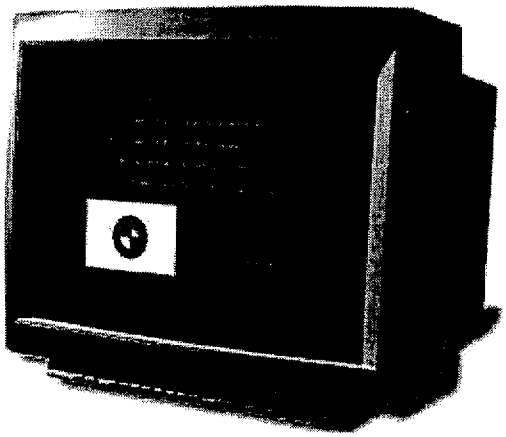
184

PointCast™ The PointCast Network

Download | Products | Company | Support | ViewPoint | Main | Site Map

What the heck is the PointCast Network...

the most exciting way **to get your news**



internet broadcast
free
the desktop newscast
personalized
up-to-the-minute

winner

Download FREE Now!

internet broadcast | free | personalized

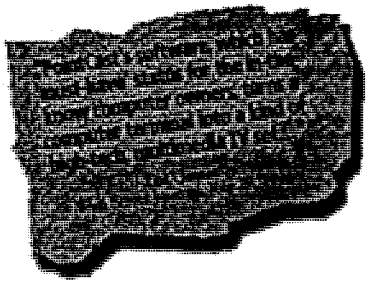
PointCast is the Internet news network that appears instantly on your computer screen. Gone are the days of surfing the net for the news and information important to you. The Internet is brought to you. That's a first. That's why C/NET honored the PointCast Network with the "Best Internet Application" award.

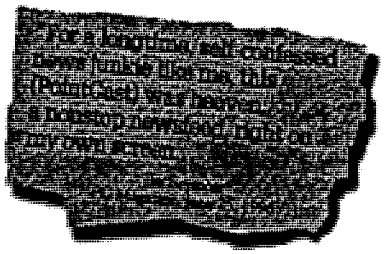
Headlines move dynamically across the screen, the colors pop and all you have to do is keep your eyes open. Effortless. No surfing required.

news from trusted sources

PointCast broadcasts national and international news, stock information, industry updates, weather from around the globe, sports scores and more from sources like CNN, CNNfn, Time, People and Money Magazines, Reuters, PR Newswire, BusinessWire, Sportsticker and Accuweather! Even your local newspaper will be on PointCast--LA Times, New York Times, Boston Globe, San Jose Mercury News and more.

Advertiser supported, the PointCast Network is completely FREE. No subscriptions. No purchase price. Just download and cruise.





PointCast truly needs to be seen to be believed. For a taste, take the PointCast Tour. For more detailed info, check out PointCast products. Or you can dive right in and download PointCast free. If you haven't seen it, you really have to see it.

the desktop newscast

PointCast is completely customizable. Interested in news in your particular industry? How about your own personalized stock ticker. Receive just the news and information you care about. Or the weather in Cleveland, Santa Fe and New York. Maybe Rio or Rome. What do you want to know? PointCast hands it all to you on a rainbow platter.

up-to-the-minute

As you read this something's happening in the world. This is called the news. Not just any news. It's the current stuff. Piping hot.

Information is power. Control that power.

Don't wait 'til tomorrow morning to find out what happened today. Don't let your office be a cave. PointCast is your window to the world.
Up-to-the-minute news throughout the day, all day, everyday! Check it out.

 http://www.union-city.k12.mi.us/bottom.html#top

Good Evening, Welcome to Union City High School!

Wednesday, October 29, 1997	What's Happening?	Where is it?
Today's Announcements Happy Halloween!	What's for Lunch? Weekly Calendar I need a day off? I'll settle for a half day Pathfinder News ESPN Sports	First Search NEW! Yahoo! Excite Webcrawler Altavista Lycos Meta Crawler Libweb
	Local Sites	**Education Help**
	UC Community Schools Big Eight Conference The UC Campus Corner NEW! The Victorian Villa Branch County Library Technology Update MHSAA Athletics	Homework Helper Ask Dr. Math AskERIC

If you find a great web site and would like to add it to the menu for others to see, send an e-mail message with the URL to Mr. Katz

Made With A Mac

A sample home page from a high school intranet. Intranets that support teaching and learning may link an entire school district, only elementary schools, secondary school teachers in a region - any number of combinations of students, teachers, and administrators. They can also be a means of communicating with the community, as this is an example. Frequently updated information such as lunch menus, calendars of upcoming events, PTA projects, even samples of students' work can be posted for parents to access, inviting more community awareness and participation.

Other useful information that can be posted on the intranet are school policies, school board meeting minutes, homework assignments, online professional development courses for teachers, library card catalog, and contact information for staff, faculty and families.

Following is a survey that highlights some additional ways an intranet can support teaching and learning communities.

Internet/Intranet Survey

This summer, Technology Services will be looking at how to facilitate use of and add value to Kyrene's web site and Intranet data systems. Your input is very important to us so that we can better serve students, staff and community members.

What is your relationship to Kyrene School District? Kyrene Teacher

How Often do you access any part of the Kyrene Web site? Daily

Rank the following according to how you use the Internet (not just Kyrene's Web).
1 indicates OFTEN, through **5** which indicates NEVER

Use of the Internet	1	2	3	4	5
Research for information	O	O	O	O	O
Collecting images for projects	O	O	O	O	O
Publishing work	O	O	O	O	O
Corresponding with other people nationally	O	O	O	O	O
Corresponding with other people internationally	O	O	O	O	O

Do you have other ideas? Type them below!

Rank the following information by how important you consider it to be part of the district's or a school's web site.
1 indicates VERY IMPORTANT, through **5** which indicates NO IMPORTANCE

Web Information Features	1	2	3	4	5
Mission, policy and beliefs information	O	O	O	O	O
Staff Information (names, positions, experience, phone numbers, etc.)	O	O	O	O	O
Student reports, poems, stories and other writings	O	O	O	O	O
Student graphics, paintings and other artwork	O	O	O	O	O
District Curriculum	O	O	O	O	O
Teacher Lesson Plans & Activities	O	O	O	O	O

Teacher Lesson Plans & Activities

Calendar of events, meetings and activities	O	O	O	O	O
School's State Report Card	O	O	O	O	O
Lunch Menus	O	O	O	O	O
Link List to other Educational resources	O	O	O	O	O

Do you have other ideas? Type them below!

Rank the following interactive *Internet* functions by how important you consider them to be part of the district's or a school's web site.
1 indicates VERY IMPORTANT, through **5** which indicates NO IMPORTANCE

Internet Interactive Features	1	2	3	4	5
Feedback mechanism (comments form, email links, etc.)	O	O	O	O	O
Threaded Discussions	O	O	O	O	O
Search Engine	O	O	O	O	O
Guestbook	O	O	O	O	O
Online Chat sessions between a classroom and the outside world (other classrooms, guest experts, etc.)	O	O	O	O	O
Tutor Sign-up and Look-up Database	O	O	O	O	O
Randomly generated practice tests that support curriculum	O	O	O	O	O
Mechanism for teachers to post curriculum paths associated with indicators	O	O	O	O	O

Do you have other ideas? Type them below!

Rank the following interactive *Intranet* functions by how important you consider them to be part of the district's or a school's web site.
1 indicates VERY IMPORTANT, through **5** which indicates NO IMPORTANCE

Intranet Interactive Features	1	2	3	4	5
Real-time chat	O	O	O	O	O
Internet Phone	O	O	O	O	O
Video Conferencing	O	O	O	O	O
Easy way to publish text and graphics to the web	O	O	O	O	O
Simple Scripts Builder (example, a way to easily create custom feedback forms)	O	O	O	O	O
Online Surveys	O	O	O	O	O

Do you have other ideas? Type them below!

Submit My Survey! Clear the Form and Start Over

Address questions or comments about this survey to Dan Hartshorn, Technology Services.

190

OPEN TEXT
Intranet

Introducing Livelink Intranet

The Intranet Application Suite

Livelink Intranet brings robust search, document management, workflow and project collaboration to private webs.

What Is Livelink Intranet?

Livelink Intranet is the only intranet application suite to provide a powerful collaborative environment that can support any number of users, systems or locations. With just a Web browser and a password, workgroups and managers working from anywhere in the world can use fully integrated Livelink tools for project collaboration, search, workflow and document management.

Using Livelink Intranet can make the same difference for your company that personal computing did a decade ago. It's the first intranet application suite that truly delivers on the promise of the World Wide Web - giving users around the world unprecedented access to all the tools and information they need to get their work done. Workgroups and individual contributors can be more productive because the logistics of accessing, sharing, tracking and re-using documents are completely automated - no matter how many sites and technologies are involved. Managers are in a much better position to track the status of work in progress at all times. The industry's best search and indexing tools make locating information a snap. And perhaps best of all, Livelink Intranet is so easy to use and intuitive that you can get up and running in an afternoon. As long as you know how to use a Web browser (i.e., Netscape), you know how to use Livelink Intranet.

All this functionality is available out of the box, or you can use the Livelink Builder, a visual, object-oriented, cross-platform development environment, to customize your application. The Livelink solution is also available as client/server software. Livelink Intranet inter-operates seamlessly with the client/server version.

Livelink Intranet Can Solve Your Most Challenging Problems

Chances are, your organization must support the collaborative efforts of many people working across departments, distance and multiple technologies. Livelink Intranet lets you eliminate the obstacles to working across diverse distributed networks.

Your Organization Should Consider Livelink Intranet If:

- Your managers and workgroups spend as much time on the logistics of collaboration across multiple sites and technologies as they do on primary business goals
- Your managers need fast, efficient tools for tracking the status of work in progress and keeping collaborative efforts focused
- Your business is subject to regulatory standards
- You must maintain an audit trail for document versions and/or workflow processes
- Your users need fast, bulletproof access to the most current document versions at all times
- You need to control and facilitate document and information access
- You need an easy to use system so contributors can get up to speed fast
- You want multi-lingual capable software (including double-byte character languages such as Japanese, Korean, Mandarin)

Powerful Engines Provide Comprehensive Functionality

The intuitive Livelink Intranet interface is so easy to use you can get productive right away. Users anywhere in the world can access Livelink Intranet from their desktops (or laptops) using a standard web browser.
The Livelink Intranet suite includes the following powerful engines:

192

Livelink Search
Offers the industry's most powerful search and indexing tools; support for document collections of any size and more than 40 different file formats, including SGML and other structured documents; Livelink Spider software lets you build and update a completely searchable and accurate unified index.

Livelink Project Collaboration
Supports project-based workflows and libraries; enables task assignment and tracking; users can participate in any number of projects; managed discussion database.

Livelink Workflow
Prompts contributors with an in-box for workflow data and documents; generates easy to read, visual workflow status maps in real time; conditional routing based on attributes; serial, parallel and rendezvous workflow paths.

Livelink Library for Document Management
Includes automatic version control; lets managers and authorized users set multi-level permissions and document attributes; provides document "check out" and "check in".

Livelink Builder
Visual, object-oriented, cross-platform development environment; add or alter functionality anytime; integrates with other applications.

Tailored To Meet Your Needs

You can build the Intranet application that best meets your needs. To get started, choose between Livelink Server and Livelink Search. Livelink Server offers comprehensive Livelink Intranet functionality, including the Livelink Library, Livelink Project Collaboration and Livelink Workflow. Livelink Server includes Livelink Search functionality against the Library only, but you can add full Livelink Search functionality at any time. You also get the Netscape FastTrack Server.

With Livelink Search, you get powerful tools for locating information contained within the controlled Livelink document repository, an external set of documents or the Internet. Livelink Search also includes a copy of the Netscape FastTrack Server. Livelink Spider and SGML Support are available as options. In addition, you can upgrade to Livelink Intranet at any time.

Livelink Intranet is also available as a client/server version that runs entirely interoperably with any number of Web clients. The wide client version is required for designing workflow maps.

Benefits You Can Build Your Business On

Power

- Supports globally distributed resources and work processes of any size

Control

- Enables managers to keep projects on track, boosting productivity

Comprehensiveness

- Seamless, integrated tools for an unprecedented level of automation

Openness

- Supports industry-standard databases and the open standards that power the Internet- HTML, HTTP, TCP/IP

Search This Site | Why Intranets? | Guided Tour | More Info | Livelink Home | Open Text Home

© Copyright 1997 Open Text Corporation. All rights reserved. All other registered and unregistered trademarks are the property of their respective holders. Send questions about Open Text's Web Site to: Webmaster

Intranet frequently asked questions

Q. What is an Intranet?

A. An Intranet is a site based on World Wide Web graphics protocols, but normally not accessible to public access.

Q. Can an Intranet and an Internet exist side by side?

A. Most definitely. They can even run on the same server.

Q. How, then, is an Intranet safeguarded from unauthorized access?

A. Through firewalls, which are servers that run programs that recognize would-be intruders and block their entry (often through the use of passwords or encrypted algorithms).

Q. Isn't an Intranet just a trendy buzz-phrase for a Wide Area Network or Local Area Network?

A. No, its not. It uses the same connections, but you don't have to worry about achieving a common interface between various systems running on different platforms.

Q. Our company's computer platforms are a smorgasbord: Windows '95, Windows NT, Mac 7.5, Unix, you name it. Will an Intranet be able to bridge the chasm between these?

A. Most of the time, yes.

Q. I'm running a groupware system. Why should I switch my company to an Intranet?

A. Most of the more popular groupware systems are based on proprietary models. Since the coding is proprietary, as opposed to the HTML coding of Web sites, it can be difficult to integrate groupware with other applications.

Q. What applications are you talking about?

A. Functions such as videoconferencing, electronic mail, and linking to other sites from within a given message. Web protocols allow for smooth integration of these functions, all within a single interface.

Q. Can I run multimedia on my Intranet?

A. Most defnitely. We're talking about Shockwave and Quick Time for video, RealAudio for sound, and other competing products as well. For those of you looking for a one-stop multimedia shop, Template Graphics Software is likely to have the products you want.

Q. Do I really need all those bells and whistles?

A. Your Intranet won't wither away without them, but they are useful additions. With RealAudio, for example, you could put your CEO's address to company stockholders on your **Intranet** site where your employees (and perhaps, even, your trusted clients or customers) could dial up and lisen in.

Q. I have other Intranet applications in mind, such as distributing financial charts and integrating them with ledger transaction balance data. I already have some programs in my database that can do this, but are there any products that can migrate these functions to my Intranet?

A. One well-known product that might fit the bill for you is Hyperion Software's Spider-Man . Click the link in the previous sentence for more information.

Q. What features should my Intranet Home Page point to?

A. There's an excellent prototype on the Cabletron Intranet Essentials page.

Q. How much will an Intranet cost me to deploy?

A. Theoretically, if you are a two-location office and have a staffer who is adept at using HTML authoring tools, you could get a site up and running for several hundred dollars. If you are a multinational corporation with hundreds of offices and thousands of people on the road at the same time, don't be surprised if your total deployment cost reaches seven figures.

Q. How do I assign URLs for Intranets?

A. InterNIC, the company that assigns URLs for *Internet* addresses, has some guidelines you can use. To read them, click here.

Q. Can you recommend sources for additional reading?

A. Cabletron Corporate Report 1996: The Intranet is Essential , provides a good overview of the different technological components you'll need.

Q. What about books on Intranets?

A. A search on the Amazon.Com Bookstore site yielded 67

books with the word **Intranet** in the title. Two of the newest and best are "The Corporate Intranet: Create and Manage an Internal Web," by Ryan Bernard (John Wiley & Sons), and "Weaving The Internal Corporate Web," by Tammy Lowe (Osborne/McGraw Hill).

Q. I have a question about Intranets that you haven't answered. How do I send you a question via e-mail?

A. To send the author of this FAQ an e-mail message, click on russellshaw@delphi.com.

Home | Intranet Builders | Glossary | What's New | References

Cost-Related Issues | Ease of Assembly | Security | ISP or You | Intranet FAQ
ISP Consultants | Working with Vendors | Cutting Edge | Implications | Your Place

A HEMNET PRODUCTION

197

AED

Academy for Educational Development

March, 1996

Bibliography

Business

Burger, Jeff. Multimedia for Decision-Makers: a Business Primer. Reading, MA: Addison-Wesley Pub., 1995.

Dillon, Patrick. Multimedia in the Corporate World: Business Uses and Technology Challenges. Atlanta, GA: Chantico Pub. Co., 1994.

Education

Anglin, Gary J. Instructional Technology - Past, Present & Future. Englewood, CO: Libraries Unlimited, 1991.

Ambron, SueAnn, and Hooper, Kristina. Learning with Interactive Multimedia. Redmond, WA: Microsoft Press, 1992.

Berger, Pam. CD-ROM for Schools: a Directory and Practical Handbook for Media Specialists. Wilton, CT: Eight Bit Books, 1994.

Bozeman, William C. Educational Technology: Best Practices From America's Schools. Princeton, NJ: Eye on Education, Inc., 1995.

Council of Chief State School Officers. United States Education and Instruction through Telecommunications. Washington, D.C., 1995.

Ely, Donald P. and Minor, Barbara B. Educational Media & Technology Yearbook. Englewood, CO: Libraries Unlimited, 1993.

Franklin, Carl and Kinnell, Susan. Hypertext/Hypermedia in Schools - a Resource Book. Santa Barbara, CA: ABC-CLIO, 1990.

Gayeski, Diane M. Multimedia for Learning: Development, Application and Evaluation. Englewood, NJ: Educational Technology Applications, 1993.

Hodges, Matthew E. and Sasnett, Russell M. Multimedia Computing: Case Studies from MIT Project Athena. Reading, MA: Addison-Wesley, 1993.

Krebs, Arlene. The USDLA Funding Source Book for Distance Learning and Educational Technology: a Guide to Foundation, Corporate, and Government Support of Telecommunications and the New Media. San Ramon, CA: United States Distance Learning Association, 1993.

1255 23rd Street, NW, Washington, DC 20037
Tel. 202-884-8700 Fax 202-884-8701

Means, Barbara. Technology and Education Reform: the Reality Behind the Promise. San Francisco, CA: Jossey-Bass, 1994.

Mergendoller, John R. Exemplary Approaches to Training Teachers to Use Technology. Washington, D.C.: Office of Technology Assessment, U.S. Congress, 1994.

National School Boards Association. Plans and Policies for Technology in Education: A Compendium.

Office of Technology Assessment, U.S. Congress. Linking for Learning. Washington, DC: GPO, 1989.

Office of Technology Assessment, U.S. Congress. Power On. Washington, DC: GPO, 1988.

Office of Technology Assessment, U.S. Congress. Teachers and Technology: Making the Connection. Washington, DC: GPO, 1995.

Only the Best: the Annual Guide to the Highest-Rated Educational Software/Multimedia for Preschool-Grade 12. Alexandria, VA: Association for Supervision and Curriculum Development, 1995.

Pollack, Richard. Multimedia & Videodisc Compendium. Emerging Technology Consultants, 1995-1996.

Schrum, Lynne. Directory of Educational Telecommunications Services. ISTE Publications, 1994.

Schwier, Richard A. and Misanchuk, Earl R. Interactive Multimedia Instruction. Englewood Cliffs, NJ: Educational Technology Publications, 1993.

Semrau, Penelope and Boyer, Barbara A. Using Interactive Video in Education. Boston, MA: Allyn and Bacon, 1994.

Thornburg, David D. Education, Technology, and Paradigms of Change for the 21st Century. Starsong Publications, 1991.

Ward, Anne W. Multimedia and Learning - A School Leader's Guide. Alexandria, VA: National School Boards Association, 1994.

Warger, Cynthia. Technology in Today's Schools. Alexandria, VA: ASCD, 1990.

General

Aston, Robert and Schwartz, Joyce. Multimedia: Gateway to the Next Millennium. Boston, MA: AP Professional, 1994.

Borkio, Furht and Milenkovic, Milan. A Guided Tour of Multimedia Systems & Applications. Los Alamitos, CA: IEEE Computer Society Press, 1995.

Buford, John F. Multimedia Systems. New York, NY: Addison-Wesley, 1993.

Feldman, Tony. Multimedia in the 1990s. Chicago, IL: American Library Association, 1991.

Feldman, Tony. Multimedia/1st ed.. London; NY: Blueprint, 1994.

Freedman, Alan. The Internet Companion, 2nd Edition. New York, NY: Addison-Wesley, 1993.

Keyes, Jessica. Multimedia Handbook. New York, NY: McGraw-Hill, 1994.

Krol, Ed. The Whole Internet, Second Edition. Sebastopol, CA: O'Reilley & Associates, 1994.

The McGraw-Hill Multimedia Handbook. New York: McGraw-Hill, 1994.

Nielson, Jakob. Multimedia & Hypertext: the Internet and Beyond. Boston, MA: AP Professional, 1995.

Rathbone, Andy. Multimedia & CD-ROMs for Dummies. New York, NY: Ellis Harwood, 1990.

Sherman, Chris. CD-ROM Handbook. New York, NY: McGraw-Hill, 1988.

Taylor, Rebecca Buffum. The Multimedia Home Companion. Sausalito, CA: Epicenter Communications. New York, NY: Warner Books, 1994.

Tway, Linda. Multimedia in Action. Boston, MA: AP Professional, 1995.

Vaughan, Tay. Multimedia: Making it Work. Berkeley, CA: Osborne McGraw-Hill, 1994.

Wodaski, Ron. Multimedia Madness. Indianapolis, IN: Sams Publishing, 1994.

Samsel, Jon and Fort, Clancy. Multimedia Directory. The Carronade Group, May 1994.

Multimedia Creation

Bergman, Robert and Moore, T. Multimedia Authoring. Boston, MA: AP Professional, 1994.

Blattner, Meera and Dannenberg, Roger B. Multimedia Interface Design in Education. Berlin; New York; Springer-Verlag, 1992.

Brinson, J. Dianne. Multimedia Law Handbook: a Practical Guide for Developers and Publishers. Menlo Park, CA: Ladera Press, 1994.

Burger, Jeff. Desktop Multimedia Bible. New York, NY: Addison-Wesley, 1993.

Demystifying Multimedia. Random House, 1994.

Iuppa, Nicholas. Practical Guide to Interactive Video Design. White Plains, NY: Knowledge Industry Publications, 1991.

Iuppa, Nicholas. The Multimedia Adventure. White Plains, NY: Knowledge Industry Publications, 1993.

Jerram, Peter and Gosney, Michael. Multimedia Power Tools. New York: Random House, 1993.

Laurel, Brenda. Art of Human Computer Interface Design. NY, NY: Addison-Wesley, 1990.

Perry, Paul J. Multimedia Developer's Guide/1st ed.. Indianapolis, IN: Sams Publishing, 1994.

Museums and Multimedia

Binder, Roberta. Videodiscs in Museums Directory. Falls Church, VA: Future Systems, 1992.

Hoffos, Signe. Multimedia and the Interactive Display in Museums, Exhibitions and Libraries. Chicago, IL: American Library Association, 1992.

AED

Academy for Educational Development

Organizations

American Council on Education
One Dupont Plaza Washington, D.C. 20036
(202) 939-9300

American Federation of Teachers
Conferences & Publications
555 New Jersey Avenue, NW Washington, D.C.
(202) 879-4400
Internet site will be: http://www.aft.org

American Library Association
Conferences: Computers in Libraries; Publications
50 East Huron Street Chicago, IL 06011
(312) 944-6780
Internet site:http://www.ala.org

American Society for Training and Development
150 King Street Alexandria, VA 22313
(703) 683-8100

Association for the Advancement of Computers in Education (AACE)
Publications:'Journal of Educational Multimedia and Hypermedia' 'Journal of Technology and Teacher Education' Conferences: ED-MEDIA
P.O. Box 2966 Charlottesville, VA 22902
(804) 973-3987, (804) 978-7449 (fax); e-mail: AACE@Virginia.Edu
Internet sites:http://aace.virginia.edu/aace and gopher: //aace.virginia.edu

Association for Educational Communications and Technology (AECT)
Publications & conferences
1025 Vermont Avenue, NW, Suite 820 Washington, D.C. 20005
(202) 347-7834
Internet site: gopher://sunbird.usd.edu:72

Agency for Instructional Technology (Bloomington, IN)
Publications: Technos magazine, Box A Bloomington, IN 47402-0120
(812) 333-4218 (fax)

Association for Supervision and Curriculum Development (ASCD)
Publications and Training Institutes
1250 North Pitt Street Alexandria, VA 22314 (703) 549-9110
Internet sites: http://www.ascd.org and gopher://gopher.ascd.org

Center for Special Education Technology
Council for Exceptional Children
1920 Association Drive Reston, VA 22091
(703) 620-3660
Internet site will be launched in early 1996. Check University of Kansas for the URL.

Center for the Study of Rural Librarianship
College of Library Science, Clarion University of Pennsylvania, Clarion, PA 16214
(814) 226-2383

Corporation for Educational Technology
Buddy System Project places technology in the homes and classrooms of Indiana students in grades 4-5 through a competitive grant process. Local coordinators are given training to facilitate Buddy's mission of extending learning through cooperative home-school activities.
17 West Market Street, Suite 960 Indianapolis, IN 46204
(317) 464-2074

Council of Chief State School Officers
One Massachusetts Avenue, NW, Suite 700 Washington, D.C. 20001-1431
(202) 336-7000
Internet site: http://www.ccsso.org

Council of Great City Schools.
1301 Pennsylvania Avenue, N.W., Suite 702, Washington, D.C. 20004
202-393-2427, 202-393-2400 (fax)
Internet site: http://www.cgcs.org

EDUCOM
Conferences, publications, higher education software awards (videos of award winners)
Suite 600, 1112 Sixteenth Street, NW Washington, D.C. 20036
(202) 872-4200
Internet site: http://educom.edu

Eisenhower National Clearinghouse for Math & Science Education
Ohio State University
1929 Kenny Road Columbus, OH 43210-1079
Internet site: http://www.enc.org

George Lucas Education Foundation
Publications: Edutopia
P.O. Box 3493 San Rafael, CA. 94912
(415) 662-1600
Internet sites: http://glef.org and gopher://glef.org

Institute for Educational Leadership
1001 Connecticut Avenue, NW - Suite 310 Washington, D.C. 20036
(202) 822-8405

Institute for Technological Solutions
Consulting services, fax newsletter
4419 Harrison Street, NW Washington, D.C. 20015
(202) 244-5697

Institute for the Transfer of Technology to Education (ITTE)-
[National School Boards Association]
1680 Duke Street Alexandria, VA 22314
(703) 838-6722
Internet site:http://www.nsba.org/itte/index.htmland NSBA's electronic newsletter at
http://www.access.digex.net/~nsbamags/e-school.html

Interactive Multimedia Association (IMA)
Trade association for companies in the industry. Members are listed in the IMA directory & database. The 'Standards' project encourages compatibility of multimedia hardware & software.
Publications: Interactive Multimedia News
Physical address: 3 Church Circle, Suite 800.
48 Maryland Ave.; Suite 202 Annapolis, MD 21401
(410) 626-1380
Internet site: http://www.ima.org

International Communications Industry Association (ICIA)
Catalog of multimedia hardware and services 3150 Spring Street Fairfax, VA 22031
(703) 273-7200

International Interactive Communications Society (IICS):
Network of several users groups both domestic and worldwide. Monthly meetings, seminars newsletter, teleconferences. Instructional Designers.
(503) 579-IICS, (503) 579-6272 (fax); iics@netcom.com
Internet site: http://www.iics.org

International Society for Technology in Education (ISTE)
Publications: Computing Teacher
University of Oregon 1787 Agate Street, Eugene, OR 97403-9905
(503) 346-4414
Internet sites:http://isteonline.uoregon.edu and gopher://isteonline.uoregon.edu America Online: FORUM on Technology in Education and Training by ISTE

Mathematics & Science Center (Museum)
2401 Hartman Street Richmond, VA 23223
(804) 788-4454

National Alliance for Business.
Conferences which feature educational technology demos.
1201 New York Avenue, NW Washington, D.C.
(202) 289-2888

National Association of Independent Schools
1620 L Street, NW; 11th Floor Washington, D.C. 20036
(202) 833-4757

National Center on Adult Literacy
University of Pennsylvania, 3910 Chestnut Street, Philadelphia, PA 19104-3111
215-898-2100, Fax 215-898-9804
E-mail: NCAL@literacy.upenn.edu

National Center for Research on Teacher Learning
118-TH Erickson Hall, Michigan State University, East Lansing, MI 48824-1034
(517) 353-4994
Internet site: http://litserver.literacy.upenn.edu

National Commission on Libraries and Information Science
Report on public libraries and the internet
1110 Vermont Avenue, NW; Suite 820 Washington, D.C. 20005-3522.
(202) 606-9200

National Education Association (Internet site: http://www.nea.org).
National Center for Innovation
1201 Sixteenth Street, NW Washington, D.C. 20036
(202) 833-4000

National Foundation for the Improvement of Education
Christa McAuliffe Institute for Educational Pioneering
1201 Sixteenth Street, N.W. Washington, D.C. 20036
(202) 822-7840

National Geographic Society Educational Technologies
1145 17th Street, NW Washington, D.C. 20036
(202) 828-5664

National Learning Foundation
11 Dupont Circle, NW Washington, DC. 20036-1271
(202) 797-0065

National School Boards Association
(See Institute for the Transfer of Technology to Education)

Society for Applied Learning Technology (SALT)
50 Culpepper Street Warrenton, VA 2186
(800) 457-6812
Internet site: http://www.salt.org

Software Publishers Association
Educational Software Competitions; Studies;
1730 M Street, NW; Suite 700; Washington, DC 20036
(202) 452-1600; Fax: (202) 785-3649
Internet site:http://www.spa.org

Stewart Publishing, Inc.
Interactive Healthcare conference
6471 Merritt Court Alexandria, VA 22312
(703) 354-8155, (703) 354-2177 (fax)
Internet site will be launched in 1996.

TERC
Internet site:http://hub.terc.edu:70/hub/owner/TERC

United States Coalition for Education for All (USCEFA)
Coalition of individuals and organizations working to promote access to opportunities for quality basic education and lifelong learning for all.
1616 N. Fort Myer Drive, Suite 1100 Arlington, VA. 22209
(703) 528-7474, (703) 528-7480 (fax)

U.S. Government Resources

Department of Education -
Internet sites:gopher://gopher.ed.gov/Department-Wide Initiatives/Technology Web site:http://www.ed.gov
AskEric education clearinghouse:http://ericir.syr.edu

Technology Resources Center
Office of Education Research & Innovation
555 New Jersey Avenue Washington, D.C. 20208
(202) 219-1699

NIH-The Learning Center for Interactive Technology, Cognitive Science Branch (formerly Education Technology Branch) The Center is the setting for the use, investigation, and demonstration of new and effective applications to faculties and staff of health sciences institutions.
8600 Rockville Pike Bethesda, MD 20894
(301) 496-6280
Internet site: http://wwwcgsb.nlm.nih.gov Courseware database: (/coursedb/index.html)

Research for Better Schools
444 North 3rd Street Philadelphia, PA 19123
(215) 574-9300
Internet sites:http://www.rbs.org and gopher//:gopher.rbs.org

Office for Technology Assessment
Reports on educational technology & teacher training
Washington, D.C. 20510-8025
(202) 224-8996, (202) 228-6098 (fax)
Anonymous FTP site: ftp://otabbs.ota.gov
login: guest, password: guest or login: anonymous, password: (your e-mail address) *Note, OTA may change their logon procedure

AED

Academy for Educational Development

Periodicals

CAUSE
CAUSE is a professional association for computing and information technology in higher education.
CAUSE Pub.: 4840 Pearl East Circle, Suite 302E, Boulder, CO 80301.
(303) 449-4430, (303) 440-0461; INFO@CAUSE.COLORADO.EDU
URL: gopher://cause-gopher.colorado.edu, http://cause-www.colorado.edu

*CBT Solutions (*formerly *CBT Directions)*
Journal for Professionals producing Computer Based Training.
Weingarten Publications, 38 Chauncy Street, Boston, MA 02111.
(617) 542-0146, (617) 749-3372 (fax)

Chronicle of Higher Education
Occasional articles on technology or multimedia.
1255 23rd Street, NW; Washington, DC 20037 (202) 466-1000

Computing Teacher (Now *Learning and Leading with Technology*)
Eugene, OR: International Society for Technology in Education
(503) 346-4414. (503) 346-5890 (fax)
http://isteonline.uoregon.edu:80/istehome/PUBS/publications.html

Ed-Tech Review
Charlottesville, VA:
Association for the Advancement of Computing in Education.
(804) 973-3987, (804) 978-7449 (fax)
gopher://state.virginia.edu:70/11/AACE%20Publications/Journals

Educational Leadership
ASCD: 1250 North Pitt Alexandria, VA 22314
(703) 549-9110, (703) 836-7921 (fax)
gopher://sunbird.usd.edu:72/11/publications/Periodicals

Educom Review
Educom:1112 16th Street, Washington, D.C. 20036
(202) 872-4200, (202) 872-4318 (fax); info@educom.edu
http://educom.edu/web/edreview.html

Edutopia
George Lucas Learning Foundation: P.O. Box 3494, San Rafael, CA 94912
(415) 662-1600, (415) 662-1605 (fax)
http://glef.org/glhttp/edutopia.html

Electronic Learning
Scholastic: 730 Broadway; New York, NY 10003
(212) 505-4900, (212) 505-4969, (212) 260-8587 (fax)

Electronic Schools
Articles on technology and multimedia.
Alexandria, VA: National School Boards Association-
Institute for the Transfer of Technology to Education
(703) 838-NSBA, (703) 548-5560 (fax)
http://www.access.digex.net/~nsbamags/e-school.html

Executive Educator
Occasional articles on technology and multimedia.
Alexandria, VA: National School Boards Association-
Institute for the Transfer of Technology to Education
(703) 838-NSBA, (703) 548-5560 (fax)

Hands On (Hands-on math and science learning)
TERC: 2067 Massachusetts Avenue, Cambridge, MA 02140
(617) 547-0430 e-mail: Peggy_Kapisovsky@TERC.edu
http://hub.terc.edu:70/1/hub/owner/TERC/Hands_On

IEEE multimedia
10662 Los Vaqueros Circle, Los Alamitos, CA 90720:
IEEE Computer Society (single issue came out spring 1994)
(714) 821-8380.

IICS Reporter
(Monthly newsletter for IICS members)
International Interactive Communications Society:
14657 SW Teal Blvd., Suite 119; Beaverton, OR 97007.
(503) 579-IICS, (503) 579-6272 (fax); mltimedia@aol.com, iics@netcom.com
URL: http://www.iics.org

Instructional Technology
Girard Assoc.: Box 455, 399 Howard Blvd.; Arlington, NJ 07856
(201) 398-5524

Interactive Multimedia News
Covers business aspects of multimedia industry.
Interactive Multimedia Association: 3 Church Circle, Ste. 800 Annapolis, MD 21401.
(410) 626-1380
http://www.ima.org/hot-top/newslet/index.html

Journal of Educational Multimedia and Hypermedia
Charlottesville, VA.: Association for the Advancement of Computing in Education.
(804) 978-7449 (fax)

Journal of Instructional Delivery Systems
Bi-annual buyers' guide which evaluates multimedia authoring systems and hardware.
Communicative Technology Corp., 50 Culpeper St., Warrenton, VA 22186.
(703) 347-0055

Journal of Technology and Teacher Education
Charlottesville, VA: Association for the Advancement of Computing in Education.
(804) 978-7449 (fax)
gopher://state.virginia.edu:70/11/AACE%20Publications/Journals

Learning and Leading with Technology
Eugene, OR: International Society for Technology in Education
(503) 346-4414, (503) 346-5890 (fax)
http://isteonline.uoregon.edu:80/istehome/PUBS/publications.html

Multimedia Business Report (weekly publication)
SIMBA Information, Inc.: Box 7430, Wilton, CT 06897
(203) 834-0033, (203) 834-1771 (fax)

The Multimedia Monitor (formerly Videodisc & Multimedia Monitor)
Future Systems, P.O. Box 26, Falls Church, VA 22046-0026.
(703) 241-1799, (703) 532-0529 (fax).

Multimedia Schools
Online Inc., 462 Danbury Road, Wilton, CT 06897-2126.
(800) 248-8466, (203) 761-1466; (203) 761-1444 (fax)

Multimedia Today (formerly Multimedia Solutions by IBM)
Covers both education and training. Includes catalog of applications as well as hardware.
660 Beachland Blvd., Vero Beach, FL 32963-1794.
(800) 779-2062, (404) 238-4298 (fax).

Multimedia Week
Business information on marketing multimedia.
Phillips Business Information: 1201 Seven Locks Road, Ste. 300, Potomac, MD 20854.
(301) 340-1520, (301) 424-4297 (fax)

Multimedia World
(targeted more for home users & entertainment)
PC World Communications, Inc.: 501 Second St., #600, San Francicso, CA 94107.
(413) 637-4343 (fax)

NCAL Connections
Occasional articles on technology and multimedia.
National Center on Adult Literacy:
3910 Chestnut Street; University of Pennsylvania; Philadelphia, PA 19104-3111

(215) 898-2100; (215) 898-9804 mailbox@literacy.upenn.edu
Gopher:gopher://litserver.literacy.upenn.edu

NEA Today
Occasional articles on technology and multimedia
National Education Assoc. 1201 16th St., NW; Washington, D.C. 20036
(202) 822-7207, (202) 822-7206 (fax)

New Media
(targeted more for home users & entertainment)
P.O. Box 5310, Pittsfield, MA 01203-9998 (415) 573-5170, (415) 573-4343 (fax)

NSBA's Insider's Letter
Occasional articles on technology and multimedia.
Alexandria, VA: National School Boards Association-
Institute for the Transfer of Technology to Education
(703) 838-NSBA, (703) 548-5560 (fax)

The Online Educator
Hass Associates: Box 251141; West Bloomfield, MI 48325.
(810) 932-3993

Syllabus
Apple Computer:
1307 South Mary Avenue, Suite. 211; Sunnyvale, CA 94087-0716.
(408) 746-2000, (408) 746-2711 (fax)
http://www.syllabus.com/syllmag.html

Tech Trends
AECT
gopher://sunbird.usd.edu:72/11/publications/Periodicals

Technology & Learning
Peter Li, Inc.: 2169 E. Francisco Blvd.; San Rafael, CA 94901
(415) 457-4333, (415) 457-4379 (fax)

Technos: Quarterly for Education & Technology
Agency for Instructional Technology: Box A, Bloomington, IN 47402-0120
(812) 333-4218 (fax)

T.H.E. Journal (Technological Horizons in Education)
Journal is free to qualified educators.
P.O. Box 17239, Irvine, California 92713.
(714) 261-0366, (714) 730-3739 (fax)
URL:http://www.thejournal.com

TABLE OF CONTENTS

ARTS: Fine Arts 1
ARTS: Music 3
Biology (See SCIENCE: Life Science)
BUSINESS (Also see TRAINING: Business) 4
CAREER GUIDANCE/COLLEGE GUIDANCE 4
Chemistry (See SCIENCE: Physics & Chemistry)
Computers (See TRAINING: Technical - Computers)
CONSUMER GUIDANCE 4
Earth Science (See SCIENCE: Physics & Chemistry)
Electronics (See TRAINING: Technical - Electronics)
Environmental Science (See SCIENCE: Earth & Environmental)
Fine Arts (See ARTS: Fine Arts)
Foreign Language (See LANGUAGE ARTS: Foreign Language)
Government (See SOCIAL SCIENCE: Government & Political Science)
HEALTH (See also TRAINING: Medical) 4
History (See SOCIAL SCIENCE: History)
Industrial & Safety Training (See TRAINING: Industrial & Safety)
LANGUAGE ARTS: Foreign Language/ English as a Second or Foreign Language 5
LANGUAGE ARTS: Literacy 6
LANGUAGE ARTS: Literature 7
Law (See TRAINING: Law)
Life Science (See SCIENCE: Life)
Literacy (See LANGUAGE: Literecy)
Literature (See LANGUAGE ARTS: Literature)
MATHEMATICS 8
Medical Training (See TRAINING: Medical)
Music (See ARTS: Music)
Physics (See SCIENCE: Physics & Chemistry)
REFERENCE 9
SCIENCE: Earth & Environmental 10
SCIENCE: General 11
SCIENCE: Life (See also Health) 12
SCIENCE: Physics & Chemistry 14
SCIENCE: Space 16
SOCIAL SCIENCE: Government & Political Science 16
SOCIAL SCIENCE: History 17
SOCIAL SCIENCE: Social Studies 19
Space (See SCIENCE: Space)
SPECIAL NEEDS (Assistive Technology & Special Education) 20
Teacher Training (See TRAINING: Teacher)
TRAINING: Business 20
TRAINING: Law 21
TRAINING: Medical 21
TRAINING: Teacher 23
TRAINING: Technical - Computers 23
TRAINING: Technical - Electronics & Electrical Safety 23
TRAINING: Technical - Industrial & Safety 24
VIRTUAL REALITY 24

ARTS: Fine Arts

Title: American Abstraction: 1930-1945
Format: Level III
Year: 1989
Producer: Lunaria Incorporated and Smithsonian Office of Telecommunications
Publisher: Lunaria Incorporated, 1100 S. Washington Street, Alexandria, VA 22314
Telephone: 703-739-9460, 202-357-2984
Hardware: IBM InfoWindow System
Abstract: Designed for an exhibit on abstract art at the National Museum of American Art, this program lets nine artists explain in their own words what contributed to their becoming artists, how they work as artists, and how the times (1930s to present) influenced their work.

Title: American Art from the National Gallery of Art
Format: Level I
Year: 1993
Producer: National Gallery of Art Department of Education Resources
Publisher: Voyager Company
Telephone: 800-446-2001, 310-451-1383
Hardware: Videodisc Player, video monitor, bar coder and/or remote controller
Abstract: The disc contains virtually the entire American art collection of the National Gallery of Art. The compendium of over 2600 works is complemented by a full-motion introduction narrated by Earl A. Powell, III, Director of the National Gallery.

Title: The Art of the Czars
Format: CD-I
Year: 1992
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-624-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Interactive maps of the Hermitage and St. Petersburg are complemented by brief documentaries about the Czars of Russia. Music by Tchaikovsky and Rachmaninov can be heard in the background.

Title: Art or Forgery? The Strange Case of Han Van Meegeren
Format: Level III
Year: 1992
Producer: Center for Design of Educational Computing, Carnegie Mellon University 412-268-7643
Publisher: Intellimation, P.O. Box 1922, Santa Barbara, CA 93116
Telephone: 800-346-8355
Hardware: IBM InfoWindow System
Abstract: A true case history. Faced with death for collaborating with the Nazis, Van Meegeren alleges that he did not steal and sell several Vermeer paintings, but instead forged them. The penalty for forgery was only four years. Users examine and compare known Van Meegeren and Vermeer paintings, while receiving updates about the facts of the case-- just as the art experts of the time uncovered new facts as they explored this fascinating case.

Title: The French Impressionists
Format: CD-I

Year: 1991
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800 824 2567, fax: 818 785 0531
Hardware: Color TV, CD-I Player
Abstract: What drove this handful of men and women to come together and revolutionize the world of art? The dramatized voyage through 19th century Paris will take the viewer to meet the artists and their critics, friends and lovers at close hand.

Title: The Louvre (3)
Format: Level I/III
Year: 1989
Producer: ODA; The Louvre Museum
Publisher: Voyager Company
Telephone: 800-446-2001, 310-451-1383
Hardware: Pioneer Videodisc Player, video monitor, bar coder and/or remote controller
Abstract: The three discs contain images of 2500 paintings and drawings, 1000 sculptures and objects d'art, and 1000 masterpieces of antiquities. The printed catalogue includes the artist and date for each work. Audio tours provide additional commentary and analysis. The videodisc companion contains powerful search, navigation and annotation tools.

Title: Microsoft Art Gallery
Format: CD-ROM
Year: 1993
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399
Telephone: 800-426-9400
Hardware: MPC
Abstract: Based on the collection of the National Gallery in London, this multimedia compendium can be accessed using powerful, yet user-friendly searching tools.

Title: The National Gallery of Art Laserguide
Format: Level III
Year: 1987
Producer: Videodisc Publishing Inc. 212-685-5522
Publisher: The Voyager Company, 2139 Manning Avenue, Los Angeles, CA 90025
Telephone: 213-474-0032, 800-446-2001
Hardware: Apple Macintosh II, Apple Color High Resolution RGB monitor, Pioneer LD-V6010, TV color monitor
Abstract: The National Gallery of Art disc contains photos of over 1500 art works from the Gallery's collection, plus motion sequences focusing on 23 of these works. The laserguide consists of two HyperCard stacks: the Gallery Index and the Gallery Laserguide. It includes an index of artists and a style/period index with descriptions and examples of each style or period. Other index categories include date, nationality and subject.

Title: National Portrait Gallery
Format: CD-ROM
Year: 1990
Producer: Abt Books & Smithsonian Institution
Publisher: Smithsonian Institution Press
Telephone: 800-782-4612
Hardware: M w/ CD-ROM drive
Abstract: Visual database of famous portraits from the National Portrait Gallery. Searching software provides quick access to artwork.

Title: New Ways of Seeing: Picasso, Braque and the Cubist Revolution
Format: Level I
Year: 1989
Producer: Philip Morris; Minkoff/Clayman Productions; Museum of Modern Art
Publisher: Films, Inc.
Telephone: 800-343-4312
Hardware: Pioneer Videodisc Player, video monitor, bar coder and/or remote controller
Abstract: Based on 1989 exhibit which showed how collaboration between Picasso and Braque created Cubism, the movement that influenced modern art. Side 2 of the disc includes a "behind-the-scenes" look which captures the excitement of creating a major international exhibition.

Title: The Renaissance of Florence
Format: CD-I
Year: 1991
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Travel back in time to the dawn of a new age: the Era of the Renaissance, and explore the art of the 15th century Florence. Contains more than 600 art images.

Title: The Renaissance Gallery
Format: CD-I
Year: 1991
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Explore Italian Ranaissance, from the early Giotto frescos to the triumph of Michelangelo's Sistine Chapel. You can also hear eight Renaissance concerts, or browse through the Reference Gallery.

Title: Time-Life Photography
Format: CD-I
Year: 1990
Producer: S ne as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: In 25 step-by-step workshops, you will learn all the basic techniques of autofocus photography. Camera shots are simulated by letting the user select speed, lighting and aperture settings. One can experiment with a variety of techniques and see the results instantly without wasting any film.

Title: Treasures of the Smithsonian
Format: CD-I
Year: 1990
Producer: Same as Publisher
Publisher: Philips Media, 11111 Santa Monica Blvd, Los Angeles, C 90025
Telephone: 800-824-2567, fax: 818-785-0531

Hardware: Color TV, CD I Player
Abstract: Survey the highlights of a dozen museums and the National Zoo organized by museum, category, date, or theme. Then get details of who, what, where and when; and explore links between objects.

Title: Van Gogh, A Portrait in Two Parts
Format: Level I
Year: 1982
Producer: Phillips Corporation
Publisher: Voyager Company
Telephone: 800-446-2001
Hardware: Pionaer Videodisc Player, video monitor, bar coder and/or remote controller
Abstract: Leonard Nimoy narrates this disc on the life and art of Vincent Van Gogh. Nimoy also performs a one-man play about Van Gogh from the point of view of Theo, Van Gogh's brother.

Title: The World of Impressionism
Format: CD-I
Year: 1991
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: This colorful overview of the Impressionist movement includes the works of Debussy, Ravel, Monet and Renoir. The user can take a tour of old Monmartre using a map of Paris from the 19th century.

ARTS: Music

Title: Classical Guitar
Format: CD-I
Year: 1992
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Learn to play Classical Guitar with private lessons customized to your skill. Other options include: Guitar Museum, Rhythm Box, Glossary, and Concert Hall.

Title: The Delaware Music Series
Format: Level I
Year: 1985
Producer: Same as Publisher
Publisher: The University of Delaware
Telephone: 302-831-8162
Hardware: TV color monitor, Pioneer LD-V2000
Abstract: Created for use as educational video aids, these videodiscs include scrolling scores, instrument stills, historical photographs, live performances of chamber music, score analysis and form analysis.

Title: Microsoft Multimedia Stravinsky
Format: D-ROM
Year: 993
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399
Telephone: 800-426-9400
Hardware: MPC
Abstract: Robert Winter collaborated on this exploration of Stravinsky and his masterpiece, the Rite of Spring. A game tests the student's knowledge.

Title: Microsoft Musical Instruments
Format: CD-ROM
Year: 1992
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399
Telephone: 800-426-9400
Hardware: MPC
Abstract: This multimedia encyclopedia includes over 200 instruments from around the world. You can learn how an instrument works, and hear musical examples.

Title: Mozart: A Musical Biography
Format: CD-I
Year: 1991
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: This interactive musical biography on Mozart includes an activity to let you compose your own masterpiece using combinations of musical themes.

Title: Multimedia Beethoven: the Ninth Symphony
Format: CD-ROM
Year: 1992
Producer: Robert Winter with the Voyeger Company
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399
Telephone: 800-426-9400
Hardware: MPC
Abstract: Commentary and analysis accompany each phrase of music in this masterpiece. The Art of Listening explains basic musical concepts, illustrated with examples from the Ninth Symphony. Beethoven's World is a short biography which examines the influances that shaped his music.

Title: The Orchestra: The Instrument Revealed
Format: CD-ROM
Year: 1991
Producer: Time Warner Interactive
Publisher: P.O. Box 30621, Tampa, FL 33630-0621
Telephone: (No longer taking phone orders)
Hardware: Macintosh w/ CD-ROM drive
Abstract: Benjamin Britten's composition, 'The Young Person's Guide to the Orchestra', is enhanced with an interactive map of the orchestra which highlights instruments as they are featured. Several lessons and activities introduce students to the instruments and to conducting.

BUSINESS (Also see TRAINING: Business)

Title: CD-MAX
Format: CD-ROM
Year: 1995
Producer: Same as Publisher
Publisher: CD-MAX, 219 South Street, Suite 203, Murray Hill, NJ 07974 2100
Telephone: 908-771-0022
Hardware: CD-ROM or modem
Abstract: This system allows electronic publishers to distribute information in a way that protects copyright while billing users based on usage. The 'pay as you go' system uses 'economies of scale' to make information more affordable and accessible.

Title: Lotus Notes Working Model CD
Format: CD-ROM
Year: 1994
Producer: Lotus Development Corporation
Publisher: Lotus Development Corporation
Telephone:
Hardware: MPC
Abstract: Overview of a groupware productivity application.

Title: Microsoft Works
Format: CD-ROM
Year: 1991
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399
Telephone: 800-426-9400
Hardware: MPC
Abstract: This integrated software package includes a multimedia animated tutorial which teaches the basics of the word processor, the spreadsheet, and the database.

CAREER GUIDANCE/COLLEGE GUIDANCE
(See also "Career Roundup" in LANGUAGE ARTS: Literacy section)

Title: College U.S.A.
Format: Level I
Year: 1986
Producer: Same as Publisher
Publisher: Info-Disc Corp.
Telephone: 800-648-6422, 301-948-2300
Hardware: Videodisc Player, video monitor, remote controller
Abstract: Videodiscs offer quick access to an archive of video tours of several universities.

Title: Make It America
Format: CD-ROM
Year: 1996
Producer: Manufacturing Inst., 1331 Penn. Ave, NW Suite 1500, Washington DC 20004
Publisher: The Mazer Corporation, PO Box 1400K, Dayton, Ohio 45413-9903
Telephone:
Hardware: MPC (386DX, 6MB RAM, CD-ROM, soundcard), or Mac Sys. 7.0 w/ CD-ROM
Abstract: Students can explore careers in today's high-tech manufacturing companies by touring several companies and trying business simulations.

Title: One-on-One With the SAT
Format: Diskettes
Year: 1995
Producer: The College Board, 45 Columbus Ave., Room 624, New York, NY 10133-0035
Publisher: Same as Producer
Telephone: 800-323-7155
Hardware: PC 386, Win 3.1, 4 MB RAM, sound card, VGA monitor.
Abstract: SAT preparation program which uses actual SAT tests to help students identify their strengths and weaknesses. Students can pick one of four 'advisors' who provide varying levels of assistance and humor. Test-taking strategies, glossaries and a calculator are included. The optional Counselor Utility lets counselors view student reports and maintain student records.

Title: Passport to Your Future
Format: Level III
Year: 1992
Producer: Same as Publisher
Publisher: Network Data Systems, Inc.
Telephone: 800-544-8970, 313-732-6340
Hardware: Info window system Touchscreen monitor or keyboard, Dot matrix printer
Abstract: Counsellors can aid students and adults in education and job exploration with Passport to Your Future's surveys on interests, values, aptitude and education, along with basic profiles on colleges, universities and potential careers. As viewers progress, their selections on what is important and of interest to them are catalogued into final recommendations on which careers and schools are best suited for them. These conclusions may be printed and fastened in a passport cover for users' future reference. Accessories: System Manager's Guide, passport covers.

Title: Tuition Funding Strategies
Format: CD-ROM
Year: 1994-1995
Producer: Same as Publisher
Publisher: Falcon Publishing
Telephone: 800-232-4004, 801-943-7676
Hardware: MPC
Abstract: Comprehensive resource for financial aid, scholarships and colleges. Students can search through scholarships by category, geographical location, college major and more. In the college section, students can get general information, view photographs and fill out online application forms. Pepsi provides this free resource to schools upon request.

COMPUTERS (See TRAINING: Technical - Computers)
CONSUMER PRODUCTS

Title: Remodeling Your Home
Format: CD-ROM
Year: 1996
Producer: Same as Publisher
Publisher: Multicom Publishing, 1100 Olive Way, Suite 1250, Seattle, WA 98101
Telephone: 800-850-7272, 206-622-5530, www.multicom.com
Hardware: Macintosh, IBM PC or compatible; videodisc player & TV monitor
Abstract: This hybrid disc contains a wealth of information on home remodeling and multiple links to related sites on the Internet containng updated information. Dozens of floorplans and photographs (organized by criteria such as room and color) link to a floor plan editor, which allows user to modify and render a customized design. In the Virtual Gallery, VR Quicktime allows users to rotate their perspective 360 degrees to see a video of an entire room and then zoom in on any detail in the room. A Materials Guide includes information on selecting and costing materials.

ELECTRONICS (See TRAINING: Technical - Electronics)

FOREIGN LANGUAGE (See LANGUAGE ARTS: Foreign Language)

HEALTH (See also TRAINING: Medical)

Title: AIDS
Format: Level I/III
Year: 1990
Producer: ABC News Interactive, 7 W. 66 St. 4th Fl., NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Macintosh, IBM PC or compatible; videodisc player & TV monitor
Abstract: Former surgeon general C. Everett Koop gives comprehensive, factual overviews of HIV (the virus which causes AIDS), ways in which it can be transmitted and how it affects society. On the second side of tha disc, teenagers talk frankly about issues and interview people living with AIDS. All text and audio is available in Spanish and in English.

Title: Mayo Clinic Family Health
Format: CD-ROM
Year: 1996
Producer: Same as Publisher
Publisher: IVI Publishing, 7500 Flying Cloud Dr., Minneapolis, MN 55344-3739
Telephone: 1-800-432-1332, www.ivi.com
Hardware: PC (486SX, 8MB RAM, 2X CD-ROM, sound card, Win 3.1 or Win 95.
Abstract: User friendly comprehensive multimedia health reference which includes videos, animations, simulations and a powerful search engine. Video guided tour provides overview to material on the disc. New sections include targetted information for age groups, and extensive data on medications.

Title: TIP-AAIDS (Target Interactive Project)
Format: Level III
Year: 989
Producer: .ame as Publisher
Publisher: National Federation of State High School Associations/TARGET
Telephone: 800-366-6667
Hardware: IBM PS/2 Model 50Z w/ M-Motion video overlay card, Pioneer 8000 & touchscreen monitor. IBM PC or compatible w/ mouse, videodisc player & TV monitor.
Abstract: Dramatization, fact sheets and multiple choice quizzes are combined in this interactive videodisc to heighten the awareness of high school students to the dangers -- both real and imaginary -- of HIV and AIDS. In addition to learning fundamental health safety precautions and statistics, students can see how to apply those lessons in several common social situations and types of relationships. Using a touchscreen monitor, students make decisions for teenage characters portrayed in the videos about drinking, drugs and sex, noting either their refusal techniques or ramifications of their actions. A question and answer section reinforces facts and dispels myths about HIV, AIDS, other STDs, and drug and alcohol abuse.

Title: TIP-DART (Target Interactive Project)
Format: Level III
Year: 1989
Producer: Same as Publisher
Publisher: National Federation of State High School Associations/TARGET
Telephone: 800-366-6667
Hardware: IBM PS/2 Model 30 or higher, touchscreen monitor, Pioneer LD-V6200A. IBM PC or compatible w/ mouse, videodisc player & TV monitor.
Abstract: Designed to teach high school students about the dangers of drug and alcohol use, this kiosk-style interactive video lets viewers make decisions for any one of seven characters at a party and see the consaquences of these choices. The program also provides the opportunity to hear the thoughts of characters when confronted with decisions and contains a knowledge vs. opinion survey on drugs and alcohol and the consequences of their use.

Title: Tobacco
Format: Level I/III
Year: 1992
Producer: ABC News Interactive, 7 W. 66 Street, 4th Fl., NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Macintosh, IBM PC or compatible; videodisc player & TV monitor
Abstract: Former Surgeon General C. Everett Koop narrates this educational program to teach people about the health risks of tobacco use. The Tobacco and Society section covers a history of tobacco advertising, social attitudes towards tobacco use, and the power of the tobacco industry.

Title: USP DI Visualized - About Your Diabetes
Format: CD-I
Year: 1993
Producer: Same as Publisher
Publisher: United States Pharmacopeial Convention, Inc., 12601 Twinbrook Parkway, Rockville, Maryland 20852
Telephone: 800-227-8772
Hardware: Color TV, CD-I Player
Abstract: Provides patients with basic information about diabetes, treatment and monitoring. Cosponsored by the America Diabetes Asso tion.

LANGUAGE ARTS: Foreign Language/ English as a Second or Foreign Language

Title: A la Rencontre de Phillippe
Format: Level III
Year: 1993
Producer: MIT Laboratory for Advanced Technology in the Humanities 617 253 2094
Publisher: Mary Coleman, Yale University Press, 92A Yale Station, New Haven CN 06520. e-mail:coleman@yalevm.bitnet
Telephone: 203-432-0912
Hardware: Apple MacIntosh II and Pioneer LD-V4200
Abstract: Developed for students of intermediate French. This program is a fictional story about a young writer who must solve his romantic problems or find a new apartment in Paris. Filmed on location, the story features numerous options for action and opportunities to use maps of Paris, answer or make telephone calls, read classified ads, and move through authentic Paris apartments.

Title: Diez Temas Interactivos
Format: Level I/III
Year: 1992
Producer: Same as Publisher
Publisher: Encyclopedia Britannica
Telephone: 800-554-9862
Hardware: Macintosh or IBM, videodisc player and TV monitor
Abstract: Beginning Spanish instruction with interactive lessons to teach vocabulary, listening comprehension and culture.

Title: Ellis ESL/EFL
Format: Level III
Year: 1992
Producer: Same as Publisher
Publisher: CALI, 734 E. Utah Valley Dr., Building 1, Suite 200, American Fork, UT 84003
Telephone: 801-756-1011
Hardware: IBM w/ multimedia. Newer version: LAN or CD-ROM with MPEG compression card. Older version: CD-ROM w/ videodisc player & video overlay card.
Abstract: Curriculum based course to teach ESL (English as a Second Language) through conversations with hypertext links to a grammar book, dictionary definitions, culture notes and pronunciations. The pronunciation portion uses an 'x-ray' animation to demonstrate the proper utilization of the lips, tongue and vocal cords to make a particular sound. Students can record their pronunciation and compare it to the pronunciation in the video.

Title: Language Lab Toolkit
Format: CD-ROM
Year: 1995
Producer: Same as Publisher
Publisher: Amtex, P.O. Box 572, Belleville, Ontario, Canada K8N 5B2
Telephone: 613-967-7900, Fax: 613-967-7902
Hardware: IBM with sound card, microphone and CD-ROM drive
Abstract: This multimedia toolkit allow teachers to create customized dictation and pronunciation exercises. After listening to a dictation, the student can type in words and receive hints and feedback from the computer to fill in the entire sentence correctly. Pronunciation exercises allow the students to see the contrast between their pronunciation with the teacher's through a visual nalysis of the voices. Languages: English, Spanish, German, French, Italian.

Title: Russian Listening Comprehension
Format: Level III
Year: 1991
Producer: Same as Publisher
Publisher: United State Army/Defense Language Institute Foreign Language Center
Telephone: 408-647-5323
Hardware: IBM, Pioneer LD-V4200
Abstract: This language lab tool teaches listening comprehension through a series of exercises.

Title: Spanish Listening Comprehension
Format: Level III
Year: 1991
Producer: Same as Publisher
Publisher: United State Army/Defense Language Institute Foreign Language Center
Telephone: 408-647-5323
Hardware: IBM, Pioneer LD-V4200
Abstract: This language lab tool teaches listening comprehension through a series of exercises.

Title: Rosetta Stone
Format: CD-ROM
Year: 1993
Producer: Same as Publisher
Publisher: Fairfield Language Tech., 122 S. Main St., Ste. 400, Harrisonburg, VA 22801
Telephone: 800-788-0822, 703-432-6166, fax: 703-432-0953
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Five languages can be learned through immersion exercises based on natural learning theory. Through trial-and-error discovery, students learn basic vocabulary, adjectives, verbs, grammar and pronunciation. Dictation exercises are included. Difficulty levels range from beginner to expert.

LANGUAGE ARTS: Literacy

Title: A Visit to Sesame Street: Letters
Format: CD-I
Year: 1991
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Children can play games with Sesame Street characters while learning their letters as well as important concepts like 'near and far'.

Title: Berenstain Bears: On Their Own
Format: CD-I
Year: 1993
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Children learn responsible habits and school skills through completing a series of learning games found throughout Bear Country. Ac s include: packing

a nutritious lunch, counting, reading a grocery list, telling time, using a telephone, and recognizing traffic signals.

Title: Career Roundup
Format: CD-ROM
Year: 1993
Producer: Interactive Knowledge and Lynchburg City Schools
Publisher: Interactive Knowledge, PO Box 560865, Charlotte, NC 28256
Telephone: 704-549-9646
Hardware: Macintosh w/ CD-ROM
Abstract: A series of reading comprehension and vocabulary exercises based on careers (dental assisting, construction and retail).

Title: Channel R.E.A.D. Videodisc Series
Format: Level I
Year: 1994
Producer: Same as Publisher
Publisher: Houghton Mifflin Company
Telephone: 800-758-6762, 617-725-5000
Hardware: Videodisc player and TV monitor
Abstract: Young students learn how to read by solving problems with the help of a space-age bookmobile.

Title: Cornerstone: Language Arts Series
Format: ILS
Year: 1993
Producer: Skills Bank, 15 Governor's Court, Baltimore, MD 21244
Publisher: Skills Bank
Telephone: 1-800-84-SKILL, 410-265-8874 (fax)
Hardware: ILS (Local Area Network)
Abstract: This basic skills series covers capitalization, spelling, punctuation and grammar through self-paced exercises which help students gain higher order skills. A comprehensive record keeping program tracks students' progress.

Title: Must Know Words Activity Disk
Format: CD-ROM
Year: 1992
Producer: Interactive Knowledge & Central Piedmont Community College
Publisher: Interactive Knowledge, PO Box 560865, Charlotte, NC 28256
Telephone: 704-549-9646
Hardware: Macintosh w/ CD-ROM drive
Abstract: A series of tests and drills on the 100 most commonly used English words.

Title: New Reader Bookstore
Format: CD-ROM
Year: 1992
Producer: Interactive Knowledge and Project READY-CPCC
Publisher: Interactive Knowledge, PO Box 560865, Charlotte, NC 28256
Telephone: 704-549-9646
Hardware: Macintosh w/ CD-ROM drive
Abstract: Series of reading comprehension exercises for new readers in which each story focuses on words beginning with a particular letter from the alphabet. Hard words are linked to audible dictionary definitions and vocabulary quizzes use multiple choice and fill-in-the-blank questions.

Title: Parenting
Format: CD-ROM
Year: 1993
Producer: Interactive Knowledge
Publisher: Interactive Knowledge, PO Box 560865, Charlotte, NC 28256
Telephone: 704-549-9646
Hardware: Macintosh w/ CD-ROM drive or MPC (286 with EGA is also possible)
Abstract: Series of reading comprehension and vocabulary exercises in which stories teach parents basic skills. Topics include teaching children discipline, planning a family budget, strategies to help children sleep and eat, and being involved in children's education.

Title: Project READY
Format: CD-ROM
Year: 1991
Producer: Interactive Knowledge
Publisher: Interactive Knowledge, PO Box 560865, Charlotte, NC 28256
Telephone: 704-549-9646
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Series of exercises that help students with reading comprehension and vocabulary.

Title: The TEXT Disc
Format: CD-ROM
Year: 1992
Producer: Interactive Knowledge & Literacy Systems Center, N.C. State Univ.
Publisher: Interactive Knowledge, PO Box 560865, Charlotte, NC 28256
Telephone: 704-549-9646
Hardware: IBM, Windows, CD-ROM drive & sound card
Abstract: A workplace literacy program for the textile industry. Reading comprehension exercises use hypertext links to glossaries and quizzes.

LANGUAGE ARTS: Literature

Title: Annabel's Dream of Ancient Egypt
Format: CD-ROM
Year: 1991
Producer: Same as Publisher
Publisher: Texas Caviar
Telephone: 512-346-7887
Hardware: MPC, Macintosh w/ CD-ROM drive
Abstract: Interactive children's story which integrates lessons about conflict resolution, sibling rivalry, ancient Egypt and the opera AIDA.

Title: Arthur's Teacher Trouble
Format: CD-ROM
Year: 1992
Producer: Same as Publisher
Publisher: Broderbund
Telephone: 800-521-6263, 415-382-4400
Hardware: MPC (w/SVGA) or Macintosh w/ CD-ROM drive; 4 MB RAM
Abstract: Interactive children's story with color animations, sound music. Text can be spoken and spelled. English and Spanish

Title: Great Literature Plus
Format: CD ROM
Year: 1993
Producer: Same as Publisher
Publisher: Bureau of Electronic Publishing, 141 New Road, Parsippany, NJ 07054
Telephone: 800-828 4766, 201-808 2700
Hardware: MPC or Macintosh w/ CD ROM drive
Abstract: Contains hundreds of the classics throughout history. Enhanced with audio and pictures. Search software allows full text searching.

Title: Just Grandma and Me
Format: CD-ROM
Year: 1992
Producer: Same as Publisher
Publisher: Broderbund
Telephone: 800-521-6263, 415-382-4400
Hardware: MPC (w/SVGA) or Macintosh w/ CD-ROM drive; 4 MB RAM
Abstract: Interactive children's story based on the popular book by Mercer Mayer. The graphic for each page contains dozens of 'hot spots' which launch playful animations. The text can be read aloud one word at a time. English, Spanish and Japanese.

Title: Illuminated Books and Manuscripts
Format: Level III
Year: 1992
Producer: Same as Publisher
Publisher: IBM Corporation, Educational Systems, P.O. 2150, Atlanta, GA 30055
Telephone: 800-426-4338
Hardware: IBM PS/2, Ultimedia Mod M57 SLC, 6MB RAM, 80MB HD, Keyboard and a mouse, IBM Internal CD-ROM Drive, Pioneer LD-V8000, M-ACPA audio card, Matrox Illuminator 16/micro channel video card
Abstract: Designed for users to fully explore five major works in five different literary genres. Using the manuscript as the primary interface metaphor, a user is presented with the text of the literary work as well as hypermedia tools for analysis and exploration. There are five reading tools that are available to the user: Define, Context, Interpret, Method, and Link. These allow the user to, among other things, explore more about the context in which the work was written, analyze a specific passage, and consult on-line references. In addition, the application has three Global Tools for navigation: Help, References (including: Biographies, Expanded Theme, Sources, Synopsis, etc.), and Mode (Explore, Analyze, Create). Complementing the 5 core literary works, the raw text for nearly 100 additional classics are included. The authoring tools provided allow users to illuminate these works as well as their own original manuscripts. The five illuminated manuscripts are:

Ulysses: This comprehensive analysis of Tennyson's Ulysses brings in a variety of perspectives. The user can hear the poem read by several different people, hear interpretations and opinions by a number of scholars, learn about Tennyson's life and his era, discover more about poetry and literary devices, or explore the Expanded Theme of Greek Mythology.

Letter from Birmingham Jail: The life, philosophy, and legacy of Dr. Martin Luther King, Jr. are the focus of this module. The user can hear the letter being ad, see video of Dr. King and other civil rights leaders, or learn more about il disobedience and the fight against racial discrimination.

Hamlet: The user can see the play performed, research Elizabethan verse, discover the historical context of the play, or learn more about character development.

Declaration of Independence: In this module, the user can uncover the events leading to the writing of the Declaration of Independence, learn more about the authors, or explore the universal struggle for liberty and independence.

Black Elk Speaks: This oral history describes the religion, culture, and everyday life of the Lakota Sioux Indians as told by the spiritual leader, Black Elk. Users can explore other historic examples of spiritual leaders as well as the complex interaction between Native Americans and other members of American society.

Title: New Kid on the Block
Format: CD-ROM
Year: 1993
Producer: Same as Publisher
Publisher: Broderbund
Telephone: 800-521-6263, 415-382-4400
Hardware: MPC (w/SVGA) or Macintosh w/ CD-ROM drive; 4 MB RAM
Abstract: Interactive children's story based on poems by Jack Prelutsky. The text can be read aloud one word at a time. English, Spanish and Japanese.

Title: Perseus-Interactive Resource on Ancient Greece
Format: Level III
Year: 1992
Producer: Yale University
Publisher: Annenberg CPB Collection
Telephone: 800-532-7637 (800-LEARNER), 805-869-8900
Hardware: Macintosh; CD-ROM and/or videodisc player with TV monitor
Abstract: Advanced tool for analyzing Greek literature, history archaeology and art. Works of literature can be viewed in Greek and in translation on the same screen with links to the Liddell-Scott Intermediate Greek-English Lexicon. Powerful search tools access items in the art catalog.

Title: Twain's World
Format: CD-ROM
Year: 1993
Producer: ..Same as publisher
Publisher: Bureau of Electronic Publishing, 141 New Road, Parsippany, NJ 07054
Telephone: 800-828-4766, 201-808-2700
Hardware: MPC
Abstract: Multimedia reference work includes full text of Mark Twain's writings, pictures, sounds and animations.

LAW: (See TRAINING: Law)

LITERATURE (See LANGUAGE ARTS: Literature)

MATHEMATICS

Title: The Adventures of Jasper Woodbury
Format: Level I/III
Year: 1988, 1989, 1992
Producer: Vanderbilt University Learning Technology Center
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 800-524-2481, 908-668-0022, Fax: 908-668-1322
Hardware: Videodisc player & TV monitor; Macintosh w/ 4 MB RAM
Abstract: Uses students' involvement in a story to stimulate enthusiasm for learning math. Students learn how to solve real-life problems by looking for numeric clues in short movies, and by breaking down complex 'word problems' into a series of simpler steps. Meets new standards for teaching math adopted by the National Council of Teachers of Math. Topics include geometry, statistics, probability, graphs, measurement and estimation.

Title: I Know Math
Format: CD-ROM
Year: 1992
Producer: Interactive Knowledge
Publisher: Interactive Knowledge, PO Box 560865, Charlotte, NC 28256
Telephone: 704-549-9646
Hardware: IBM 286, Windows 3.0, sound card, CD-ROM drive; Mac w/ CD-ROM drive
Abstract: A series of interactive exercises which show how to use math skills in daily life. Includes a record-keeping program.

Title: Interactive Modumath: Algebra
Format: Level III
Year: 1989
Producer: Same as Publisher
Publisher: Video-based Training And Education (VTAE), One Foundation Circle, Waunakee, WI 53597
Telephone: 800-821-6313, 608-831-6313
Hardware: New Media Graphics, InfoWindow, SonyVIEW, VTAE; CGA, EGA, SVGA, VGA, Touchscreen
Abstract: Developed primarily to meet the math needs of adult learners and non-traditional students. The Modumath package contains several interactive video lessons on disks, software, instructor's guide and study guide. The self-paced program includes learning objectives, prescriptive tests, and individual lesson tests. Uses a friendly instructional approach and strong visual presentation.

Title: Interactive Modumath: Mathematics
Format: Level III
Year: 1989
Producer: Same as Publisher
Publisher: Video-based Training And Education (VTAE), One Foundation Circle, Waunakee, WI 53597
Telephone: 800-821-6313, 608-831-6313
Hardware: New Media Graphics, InfoWindow, SonyVIEW, VTAE; CGA, EGA, SVGA, VGA, Touchscreen
Abstract: Developed primarily to meet the math needs of adult learners and non-traditional students. The Modumath package contains 39 interactive video lessons on twenty double-sided disks, software, instructor's guide and study guide. The self-paced program includes learning objectives, prescriptive tests, and individual lesson tests. Uses a friendly instructional approach and strong visual presentation.

Title: A Visit to Sesame Street: Numbers
Format: CD-I
Year: 1991
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Children can play games and explore with Sesame Street characters. Includes video and songs about numbers.

MUSIC (See ARTS: Music)

REFERENCE

Title: American Memory
Format: CD-ROM, World-Wide-Web, America Online
Year: 1990
Producer: Library of Congress
Publisher: Library of Congress
Telephone: 202-707-5000
Hardware: IBM or Mac w/ CD-ROM. Internet using World-Wide Web browser or gopher.
Abstract: The Library of Congress is using a variety of technologies to preserve and disseminate collections of rare historical primary source materials. The collections include the manuscripts of the Constitutional Convention, Civil War photographs, recorded speeches from the election of 1920, and videos from the turn of the century. Each item has been catalogued according to Library of Congress standards, so that researchers can search keywords in the author, title, subject, date, and abstract fields of the bibliographic record.

Title: Compton's Multimedia Encyclopedia
Format: CD-ROM
Year: 1991
Producer: Compton's New Media
Publisher: Softkey
Telephone: 800-227-5609 (800-852-2255 for educators), fax: 617-494-5898
Hardware: IBM w/ soundboard, MPC
Abstract: This children's encyclopedia can be searched or accessed through the Knowledge Tree which divides information into main topics. Articles are enhanced by images and sounds.

Title: Microsoft Bookshelf
Format: CD-ROM
Year: 1993, 1994
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052 6399
Telephone: 800-426-9400
Hardware: MPC (IBM PC compatible, sound card, CD-ROM drive)
Abstract: Powerful searching tools allow full text searches of Columbia Concise Encyclopedia, Bartlett's Familiar Quotations, The Americ[illegible]itage Dictionary,

Roget's Thesaurus, The World Almanac and Book of Facts. Encyclopedia articles are enhanced with animations, images and sounds.

Title: Microsoft Encarta
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052 6399
Telephone: 800-426-9400
Hardware: MPC (IBM PC compatible, sound card, CD-ROM drive)
Abstract: This electronic encyclopedia can be accessed by using a topic menu or by using the traditional alphabetized volumes. Articles are enhanced with hypertext links, sounds, animations and video clips. The game is designed to quiz children on various topics of knowledge at different difficulty levels.

Title: Monarch Notes
Format: CD-ROM
Year: 1992
Producer: Same as Publisher
Publisher: Bureau of Electronic Publishing, 141 New Road, Parsippany, NJ 07054
Telephone: 800-828-4766, 201-808-2700
Hardware: MPC, IBM DOS, Macintosh with CD-ROM.
Abstract: Provides the complete text of every Monarch Note Study Guide ever published covering the works of 226 authors. Enhanced by animations of key events in the literature and video interviews with notable authors.

Title: Multimedia World Factbook
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Bureau of Electronic Publishing, 141 New Road, Parsippany, NJ 07054
Telephone: 800-828-4766, 201-808-2700
Hardware: MPC

Title: The New Grolier Electronic Encyclopedia
Format: CD-ROM
Year: 1992
Producer: Grolier
Publisher: Grolier
Telephone: 800-285-4534, 203-797-3530
Hardware: IBM with CD-ROM drive, MPC, Macintosh with CD-ROM drive
Abstract: Grolier's 20-volume encyclopedia in a query-based package. The program also enables users to link quickly to articles on topics related to the chosen subject. Articles are enhanced with images and sounds.

Title: Verbum Interactive
Format: CD-ROM
Year: 1991
Producer: GTE Imagitrek and Verbum, Inc.
Publisher: Verbum, Inc. PO Box 12564, San Diego, CA 92112
Telephone: 619-233-9977, fax: 619-233-9976
Hardware: Macintosh w/ CD-ROM drive; 5 MB RAM
Abstract: Interactive version of the magazine, Verbum, including demos of software ıckages. The Verbum Roundtable is an interactive Q&A session with the Justry's leading experts.

Title: World Book Multimedia Encyclopedia
Format: CD-ROM
Year: 1995
Producer: Same as Publisher
Publisher: World Book, Inc. 525 W. Monroe, Chicago, IL 60661
Telephone: ' ,00-413-4854
Hardware: Macintosh w/ CD-ROM drive, MPC
Abstract: The entire text of the World Book Encyclopedia (17,000 articles, 60,000 cross-references and 1700 quick facts) has been enhanced by hypertext links to the World Book Dictionary and by a gallery of videos, animations, pictures and sounds. The InfoTree is a knowledge map that organizes the 17000 articles into a series of topics and several levels of subtopics. Research Center allows complex searching (and, or, not, near) through topics and keywords. Atlas and timeline are also included.

SCIENCE: Earth & Environmental

Title: Decisions, Decisions: The Environment
Format: Diskettes
Year: 1993
Producer: Tom Snyder Productions, 80 Coolidge Hill Rd., Watertown, MA 02172-2817
Telephone: 800-342-0236, Fax: 617-926-6222
Hardware: Macintosh, DOS
Abstract: A multi-disciplinary simulation activity in which students role play scientists, policy advisors, economists and environmentalists who must advise a mayor how to handle a polluted pond in an economically stressed town which relies heavily on one industry. With each decision, students see the consequences and the reactions of various interest groups. The program is designed to allow constant interactivity and discussion in classrooms which have only one computer. Available in English and Spanish.

Title: Earth Explorer
Format: CD-ROM
Year: 1995
Producer: Enteractive (support provided by a grant from the National Science Foundation)
Publisher: Apple Computer, Inc., 1 Infinite Loop, Cupertino, California 95014-2084
Telephone: 408-996-1010
Hardware: CD-ROM drive. Macintosh and MPC versions are available.
Abstract: Connections between the environment and humans can be explored through articles, mini-simulation models, videos, interactive charts and games. Topics include population, renewable energy, water pollution, global warming and many others. All information has been reviewed for accuracy by the American Association for the Advancement of Science. Spoken instructions, a search program and a navigation map facilitate ease of use.

Title: Microsoft Dinosaurs
Format: CD-ROM
Year: 1993
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052 6399
Telephone: 800-426-9400
Hardware: MPC
Abstract: This interactive journey into the world of dinosaurs includes video from the PBS series, "The Dinosaurs!". Options include a timelir ıs, index, guided tours and families of dinosaurs.

Title: Great Ocean Rescue
Format: Level I, III
Year: 1992
Producer: Same as Publisher
Publisher: Tom Snyder Productions, 80 Coolidge Hill Rd., Watertown, MA 02172-2817
Telephone: 800-342-0236, Fax: 617-926-6222
Hardware: Macintosh or Windows; Videodisc player
Abstract: Information learned about the ocean and the environment is applied in problem solving activities which encourage students to work collaboratively as a multidisciplinary team. Each student becomes an expert in a particular area of science (environmental science, marine biology, geology, or oceanography) and must make a contribution to the group so that the solution can be found through process of elimination.

Title: The Greenhouse Effect: An Investigation
Format: Level I, III
Year: 1990,
Producer: WHRO (funded by Virginia Department of Education)
Publisher: WHRO, Norfolk, Virginia, Internet: info@whro.org, www.whro.org
Telephone: 804-889-9400, Educational Technology division
Hardware: Macintosh, Videodisc player, TV monitor, remote control
Abstract: Hosted by Dr. Joel Levine, a NASA Langley Research scientist, this disc explores the causes and consequences of global warming.

Title: GTV: Planetary Manager
Format: Level I/III
Year: 1992
Producer: Same as Publisher
Publisher: National Geographic Society
Telephone: 800-368-2728
Hardware: Macintosh, Apple IIgs or IBM; videodisc player & TV monitor
Abstract: Topics include deforestation, global warming and water pollution. Students or teachers can use documentary maker to create presentations and slide shows.

Title: Hurricane Hugo
Format: Level III
Year: 1990
Producer: Same as Publisher
Publisher: Turner Education Services, Inc. and Floyd Design
Telephone: 800-344-6219, 404-827-2252
Hardware: Pioneer LD-V4200 and Mouse
Abstract: Designed to teach students how to analyze current events. Featuring the devastating 1989 storm known as Hurricane Hugo, interactive video segments were created using CNN footage, interviews, other news sources, and advanced computer animation. Students learn about hurricanes: their scientific causes, and their physical, historical and sociological effect on those who fall within their path. Extensive word linking allows students to investigate related situations and subjects. A short game tests awareness to important hurricane preparedness measures. Accessories: Teachers' Guide, 57 pages including lesson plans in Geography, Language Arts, Social Studies, and Science.

Title: Interactive NOVA: Race to Save the Planet
Format: 'evel III
Year: 91
Producer: .VGBH Interactive Multimedia Group, 125 Western Ave., Boston, MA 02134
Publisher: Scholastic Software, 730 Broadway, New York, NY 10003
Telephone: 800-541-5513
Hardware: Apple Macintosh II, Pioneer LD-V4200
Abstract: Although appropriate for a wider range of audiences, it is most suitable for grades 5 through 10. This program is intended to be used as a part of science or social studies curriculum when studying environmental issues. Accessories: Handbook, Teacher's Guide with examples of lesson plans which focus on thinking and cooperative learning skills.

Title: JEdi-Joint Education Initiative
Format: CD-ROM
Year: 1991
Producer: University of Maryland at College Park
Publisher: Office of Tech. Liaison, UMCP, 4312 Knox Rd., College Park, MD 20742
Telephone: 301-405-4209, fax: 301-314-9871
Hardware: IBM or Macintosh; CD-ROM drive
Abstract: Sponsored by NASA, NOAA and USGS, this database of images from satellites and space missions was created to "broaden educational horizons and promote the advancement of science".

Title: Minds on Science: For Profit, For Planet
Format: Level I, III
Year: 1995
Producer: Tom Snyder Productions, The Smithsonian Institution
Publisher: Tom Snyder Productions, 80 Coolidge Hill Rd., Watertown, MA 02172-2817
Telephone: 800-342-0236, Fax: 617-926-6222
Hardware: Macintosh, Videodisc player, TV monitor, remote control
Abstract: Created to complement the Smithsonian's exhibit: Science in America, this videodisc lets students roleplay scientists dealing with environmental issues. Includes video footage about the history of science in America.

Title: On Dry Land: The Desert Biome
Format: Level III
Year: 1991
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Vidao, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: Challenge the world's most hostile environments and learn the secrets of adaptation and survival. Accessories: Classroom Guide with teaching units stressing links, concepts and explorations; and student units emphasizing reading, thinking and worksheets.

Title: Planet Earth: The Blue Planet
Format: Level III
Year: 1992
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Video, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: Examine how ocean and atmosphere are partners in motion, influencing our weather and climate. Accessories: Classroom Guide with teaching units stressing links, concepts and explorations; and stude[illegible]its emphasizing reading, thinking and worksheets.

Title: Planet Earth: The Force Within
Format: Level III
Year: 1991
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Video, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: Journey under the Earth's surface and discover how the forces of plate tectonics shape our planet. Accessories: Classroom Guide with teaching units stressing links, concepts and explorations; and student units emphasizing reading, thinking and worksheets.

Title: Rainforest Researchers
Format: CD-ROM
Year: 1995
Producer: Tom Snyder Productions, The Smithsonian Institution
Publisher: Tom Snyder Productions, 80 Coolidge Hill Rd., Watertown, MA 02172-2817
Telephone: 800-342-0236, Fax: 617-926-6222
Hardware: PC (486 w/ X MB RAM, CD-ROM drive, sound card)
Abstract: Students roleplay teams of scientists solving mysteries in the rainforests of Indonesia. In one mystery, students must find a plant which may have medicinal value, in another mystery, students must determine why a plant is no longer producing fruit. Topics include diodiversity, plant classification and rainforest ecosystems.

Title: Renewable Energy in Latin America and the Caribbean
Format: CD-ROM
Year: 1996
Producer: The Center for Renewable Energy and Sustainable Technology (CREST)
Publisher: Same as Producer, 777 North Capitol St., NW #805, Washington DC 20002
Telephone: 202-289-5370, Fax: 202-289-5354
Hardware: PC (486DX, 8 MB RAM, CD-ROM, sound card), Mac (8 MB RAM, CD-ROM
Abstract: Multimedia encyclopedia about renewable energy and its uses in Latin America. Includes 'Energy Selector' which assists decisionmakers in selecting the most cost-effective renewable energy options depending on factors such as insolation and wind speed.

Title: The Sun's Joules
Format: CD-ROM
Year: 1995
Producer: The Center for Renewable Energy and Sustainable Technology (CREST)
Publisher: Same as Producer, 777 North Capitol St., NW #805, Washington DC 20002
Telephone: 202-289-5370, Fax: 202-289-5354
Hardware: PC (486DX, 12 MB RAM, CD-ROM, sound card), Mac (12 MB RAM, CD-ROM)
Abstract: Multimedia encyclopedia about renewable energy, which includes 60 video clips and 10 interactive exercises. Index and search engine. Funded by Department of Energy. Demo version available on web site (solstice.crest.org/).

Title: Understanding Earth Volume 1
Format: CD-ROM
Year: 1996
Producer: Same as Publisher
Publisher: ideodiscovery, 1515 Dexter Ave. N., Ste. 400, Seattle, WA 98109-3017
Telephone:)6-285-5400, 800-548-3472
Hardware: Multimedia PC(Win 3.1 or 95, 486 DX 25MHz, 8 MB RAM, 2X CD-ROM)
Abstract: This fully-interactive research tool contains over 3,000 high quality photos, sattelite imagery, illustration, and 3-D animation plus 55 minutes of narrated video segments. It covers real world earth science topics and geological processes plus geological features of North America as seen from air.

SCIENCE: General

Title: Exploring Antarctica
Format: Level I/III
Year: 1991
Producer: Emerging Technology Consultants, Science Museum of Minnesota
Publisher: Emerging Technology Consultants
Telephone: 612-639-3973, Fax: 612-639-0110
Hardware: Videodisc player & TV monitor; Macintosh optional
Abstract: Resource on the life, geography and issues of Antarctica. Lesson Sequencer can be used to create customized presentations.

Title: Minds on Science: For the Sake of the Nation
Format: Level I, III
Year: 1995
Producer: Tom Snyder Productions, The Smithsonian Institution
Publisher: Tom Snyder Productions, 80 Coolidge Hill Rd., Watertown, MA 02172-2817
Telephone: 800-342-0236, Fax: 617-926-6222
Hardware: Macintosh, Videodisc player, TV monitor, remote control
Abstract: A roleplaying activity in which students, as the President's Scientific Advisor must recommend whether the science research budget should be spent on biotechnology, an environmental car or the space program.

Title: Science Discovery: Image and Activity Bank
Format: Level I
Year: 1992
Producer: Same as Publisher
Publisher: Videodiscovery, 1515 Dexter Ave. N., Ste. 400, Seattle, WA 98109-3017
Telephone: 206-285-5400, 800-548-3472
Hardware: Videodisc Player
Abstract: Over 2000 images, 40 minutes of video, 500 graphics are combined with 24 lessons to teach integrated middle school science (life, earth and physical science).

Title: Science Discovery: Science Sleuths
Format: CD-ROM, OR Level I
Year: 1995/ 1992 (for Level I version)
Producer: Same as Publisher
Publisher: Videodiscovery, 1515 Dexter Ave. N., Ste. 400, Seattle, WA 98109-3017
Telephone: 206-285-5400, 800-548-3472
Hardware: Multimedia PC (OR Videodisc Player)
Abstract: Students use scientific and research tools to solve various humorous, yet challenging mysteries. Each mystery can be played at 6 different levels of difficulty depending on the complexity of the mystery and the amount of data to research. The CD-ROM version has user-friendly guided tours and the scientists' virtual office has a number of interactive re[illegible] tools to use.

The videodisc version contains more mysteries, although they rely more heavily on the barcoded lesson book

Title: Science Discovery: Science Sleuths Volume 2
Format: CD-ROM
Year: 1995
Producer: Same as Publisher
Publisher: Videodiscovery, 1515 Dexter Ave. N., Ste. 400, Seattle, WA 98109-3017
Telephone: 206-285-5400, 800-548-3472
Hardware: Multimedia PC
Abstract: This CD contains two new mysteries to be solved and is in the same format as Science Sleuths Volume 1(see above).

Title: Tell Me Why I
Format: CD-I
Year: 1990
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: Answers to questions that kids ask in five different subject areas: Our World, How Things Work, The Zoo, How Things Began, and The Human Body. For children ages 7-14.

Title: Tell Me Why II
Format: CD-I
Year: 1990
Producer: Same as Publisher
Publisher: Philips Media, 15071 Keswick Street, Van Nuys, CA 91405
Telephone: 800-824-2567, fax: 818-785-0531
Hardware: Color TV, CD-I Player
Abstract: More answers to questions that kids ask in five different subject areas: Our World, How Things Work, The Zoo, How Things Began, and The Human Body. For children ages 7-14.

Title: Time Table of Science and Innovation
Format: CDTV
Year: 1991
Producer: Xiphias
Publisher: Softkey
Telephone: 800-227-5609 (800-852-2255 for educators), fax: 617-494-5898
Hardware: CDTV player
Abstract: Reference tool about important events in science and innovation.

Title: Tri-City Science Club
Format: Level I/III (videotape version also available)
Year: 1996
Producer: Same as Publisher
Publisher: Tom Snyder Productions, 80 Coolidge Hill Rd., Watertown, MA 02172-2817
Telephone: 800-342-0236, Fax: 617-926-6222
Hardware: Videodisc player (Windows or Macintosh software is optional)
Abstract: Elementary students learn the scientific method by accompanying a cartoon character through the three cities of Imagination, Discovery and Sharing to plore the question: do sunflower seeds grow in peanut butter? Students lp Simplicity Arkane to design an experiment by outlining steps, selecting materials and performing a control experiment. After Simplicity shares the results of her experiment, she learns that her experiment has inspired other scientists to raise questions which she records in her Wonder Journal. Related lessons cover careers in science (specifically space exploration), plants (the dependence of humans on plants for oxygen, ozone and food), and urban planning (zoning and environmental impact.) Barcoded teachers guide includes a variety of handouts, and lesson plans with recommended Internet sites.

SCIENCE: Life (See also Health)

Title: The Animals!
Format: CD-ROM
Year: 1992
Producer: Arnowitz, Inc.
Publisher: The Software Toolworks, Inc.
Telephone: 415-883-3000
Hardware: Macintosh w/ CD-ROM, MPC
Abstract: The multimedia visit to the San Diego Zoo includes Animal Nursery, Kid's Corner, Zoo Gardens, Inside Look at the San Diego Zoo, and the Center for Reproduction of Endangered Species. The Media Library allows users to search through 80 videos, 1300 photos, 200 animals, 2 1/2 hours of audio.

Title: Animations for Introductory Psychology
Format: Level I
Year: 1992
Producer: Videodisc Design and Production Group, Lincoln, NE
Publisher: Brooks/Cole & Wadsworth Publishing Company
Telephone:
Hardware: Videodisc player, TV monitor & remote control
Abstract: Topics include neural transmission, sensation and perception, and learning. Instructor's Guide contains barcodes for quick access to material.

Title: Bio Sci I and II
Format: Level I/III
Year: 1983, 1990
Producer: Same as Publisher
Publisher: Videodiscovery, 1515 Dexter Ava. N., Ste. 400, Seattle, WA 98109-3017
Telephone: 800-548-3472, 206-285-5400
Hardware: Macintosh, videodisc player, TV monitor
Abstract: Extensive visual database of photographs and videos from all areas of life sciences. Also included are quizzes on full dissections of several animals.

Title: Biotechnology (2 discs)
Format: Level I
Year: 1987
Producer: Nebraska Videodisc Design Group
Publisher: GPN (Great Plains Network)
Telephone: 800-228-4638
Hardware: Videodisc player, TV monitor & remote control
Abstract: Comprehensive collection of videos demonstrating techniques (and safety tips) used in biotechnology research.

Title: Digital Humans

Format: CD ROM
Year: 1995
Producer: Multimedia Medical Systems/ National Library of Medicine
Publisher: Multimedia Medical Systems, 1 Morton Dr., #400 Charlottesville, VA 22901
Telephone: N/A Email: dighumans@mmms.com
Hardware: 486/Pentium, 8MB RAM, Win3.1/ Win95/WinNT, sound card
Abstract: This application explores the National Library of Medicine's Visible Human Project in which the most detailed digital archive of human anatomy was created from two dead human bodies that were sliced into sub-millimeter sections. This project has enabled nondestructive dissection of cadavers by millions of people.

Title: Exotic Plants
Format: Level I
Year: 1986
Producer:
Publisher:
Telephone:
Hardware: Videodisc player, TV monitor and remote control
Abstract: Encyclopedia of photographs of plants.

Title: A Field Guide to Insects and Culture
Format: Level III
Year: 1990
Producer: Cornell University
Publisher: Interactive Multimedia Group, 215 Computing & Comm. Center, Cornell University, Ithaca, NY 14853
Telephone: 607-255-5530
Hardware: IBM PC/XT Model 286, IBM InfoWindow monitor, Pioneer LD-V6000A
Abstract: Using a touchscreen to move through rooms of the bughouse, viewers are exposed to a variety of cultural and entomological information presented in slides, video, film and audio. Based on an actual course in cultural entomology at the New York State College of Agriculture and Life Sciences.

Title: Fields of Learning: Life Science
Format: Diskettes
Year: 1991
Producer: Wiz Kids
Publisher: K-12 Micromedia Publishing
Telephone: 800-292-1997, 201-825-8888
Hardware: Macintosh
Abstract: Curriculum-based package which includes hypertext essays, animations, pictures, activities, quizzes and links to several videodiscs. Students can use authoring section to create their own animations and text cards. Microsoft Works or ClarisWorks may also be used to add materials to the database.

Title: In the Company of Whales
Format: Level III/or CD-ROM
Year: 1992
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Video, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: 'his interactive documentary, narrated by Patrick Stewart, explore the crucial 'lationship between whales, humans and the global ecosystem. Accessories: Classroom Guide with teaching units stressing links, concepts and explorations; and student units emphasizing reading, thinking and worksheets. The home CD-ROM version contains videos, a narrated tutorial and a section of video interviews with four whale experts.

Title: Insects: Little Giants of The Earth
Format: Level III
Year: 1991
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Video, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: Travel into the microworld of insects to examine their variety of shapes, colors, sizes and behaviors. Accessories: Classroom Guide with teaching units stressing links, concepts and explorations; and student units emphasizing reading, thinking and worksheets.

Title: I aractive NOVA: Animal Pathfinders
Format: Level III
Year: 1990
Producer: WGBH Educational Foundation and Peace River Films
Publisher: Scholastic Software, 730 Broadway, New York, NY 10003
Telephone: 800-541-5513
Hardware: Apple Macintosh II, Pioneer LD-V4200
Abstract: A natural science videodisc application using HyperCard stacks and footage from the NOVA science series. Includes overviews (narrated film segments), a database (about animals, habitats and behavior), activities, and resources.

Title: Interactive NOVA: Miracle of Life
Format: Level III
Year: 1991
Producer: WGBH Educational Foundation
Publisher: Scholastic Software, 730 Broadway, New York, NY 10003
Telephone: 800-541-5513
Hardware: Apple Macintosh II, Pioneer LD-V4200
Abstract: Geared for science and health classrooms for grades 5-10, Miracle of Life teaches fundamental human reproductive biology. The anchor of the program is its database, organized into cards on female and male anatomy, egg and sperm, fertilization, fetal development, and birth. Video overviews and slides accompany subject selections. Activities test awareness to healthy prenatal care. A section on sex education is optional. Teachers can also assign students to write and develop their own reports with video selections in VideoEditor and ReportMaker, prompting active learning exercises for individuals, teams or groups. Accessories: Teachers' guide, including suggestions for teaching strategies and activities, along with sample student worksheets.

Title: Investigating Science: Treasures from the Deep
Format: Level III
Year: 1991
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Video, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: Join teams of underwater researchers as they use scir methodology to hunt for sunken treasure. Accessories: Classroom Gu th teaching units

stressing links, concepts and explorations; and student units emphasizing reading, thinking and worksheets.

Title: Life Story
Format: CD-ROM; Videodisc; CD-ROM & Videodisc
Year: 1988,1993
Producer: Apple Multimedia Lab, Adrian Malone Productions, Lucasfilm Ltd, Smithsonian Institution
Publisher: Sunburst/Wings for Learning
Telephone: 800-321-7511, 914-747-3310
Hardware: Macintosh with CD-ROM &/or Laserdisc player
Abstract: Through Life Story students can experience the discovery of DNA's double helix structure. BBC's drama centers around two teams of scientists who are striving to solve the mystery: Jim Watson and Francis Crick in Cambridge racing against Rosalind Franklin and Maurice Wilkins. The drama is cross-referenced with video interviews of the scientists portrayed in the drama, as well as a comprehensive bibliography on topics such as 'Women in Science' and 'DNA'. In an activity students use information from the drama to make hypotheses about the location of various chemical bonds.

Title: Living Textbook: Mechanisms of Stability and Change
Format: Level I/III
Year: 1991
Producer: Same as Publisher
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Macintosh, Apple IIgs or IBM; videodisc player
Abstract: Topics include physiology, genetics, ecology and evolution. English and Spanish.

Title: MacRAPID
Format: Level III
Year: 1990
Producer: Same as Publisher
Publisher: Clemson University Horticulture Department
Telephone: 803-656-4920
Hardware: Macintosh, videodisc player & TV monitor
Abstract: Reference and search tool for "Clemson University Video Encyclopedia of Herbaceous Ornamentals".

Title: Magic Schoolbus: Explore the Human Body
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399
Telephone: 800-426-9400
Hardware: MPC
Abstract: An interactive story for children based on the TV series, the Magic Schoolbus. The Magic Schoolbus shrinks in size to journey into the human body. An interactive map provides quick access to any part of the body. Games and activities are available which teach students more about body parts.

Title: Mammals: A Multimedia Encyclopedia
Format: D-ROM
Year: 990
Producer: Same as Publisher
Publisher: National Geographic Society
Telephone: 800-368-2728
Hardware: IBM PC or compatible, 4mb RAM, soundcard optional.
Abstract: Encyclopedia of over 200 mammals includes 45 video clips, 700 photographs, 155 animal sounds and full text essays. Includes a game on animal classification game and geography, hypertext links to a glossary, and a narrated tutorial.

Title: The National Zoo
Format: Level I
Year: 1989
Producer: The Smithsonian Institution
Publisher: Lumivision
Telephone: 800-776-5864
Hardware: Videodisc player, TV monitor & remote control
Abstract: The video tour of the National Zoo highlights its most famous inhabitants: the giant pandas, lions, orangutans, gorillas and elephants. Students can learn how the Zoo is saving animals from extinction by keeping them healthy and training them to return to their natural habitat.

Title: OceanLife Volume 1-Western Pacific
Format: CD-ROM
Year: 1993
Producer: Same as Publisher
Publisher: Sumeria, 329 Bryant Street, Ste. 3D, San Francisco, CA 94107
Telephone: 800-478-6374, 415-904-0800, Fax: 415-904-0888
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Collection of narrated films about the marine life in the Western Pacific region.

Title: OceanLife Volume 2-Micronesia
Format: CD-ROM
Year: 1993
Producer: Same as Publisher
Publisher: Sumeria, 329 Bryant Street, Ste. 3D, San Francisco, CA 94107
Telephone: 800-478-6374, 415-904-0800, Fax: 415-904-0888
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Collection of narrated films about the marine life including sponges, crustaceans, mollusks, and corals.

Title: OceanLife Volume 4-Great Barrier Reef
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Sumeria, 329 Bryant Street, Ste. 3D, San Francisco, CA 94107
Telephone: 800-478-6374, 415-904-0800, Fax: 415-904-0888
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Collection of narrated films about the marine life in the Great Barrier Reef.

Title: Photosynthesis
Format: Level I
Year: 1991
Producer: Same as Publisher
Publisher: TV Ontario
Telephone: 800-331-9566, 919-380-0747

Hardware: Videodisc player, TV monitor & remote control
Abstract: Series of photographs and videos about photosynthesis, including historic scientific discoveries and the Calvin cycle.

Title: The Teacher's Living World
Format: Level III
Year: 1991
Producer: Same as Publisher
Publisher: Arnowitz Inc., 650 E. Blithedale Ave., Suite A, Mill Valley, CA 94941
Telephone: 415-383-2878
Hardware: Macintosh IIci, Mass Microsystems Colorspace Iii, FX video boards, JVC Super VHS Video Recorder, Pioneer LC-V330 Laserdisc 12 inches Autochanger System with 8 discs
Abstract: This interactive exploration of the St. Louis Zoo provides educators with a repository of full motion video, sounds, text, and graphics to create multimedia educational materials for classroom instruction. There are two primary pathways to enter the database: Animals and Ecology and Conservation. Users may navigate through information about the animal kingdom and our planet, choosing their paths as they go along. The user also has on-line access to a multimedia Library which allows browsing the information by media type including: Videos, Sounds, Glossaries, Classroom Activities, Classroom Sets, and St. Louis Zoo Links. Especially useful for educators is the ability to mark and save materials on a particular topic to a videotape and/or a floppy disk which may be used later in the classroom. Level IV interactive videodisc.

Title: The Virtual Body
Format: CD-ROM
Year: 1995
Producer: Lunaria, Time-Life
Publisher: IVI Publishing, 7500 Flying Cloud Drive, Minneapolis, Minnesota 55344-3739
Telephone: 1-800-754-1484
Hardware: 486, 8 MB RAM, Windows 3.1, 2X CD-ROM Drive, Mouse, 256 color VGA, Sound Card (Sound Blaster 16 or compatible), speakers
Abstract: This comprehensive science title answers 52 of the most-asked questions about the body. Includes over 20 real laboratory experiments. Illustrations and detailed animations explain the workings of the human body, from circulation to brain development.

SCIENCE: Physics & Chemistry

Title: Chemistry at Work
Format: Level I/Level III
Year: 1991
Producer: Same as Publisher
Publisher: Videodiscovery, 1515 Dexter Ave. N., Ste. 400, Seattle, WA 98109-3017, McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, NY 10020,
Telephone: Videodiscovery: 206-285-5400, 800-548-3472/ Mc-Graw Hill: 800-338-3987
Hardware: Macintosh or IBM, Videodisc player & TV monitor.
Abstract: This image database contains more than 800 images, 1500 diagrams, dozens of motion pictures and animations. Videos include specialized laboratory equipment and hazardous demonstrations.

Title: ɔing Chemistry
Format: Level III
Year: 1988
Producer: American Chemical Society and the National Science Foundation
Publisher: American Chemical Society, Washington, DC 20036
Telephone: 202-872-4600
Hardware: Apple Macintosh II, Apple Color High Resolution RGB monitor, Pioneer LD-V6010, and TV color monitor
Abstract: This program is intended for use by high school chemistry teachers. Lessons are labeled according to how the activities cen be performed best: as a teacher-centered classroom demonstration, as student-centered classroom experiments, or as either teacher- or student-centered.

Title: Florida Science Disc
Format: Level I/III
Year: 1991
Producer: Same as Publisher
Publisher: Florida Institute of Technology
Telephone:
Hardware: IBM or Macintosh; videodisc player & TV monitor
Abstract: A science class created this series of lessons & quizzes about a variety of scientific topics.

Title: Invention: Mastering Sound
Format: Level III
Year: 1991
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Video, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: Explore the physics of sound through the eyes of inventors who changed the world of communications. Accessories: Classroom Guide with teaching units stressing links, concepts and explorations; and student units emphasizing reading, thinking and worksheets.

Title: Living Textbook: Physical Science-Cosmic Chemistry
Format: Level I
Year: 1991
Producer: Same as Publisher
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Videodisc player, TV monitor & remote control
Abstract: Visual database of images, classic demonstrations, videos and animations about chemistry. English/Spanish.

Title: Mechanical Universe and Beyond, The
Format: Level I
Year: 1987
Producer: California Institute of Technology and the Southern California Consortium
Publisher: Intellimation, P.O. Box 1922, Santa Barbara, CA 93116
Telephone: 1-800-LEARNER (Annenberg/CPB)
Hardware: Videodisc player, TV monitor, remote control
Abstract: Reenactments of scientific discoveries are complemented by computer graphics which explain the foundations of physics (mechanics, electricity and r gnetism, optics, relativity). Cal Tech physics lectu 9 also included.

Title: NOVA Science Quiz
Format: Level III
Year: 1987
Producer: WGBH Educational Foundation and Creative Technologies Corporation
Publisher: Creative Technologies Corporation, 4820 North Spring Street, Evansville, IN 47711
Telephone: 812-422-4112
Hardware: iPOP 2300, Carroll 19 inch Touchscreen, Pioneer LD-V4000
Abstract: A kiosk-style elementary science application on two videodiscs that offers multiple-choice quizzes on topics about biology, physics and chemistry.

Title: Physics & Automobile Collisions
Format: Level I
Year: 1984
Producer: Kansas State University
Publisher: John Wiley & Sons
Telephone: 800-225-5945
Hardware: TV color monitor, Pioneer LD-V2000
Abstract: This program is designed to teach laws of physics and physics measurements through practical examples. Newton's First and Second Laws and their application to auto passenger safety are demonstrated through filmed collisions using mannequin drivers and passengers. The program shows how seatbelts and airbags can decrease injury and save lives. Chapters 10 and 11 include 36 experiments in physics measurements using models. Both chapters require the use of an external computer for fully effective use.

Title: TLTG Physical Science
Format: Level III
Year: 1989,1991
Producer: Same as Publisher
Publisher: Texas Learning Technology Group, 7620 Guadalupe, P.O. Box 2947, Austin, TX 78769-2947
Telephone: 800-866-8582, 512-467-0222
Hardware: IBM InfoWindow System
Abstract: A complete two-semester physical science course for 9th and 10th grade level developed with the Texas Association of School Boards. Package includes 15 videodisc sides, IBM InfoWindow software, teacher resource guide, and student manual (summary notes, practice sets, and lab activities). TLTG conducts a teacher training program and has a hotline for technical support.

Title: The Video Encyclopedia of Physics Demonstrations (25 discs)
Format: Level I
Year: 1993
Producer: University of Maryland at College Park (Funded by NSF)
Publisher: The Education Group
Telephone: 310-659-8842
Hardware: Videodisc player, TV monitor & remote control
Abstract: The creator of 'Physics is Phun' lecture series has used the world's largest collection of working physics demonstration equipment to produce over 600 narrated demonstrations. When appropriate, slow-motion photography and/or strobe lights have been used to show events which are too fast to analyze with the human eye. High quality computer graphics and animations have been used to explain 'invisible' forces like electricity and magnetism. Over 800 pages of text provide teacher support through scripts, illustrations and lesson plans.

Title: The Visual Almanac
Format: Level III
Year: 1989
Producer: Apple Computer Multimedia Lab
Publisher: The Voyager Company, 2139 Manning Avenue, Los Angeles, CA 90025
Telephone: 800-446-2001, 310-860-0400
Hardware: Macintosh, Apple CD ROM, Pioneer LD-V4200, TV Monitor
Abstract: This interactive videodisc application extends the concept of an almanac to include a complete set of multimedia materials. Broad in scope, the Visual Almanac organizes its information into three areas: Collections, Activities, and Composition Workspaces. Each collection is a database of audio, video, graphics, and text that represents and illustrates concepts in a wide range of topics including: Playground Physics, Everyday Objects, and the Solar System. Activities and Composition Workspaces are constructed from the collections to create different perspectives and experiences. Users may interact with the computer to see the phases of the moon, to hear what different musical instruments sound like, to see angular momentum from different perspectives, or to create his/her own multimedia presentations.

SCIENCE: Space

Title: The Great Solar System Rescue
Format: Level I, III
Year: 1992
Producer: Same as Publisher
Publisher: Tom Snyder Productions, 80 Coolidge Hill Rd., Watertown, MA 02172-2817
Telephone: 800-342-0236, Fax: 617-926-6222
Hardware: Macintosh, Windows; Videodisc player
Abstract: Information learned about the solar system is applied in activities which encourage students to solve problems collaboratively as a multidisciplinary team. Each student becomes an expert in a particular area of study (meteorology, astronomy, geology or history) and must make a contribution to the group so that the solution can be found through process of elimination.

Title: NASM: Archival Videodiscs 1-6
Format: Level I
Year: 1983-1989
Producer: Smithsonian Institution
Publisher: Smithsonian Institution Press
Telephone: 800-782-4612
Hardware: Videodisc player, TV monitor and remote control
Abstract: 1. U.S. and foreign aircraft. 2. Aircraft, equipment and personalities. 3. U.S. Air Force World War II. 4. U.S. Air Force Korean War. 5. NASA and U.S. Space Program (1958-1986). 6. Lunar missions.

Title: Space: Visual History of Manned Space Flight
Format: CD-ROM
Year: 1993
Producer: Same as Publisher
Publisher: Sumeria, 329 Bryant Street, Ste. 3D, San Francisco, CA 94107
Telephone: 800-478-6374, 415-904-0800, Fax: 415-904-0888
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Interactive video history of the US space program.

Title: Space Archive: Space Shuttle Mission Reports (Vol 1)
Format: Level I
Year: 1983
Producer: Video Vision Associates, Ltd.
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 800-524-2481, 908 668-0022, Fax: 908 668 1322
Hardware: Videodisc player, TV monitor, remote control
Abstract: Historic footage of the space shuttle which carried Sally Ride, America's first woman into space. The space walk and satellite launch sequences use dual sound tracks to offer a choice between in-flight communications and post-mission crew comments.

Title: Space Archive: Greetings from Earth - Picture Postcards from Space (Vol. 5)
Format: Level I
Year: 1985
Producer: Video Vision Associates, Ltd.
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 800-524-2481, 908-668-0022, Fax: 908-668-1322
Hardware: Videodisc player, TV monitor, remote control
Abstract: Landsat images, computer simulations and shuttle photographs of Earth.

Title: Space Archive: Encounters with Comet Halley, Uranus and Zero-G (Vol. 6)
Format: Level I
Year: 1986
Producer: Optical Data Corporation
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 800-524-2481, 908-668-0022, Fax: 908-668-1322
Hardware: Videodisc player, TV monitor, remote control
Abstract: The photographs of Voyager's trip to Uranus are followed by a collection of images and animations of Comet Halley. Side 2 provides a look into the zero gravity environment of space stations.

SOCIAL SCIENCE: Government & Political Science

Title: '88 Vote: Campaign for the White House
Format: Level III
Year: 1989
Producer: ABC NEWS InterActive, 7 W 66 Street, 4th Fl., NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Apple Macintosh II and Pioneer LD-V4200
Abstract: A videodisc application covering the primaries, the Republican and Democratic campaigns, and the results of the 1988 presidential election. Information includes issues, debates, commercials, news footage, and opinion polls. Program features include a video documentary maker.

Title: Bill of Rights
Format: Level III
Year: 1993
Producer: AND Communications and IBM
Publisher: IBM Education Systems, Atlanta, GA
Telephone: 800-426-4338
Hardware: 3M, Matrox Illuminator video overlay card, Pioneer 8000 videodisc player, and card
Abstract: The first ten amendments to the Constitution are extensively analyzed by variety of experts with different opinions. Hypertext links to glossaries and footnotes further enhance the document.

Title: Capitol Hill
Format: CD-ROM
Year: 1993
Producer: Amazing Media, Inc.
Publisher: The Software Toolworks, Inc.
Telephone: 415-883-3000
Hardware: Macintosh w/ CD-ROM
Abstract: The user can experience of the daily life of a member of the U.S. Congress. The orientation includes a tour of the Capitol and an overview of a typical congressional office. The user can vote on bills, listen to constituent phone calls, read constituent mail and review resumes of prospective congressional staffers. Video clips include advice from a California congresswoman, tours of the Capitol, and overviews from the former Historian.

Title: Powers of the Congress
Format: Level I
Year: 1991
Producer: ABC NEWS InterActive, 7 W 66 St., 4th Floor, NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Pioneer Videodisc Player, video monitor, bar coder and remote controller
Abstract: With this videodisc, teachers may create classroom presentations to augment civics courses in fundamental theories of the power of the U.S. congress. Short video interviews with members of Congress, images of members at work and the issues before them, as well as still photos, portraits, glossary terms and fact files can be selected in the guidebook by barcoder or remote controller and instantly retrieved. Accessories: Guidebook.

Title: Powers of the Supreme Court
Format: Level I
Year: 1991
Producer: ABC NEWS InterActive, 7 W. 66 St., 4th Floor, NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Pioneer Videodisc Player, video monitor, bar coder and remote controller
Abstract: Explore the Bill of Rights, along with other Amendments to the Constitution which have set forth and expanded our rights and liberties. Also, take a unique opportunity to look inside the nation's highest court in special Q&A sessions with Chief Justice William Rehnquist. Accessories: Guidebook.

Title: The Presidents: It All Started with George
Format: CD-ROM
Year: 1991
Producer: Same as Publisher
Publisher: National Geographic Society
Telephone: 1-800-368-2728
Hardware: IBM with soundcard, CD-ROM drive
Abstract: For every president in this multimedia encyclopedia, the user can browse through an interactive timeline, photographs or portr[illegible] text essay and

often video and audio clips. A game encourages students to memorize significant names, places and events.

Title: SimHealth
Format: Diskettes
Year: 1993
Producer: Maxis and the Markle Foundation
Publisher: Maxis
Telephone: 510-254-9700, fax: 510-253-3736
Hardware: PC compatible w/ Windows. VGA or SVGA versions available.
Abstract: Simulation in which user, roleplaying a congressperson, designs a national health care reform system and sees the interrelated effects on all major aspects of a community (hospitals, patients, small businesses, insurance companies, biotechnology firms, government and citizens). A comprehensive reference library summarizes different health care systems (Canada, UNY, current U.S. and proposals). Each policy decision costs political 'chips' and voter's reactions are reflected in polls and elections.

SOCIAL SCIENCE: History

Title: Chronoscope: Exploring 1492
Format: Level III
Year: 1992
Producer: WGBH, Optical Data Corp.
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Macintosh, videodisc player and TV monitor.
Abstract: Explore many aspects of life in 1492 across several continents. Searching tools can locate keywords in the hypertext essays. Documentary maker tools allow teachers or students to create presentations and slideshows.

Title: Columbus: Encounter, Discovery and Beyond
Format: Level III
Year: 1992
Producer: Same as Publisher
Publisher: IBM Corporation, Educational Systems, P.O. 2150, Atlanta, GA 30055
Telephone: 800-426-4338
Hardware: IBM PS/2, Ultimedia Model M57 SLC with 6 MB RAM and 80 MB hard drive, Keyboard and a mouse, IBM SCSI Internal CD-ROM Drive, Pioneer LD-V8000 Laserdisc player, M-Audio Capture/Playback Adapter Card and Matrox Illuminator 16/micro channel video card
Abstract: Geared towards students of all ages, this application chronicles the voyages of Columbus and the Age of Discovery. The focus of the interactive videodisc is a database of multimedia objects that describe Columbus from various perspectives. Interviews, primary sources, maps, and background descriptions are accessible in many different ways. A broad database of related multimedia objects links the Columbian period and the concept of exploration generally with people, places, and events, from 4000 B.C. to the current day. A flexible set of navigational tools allow the database to be searched according to media type, keyword, thematic categories, geography, and time-lines.

Title: Communism and the Cold War
Format: evel III
Year: 991
Producer: ABC NEWS InterActive, 7 W. 66 St., 4th Floor, NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Apple Macintosh II, Pioneer LD-V4200
Abstract: Visual images of the major events of the Cold War, along with a wide selection of resource material which put the U.S.-Soviet rivalry into context. Also, an exploration of the impact of the Cold War in various regions of the world. Accessories: A Guidebook.

Title: The Darkest Hour
Format: Level I/III
Year: 1992
Producer: Same as Publisher
Publisher: Aims Media
Telephone: 800-367-2467, 818-773-4300
Hardware: Macintosh, videodisc player and TV monitor
Abstract: An interactive menu allows quick access to archived footage from World War II. A randomized quiz provides visual remediation.

Title: Desert Storm: The War in the Persian Gulf
Format: CD-ROM
Year: 1991
Producer: Same as Publisher
Publisher: Time Warner Interactive, P.O. Box 30621, Tampa, FL 33630-0621
Telephone: (No longer taking telephone orders)
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Comprehensive archive of Time Magazine's coverage of the Persian Gulf crisis. Also included are reporter's journals, eye-witness accounts and tape recorded interviews by correspondents, maps, photos and country reports.

Title: Divided Union
Format: Level I
Year: 1987
Producer: Peter Batty Productions & Public Media Video
Publisher: Films, Inc.
Telephone: 800-343-4312
Hardware: Videodisc player, TV monitor & remote control
Abstract: This documentary series on the Civil War includes reenactment, artwork, letters, photographs and interviews with historians and writers.

Title: GTV: A Geographic Perspective on American History
Format: Level I/III
Year: 1990
Producer: Same as Publisher
Publisher: National Geographic Society
Telephone: 800-368-2728
Hardware: Macintosh, Apple IIgs or IBM; videodisc player & TV monitor
Abstract: National Geographic helps students understand the importance of geography in the development of the United States. Well-researched photographs and primary source materials bring an intensity and vividness to history

Title: Historical Atlas of the Holocaust
Format: CD-ROM
Year: 1996
Producer: Yechiam Halevy, U.S. Holocaust Memorial Museum

Publisher: Macmillan Publ., U.S. Holocaust Memorial Museum, Washington, DC
Telephone: 800 592 8057
Hardware: PC 386, Windows 3.1, 4 MB RAM, 2X CD ROM
Abstract: The Atlas contains 275 annotated maps and photographs of Holocaust sites in 20 European countries. Maps can be chosen from a thematic table of contents or through an alphabetical index. Maps are often cross referenced and have clickable 'hot areas' which link to more detailed maps or additional information. A bookmarking tool and glossary are included.

Title: In the Holy Land
Format: Level III
Year: 1989
Producer: ABC NEWS InterActive, 7 W. 66 St., 4th Floor, NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Apple Macintosh II, Pioneer LD-V4200
Abstract: Covers the history of turmoil and conflict in the Middle East. Includes recent and historical video, map, time-line and textual information about the religions, geography, and politics of the Holy Land. Features a video documentary maker, print directory, video lesson plans and supplemental material. Uses Hypercard stack.

Title: History in Motion
Format: Level I
Year: 1992
Producer: Same as Publisher
Publisher: CEL Educational Resources
Telephone: 800-235-3339, fax: 212-953-4646
Hardware: Videodisc player, TV and remote control
Abstract: Series of mini-documentaries from the most important historic events of the 20th century. A barcoded teacher's manual is included.

Title: A House Divided
Format: CD-ROM
Year: 1995
Producer: Same as Publisher
Publisher: Grafica Multimedia, 1777 Borel Place, Ste. 500, San Mateo, CA 94402
Telephone: 415-358-5553
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: This interactive disc on the Lincoln-Douglas debates provides an overview to the Civil War.

Title: Investigating History: Treasures from the Deep
Format: Level III
Year: 1991
Producer: The Discovery Channel
Publisher: Coronet/MTI Film & Video, 420 Academy Drive, Northbrook, IL 60062
Telephone: 800-777-8100
Hardware: Pioneer LD, IBM or Macintosh
Abstract: Join high-tech historians in their search for the sunken gold-rush steamer S.S. Central America. Accessories: Classroom Guide with teaching units stressing links, concepts and explorations; and student units emphasizing reading, thinking and worksheets.

Title: essons of War
Format: Level III
Year: 1992
Producer: ABC NEWS InterActive, 7 W. 66 St., 4th Floor, NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Apple Macintosh II, Pioneer LD-V4200
Abstract: The student examines the causes of, the consequences of, and the alternatives to war. Accessories: A Guidebook that contains (among other things) activities, discussion questions, lesson plans, and barcodes.

Title: Martin Luther King Jr.
Format: Level III
Year: 1989
Producer: ABC NEWS InterActive, 7 W. 66 St., 4th Floor, NY, NY 10023 212-456-4060
Publisher: Optical Data Corporation, 30 Technology Drive, Warren, New Jersey 07059
Telephone: 908-668-0022, 800-524-2481, Fax: 908-668-1322
Hardware: Apple Macintosh II, Pioneer LD-V4200
Abstract: Contains documents, speeches, file video, biographies, and other historical and current information about the Civil Rights Movement, racism in America today, and the life and death of Dr. Martin Luther King, Jr. Features include a video documentary maker, and audio tracks in English and Spanish. Uses HyperCard stacks.

Title: Multimedia U.S. History
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Bureau of Electronic Publishing, 141 New Road, Parsippany, NJ 07054
Telephone: 800-828-4766, 201-808-2700
Hardware: MPC
Abstract: A multimedia reference tool on important events in U.S. History. Full-text searches through hundreds of historical documents are available.

Title: Multimedia World History
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Bureau of Electronic Publishing, 141 New Road, Parsippany, NJ 07054
Telephone: 800-828-4766, 201-808-2700
Hardware: MPC
Abstract: A multimedia reference tool on important events in world history. Full-text searches through hundreds of historical documents are available.

Title: Struggles for Justice, Vol. I
Format: Level III
Year: 1990
Producer: Same as Publisher
Publisher: Scholastic Software, 730 Broadway, New York, NY 10003
Telephone: 800-541-5513
Hardware: Amiga 2500, Amiga 2300 Genlock, Amiga 1084S monitor, Pioneer LD V2200
Abstract: A presentation tool for teachers and a browsing tool for students. Historical information on African American, Native American and Latino struggles for justice is displayed in the form of video presentations, photographs, paintings, documents, cartoons, animated maps, charts, graph eches, music and text. As a multimedia package, history is presented init rough a series of

mini documentaries, including dramatizations and film footage. Interactive visual and audio resources enable students to further pursue details and issues of each theme. An Edit Room feature allows teachers and students to create their own video presentations, or author language to create presentations using their own text, graphics, animations and music. Accessories: User's Guide, Teacher's Guide.

Title: The Video Encyclopedia of the 20th Century
Format: Level I
Year: 1986
Producer: Same as Publisher
Publisher: CEL Educational Resources
Telephone: 800-235-3339, fax: 212-953-4646
Hardware: TV color monitor, Pioneer LD-V2000
Abstract: Thirty-nine videodiscs in CLV format containing seventy-seven hours of video which are indexed in reference manuals and are accessed by chapter search.

SOCIAL SCIENCE: Social Studies

Title: Amnesty Interactive
Format: CD-ROM
Year: 1994
Producer: Ignition Multimedia
Publisher: Amnesty International
Telephone: 1-800-446-2001
Hardware: Macintosh w/ CD-ROM
Abstract: Leonard Nimoy narrates this disc by Amnesty International which was created to raise social consciousness about human rights issues. Tragic stories of courageous people who have been denied basic human rights are recounted. The Universal Declaration of Human Rights (established by the United Nations) is illustrated through animations created and donated by several leading graphic arts companies. The disc concludes with the section, "What You Can Do To Help" which encourages the user to become an agent for change.

Title: Countries of the World
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Bureau of Electronic Publishing
Telephone:
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: Contains over 106 country study books, maps, pictures and information from embassies.

Title: Exploring Ancient Cities
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: Sumeria, 329 Bryant Street, Ste. 3D, San Francisco, CA 94107
Telephone: 800-478-6374, 415-904-08000, Fax: 415-904-0888
Hardware: MPC or Macintosh w/ CD-ROM drive
Abstract: The art and history of Crete, Petra, Pompeii, and Teotihuacan can be explored through narrated slide shows lasting from 2 to 35 minutes. Detailed interactive maps of these cities allows users to see various temples and points of interest.

Title: Time Table of Business, Politics and Media
Format: CDTV
Year: 1991
Producer: Xiphias
Publisher: Softkey
Telephone: 800-227-5609 (800-852-2255 for educators), fax: 617-494-5898
Hardware: CDTV player
Abstract: Reference tool covering historic events in business, politics and media.

Title: World Bank Data
Format: CD-ROM
Year: 1994
Producer: Same as Publisher
Publisher: World Bank
Telephone:
Hardware: IBM w/ CD-ROM drive
Abstract: Searchable database of socio-economic facts about countries around the world. Simulation software is included.

SPECIAL NEEDS (Assistive Technology & Special Education)

Title: Rosie Takes a Walk
Format: CD-ROM
Year: 1995
Producer: Same as Publisher (funding provided from U.S. Department of Education grant)
Publisher: Texas School for the Deaf, P.O. Box 3538, Austin, TX 78764-3538
Telephone: 512-462-5408, pollardg@tenet.edu
Hardware: CD-ROM drive. Macintosh and MPC versions are available.
Abstract: This interactive animated storybook CD is accessible for the deaf. Each word and picture in the story is linked to a video of either American Sign Language or Signed English. Games teach students to match text, pictures and signed videos.

Title: Screen Magnifier
Format: Diskettes
Publisher: IBM Special Needs, Bld. 904 Int.zip 9448, 11400 Burnet Rd, Austin, TX 78758
Telephone: 800-426-4832 (Voice), 800-426-4833 (TDD)
Internet: World Wide Web site: http://www.austin.ibm.com/pspinfo/snshome.html
Hardware: IBM
Abstract: Software magnifies text and images by two to 32 times their usual size. A reading function pans across the screen at variable screen to make reading easier for the visually impaired user.

Title: ScreenReader
Format: Diskettes, 18-key keypad
Publisher: IBM Special Needs, Bld. 904 Int.zip 9448, 11400 Burnet Rd, Austin, TX 78758
Telephone: 800-426-4832 (Voice), 800-426-4833 (TDD)
Internet: World Wide Web site: http://www.austin.ibm.com/pspinfo/snshome.html
Hardware: IBM, mouse port, text-to-speech synthesizer box, speaker
Abstract: Enables visually-impaired individuals to use computer [illegible] verting text on a computer screen to speech using a voice synthesizer [illegible] s with operating

systems (DOS, OS/2, Windows), word processors, spreadsheets, and many other applications

Title: SpeechViewer
Format: Diskettes
Publisher: IBM Special Needs, Bld. 904 Int.zip 9448, 11400 Burnet Rd. Austin, TX 78758
Telephone: 800-426 4832 (Voice), 800 426 4833 (TDD)
Internet: World Wide Web site: http://www.austin.ibm.com/pspinfo/snshome.html
Hardware: IBM 286 or higher, VGA monitor, audio card, microphone
Abstract: A speech therapy learning tool allows the speech- or hearing impaired student to see visual feedback for each different sound they make. Students learn to regulate pitch, volume and to disciminate vowel sounds. A case management provides detailed reports on student progress.

Title: Thinkable
Format: Diskettes
Publisher: IBM Special Needs, Bld. 904 Int.zip 9448, 11400 Burnet Rd, Austin, TX 78758
Telephone: 800-426-4832 (Voice), 800-426-4833 (TDD)
Internet: World Wide Web site: http://www.austin.ibm.com/pspinfo/snshome.html
Hardware: IBM, sound card, mouse or touchscreen
Abstract: A cognitive rehabilitation tool which helps individuals improve attention, memory and discrimination. The case management tool provides detailed reports on student progress.

TEACHER TRAINING (See TRAINING: Teacher)

TRAINING: Business

Title: Acquisition Reform
Format: CD-ROM
Year: 1996
Producer: Army Management Engineering College (AMEC)
Publisher: Defense Acquisition University
Telephone: 703-845-6634, Fax: 703-379-4319
Hardware: PC (486 SX, 8 MB RAM, CD-ROM drive, sound card)
Abstract: Procurement officers learn how to use new guidelines and systems which were introduced to streamline government acquisition procedures. Includes video simulations, pre-tests and post-tests with remediation. Full-text search capability and links to glossaries and regulations make the disc a powerful reference tool.

Title: The Business Disc
Format: Level III
Year: 1986
Producer: Same as Publisher
Publisher: Maryland Interactive Tech., 11767 Bonita Ave., Owings Mills, MD 21117
Telephone: 301-581-4117
Hardware: IBM InfoWindow System or Sony View System
Abstract: Two two-sided videodiscs offer a simulation that leads the user through the steps involved in planning and managing a small business.

Title: Reading and Writing Enhancement (6)
Format: vel III
Year: 1992
Producer: Same as Publisher
Publisher: Industrial Training Corp., 13515 Dulles Technology Dr., Herndon, VA 22071
Telephone: 800-638-3757, 703-713-3335, Fax: 703-313-0065
Hardware: IBM PC or compatible; M-Motion, Videologic video overlay board, EIDS, InfoWindow, Sony VIEW, touchscreen.
Abstract: This series of lessons was created to teach the basics of reading and writing in the corporate environment. Lessons include Reference Manuals, Technical Manuals, Memos and Logs, Workplace Information Documents, Procedures and Instructions.

Title: Safety Health and Environmental Management Disc #1
Format: CD-ROM
Year: 1995
Producer: Environmental Protection Agency's SHEMD Multimedia Lab
Publisher: Same as Producer
Telephone: Fax: 202-260-0215
Hardware: MPC
Abstract: As a National Reinvention Lab, the EPA's multimedia lab has created training programs on topics like Radiation, and Ergonomics. Electronic Performance Support Systems for filling out government forms and creating pollution prevention plans are also included.

Title: Safety Health and Environmental Management Disc #2
Format: CD-ROM
Year: 1995
Producer: Environmental Protection Agency's SHEMD Multimedia Lab
Publisher: Same as Producer
Telephone: Fax: 202-260-0215
Hardware: MPC
Abstract: EPA created interactive multimedia training modules to train field staff cost-effectively in the areas of safety, health and environmental management.

Title: Situational Leadership
Format: Level III
Year: 1988
Producer: Same as Publisher
Publisher: Leadership Studies, 230 West Third Ave., Escondido, CA 92025
Telephone: 800-826-5457, 619-741-6595
Hardware: IBM Infowindow
Abstract: Managers learn how to assess an employee's motivation and skill level and adapt their management style accordingly.

TRAINING: Law

Title: The Interactive Courtroom
Format: Level III, CD-ROM
Year: 1992, 1996
Producer: Stanford Law School Interactive Video Project
Publisher: CLE Group, 695 Oak Grove Avenue, Suite 2C, Menlo Park, CA 94025
Telephone: 800-373-1829, 415-324-1827, Fx: 415-324-1991; http://www.clegroup.com
Hardware: CD-ROM version: (pc) 486, SVGA monitor, soundcard, 8 MB RAM, Win 3.1
CD-ROM version (Mac) Mac II or better, 8 MB RAM, S- 7.0
Videodisc version: IBM pc compatible, laserdisc player, monitor

Abstract: This educational application provides law students and attorneys an interactive trial simulation to refine their courtroom skills by role playing a litigator or a judge. Using the Federal Rules of Evidence, state Evidence Code, and other background materials, students can review the points of law relevant to the case scenario. Expert advice is available from noted trial lawyers or legal educators, including Howard Weitzman, Barbara Caulfield, Terry MacCarthy and Tim Hallahan. Students may raise objections at any time during the simulated trial and then see and hear the judge's ruling. In addition, a textual explanation of the ruling is given as well as the relevant legal precedents. Course material was developed in conjunction with the Stanford Law School Interactive Video Project and the California Continuing Education of the Bar.

TRAINING: Medical

Title: The Active Knee
Format: Level III
Year: 1987
Producer: Same as Publisher
Publisher: ALIVE Centers of America Inc., 3250 West Market Street, Suite 202, Fairlawn, OH 44313
Telephone: 216-869-9623, Fax: 216-869-9103
Hardware: IBM-PC AT, Pioneer LD-V6000, Sony View System
Abstract: An interactive videodisc training program for medical and health personnel that examines the knee, tells why it is so vulnerable, and explains procedures to detect knee injuries. After completing the program, the user should be able to evaluate a knee injury, determine its nature, and decide the next steps to be taken.

Title: Bereavement Counseling: Part II: Support Strategies
Format: Level III
Year: 1990
Producer: American Journal of Nursing and University of Delaware
Publisher: American Journal of Nursing
Telephone: 800-225-5256
Hardware: IBM PC or compatible, IWPS; M-Motion, VAL, Videologic, Visage; FITNE, InfoWindow, Sony VIEW; Touchscreen
Abstract: After an introduction to the different stages of the grief process, the user is tested through 3 video simulations including deaths of an infant, young adult and elderly patient. If the user makes an inappropriate decision or remark, the actors portraying the bereaved family members will react negatively. A reference section includes a glossary, a bibliography and a list of bereavement assistance organizations.

Title: The Body Disc (pilot)
Format: Level II
Producer: The Longman Group and Grolier Inc.
Publisher:
Hardware: TV color monitor, Pioneer LD-V2000
Abstract: A Level II videodisc combining illustrative film sequences and still frames to teach basic physiology and anatomy. The still frames include detailed diagrams and offer the user outlines of important concepts. (The copy at the NDL is a pilot disc that does not include all of the lessons.)

Title: ardiac Imaging
Format: Level III
Year: 1989
Producer: Yale University School of Medicine
Telephone: 203-785-4088
Hardware: Apple Macintosh II, Apple Color High Resolution RGB monitor, Pioneer LD-V6000, and TV color monitor
Abstract: An interactive videodisc application using HyperCard stacks to teach echo-cardiography to residents and clinical staff. The disc was developed with the assistance of the National Library of Medicine.

Title: Conversim
Format: Level III
Year: 1990, 1995
Producer: Same as Publisher
Publisher: Interactive Drama, Inc.
Telephone: 301-654-0676, Fax:301-657-9174
Hardware: IBM compatible, sound card, videodisc player, voice recognition software.
Abstract: Professors are using this 'conversation simulation' to teach medical students how to interview and diagnose patients. Students see the video of the 'patient' on a large screen in front of the class and take turns asking the patient questions. Approximately 200 responses were previously recorded, so that students can ask almost any appropriate question and instantly access the pre-recorded response. Students can use the patient's medical history and test results to diagnose and treat the patient. Students then see the consequences of their decisions as their patient's medical condition improves or deteriorates.

Title: DAX: A Right to Die
Format: Level III
Year: 1990
Producer: Center for Design of Educational Computing, Carnegie Mellon U. 4122687643
Publisher: Falcon Software, P.O. Box 200, Wentworth, NH 03282
Telephone: 603-764-5788
Hardware: IBM InfoWindow System
Abstract: A true case history which examines ethical and moral issues. In 1973, Dax Cowart suffered severe burns over two-thirds of his body, resulting in blindness and other physical handicaps. Dax's year-long medical treatment was extremely painful. Repeatedly, Dax requested that his treatment cease, which would cause his death. Users examine the facts; listen to Dax; review and react to Dax's doctors, nurses, lawyer, and friends; and decide for themselves if Dax should receive medical care against his expressed wishes.

Title: HyperHeart
Format: Level III
Year: 1991
Producer: Same as Publisher.. e-mail:stpierre@cc.utah.edu
Publisher: Institutional Media Serv., 207 MBH, Univ. of Utah, Salt Lake City, UT 84112
Telephone: 801-581-8694, Fax: 801-581-7987
Hardware: Apple Mac II, High Res. RGB monitor, Pioneer LD-V6010, TV color monitor
Abstract: HyperCard stacks provide diagrams and textual explanations of the heart's anatomy, cardiac cycles, blood flow, and sounds as well as how to read electrocardiograms. Some sections access material on the Slice of Life.

Title: Interactive Medical Courseware: Adult Airway Management
Format: Level III
Year: 1992

Producer: Datastar Educational Systems
Publisher: Datastar
Telephone: 403 463 3327
Hardware: EIDS, FITNE, InfoWindow, Sony VIEW 5000, Visage
Abstract: Emergency care simulations include a choking patient and an automobile accident victim. The user must decide when and how to intervene in the scenario and experience the outcome of those decisions.

Title: Interactive Medical Courseware: Emergency Simulation
Format: Level III
Year: 1992
Producer: Datastar Educational Systems
Publisher: Datastar
Telephone: 403-463-3327
Hardware: EIDS, FITNE, InfoWindow, Sony VIEW 5000, Visage
Abstract: Emergency care simulations include a heart attack victim and an automobile accident victim. The user must decide when and how to intervene in the scenario and experience the outcome of those decisions.

Title: Interactive Technology Sampler
Format: Level II/ III
Year: 1990
Producer: Same as Publisher
Publisher: Cognitive Science Branch, National Library of Medicine, NIH
Telephone: 301-496-6280
Hardware: 2 screen system: Videodisc player, TV, IBM/Mac.
1 screen system: Videodisc player & IBM w/ M-Motion or InfoWindow.
Abstract: This collection of demonstrations shows interactive technology applications in medicine and the health sciences.

Title: Nursing Care of Elderly Patients with Acute Cardiac Disorders
Format: Level III
Year: 1989
Producer: American Journal of Nursing
Publisher: American Journal of Nursing
Telephone: 800-225-5256, 212-582-8820 x541
Hardware: IBM PC or compatible, IWPS; M-Motion, VAL, Videologic, Visage; FITNE, InfoWindow, Sony VIEW; Touchscreen.
Abstract: Through the simulation, nursing students assess and treat the cardiac disorder of the elderly patient. A comprehensive library is available with information to help the student make the correct diagnosis and treatment. Topics in the library include heart and lung sounds, analysis of ECGs, and side effects of medications. Immediate feedback is given with each answer.

Title: Nursing Care of the Elderly Patient w/ Chronic Obstructive Pulmonary Disease
Format: Level III
Year: 1988
Producer: Same as Publisher
Publisher: Education Services Division, American Journal of Nursing Co., 555 W 57th St., New York, NY 10019
Telephone: 800-225-5256, 212-582-8820 X541, 212-586-5462
Hardware: IBM InfoWindow System
Abstract: Designed as a simulation, nursing staff and students manage a patient's care 'm emergency room admission through ICU to discharge. Staff and students ;ess chest and lung sounds, interpret arterial blood gases, provide mechanical ventilator care, select appropriate medications, evaluate lab results, monitor oxygen therapy, and teach the patient about COPD. Users may request information from a data library. First of three interactive videodisc programs.

Title: Slice of Life III and V
Format: Level I
Year: 1986, 1992
Producer: University of Utah
Publisher: Slice of Life, University of Utah
Telephone: 801-851-8694
Hardware: Videodisc player & TV monitor
Abstract: Visual encyclopedia of over 38,500 images of the body.

Title: Therapeutic Communication
Format: Level III
Year: 1990
Producer: Same as Publisher
Publisher: Fuld Institute for Teaching Nursing Education
Telephone: 6 4-592-2511
Hardware: FITNE, InfoWindow
Abstract: Teaches health professionals how to communicate with more effectively with patients. One section also teaches therapeutic listening skills.

TRAINING: Teacher

Title: Essential Teaching Skills Program
Format: Level III
Year: 1990
Producer: Ferranti International (This program is no longer commercially available)
Publisher: N/A
Telephone: (This program is no longer commercially available)
Hardware: Info window system touch screen monitor or keyboard
Abstract: Video segments demonstrate effective teaching styles, strategies and techniques in actual classroom settings, as the viewer advances through short, introductory courses on basic teaching skills. Courses on classroom management, teaching and learning styles, instructional strategies, lesson planning, student assessment and professional development are included.

TRAINING: Technical - Computers

Title: How Computers Work
Format: CD-ROM
Year: 1992
Producer: Same as Publisher
Publisher: Time Warner Interactive, P.O. Box 30621, Tampa, FL 33630-0621
Telephone: (No longer taking telephone orders)
Hardware: Macintosh, System 6.0.7, 4 MB RAM
Abstract: Basic computer literacy course based on Time-Life book series "Understanding Computers" and "How Things Work". Includes demos of software: word processors, desktop publishing, and multimedia. The game using LOGO (the user-friendly programming language for children) provides a hand-on experience with how computers think.

Title: Microsoft PowerPoint 7
Format: CD ROM
Year: 1996
Producer: Same as Publisher
Publisher: MicroVideo Learning Systems, 250 Park Ave., South New York, NY 10003
Telephone: 800-231-4021, fax: 800-TRY-MVLS, Email info@microvideo.com
Hardware: 486/33 PC, 8 MB RAM, 2X CD-ROM drive, sound card (MPEG optional)
Abstract: A user-friendly, video enhanced, guided tutorial for Microsoft PowerPoint.

Title: South-Western Computer Dimensions
Format: Level III
Year: 1992
Producer: Arnowitz Productions
Publisher: South-Western Publishing
Telephone: 800-543-0487, 513-271-8811
Hardware: IBM or Macintosh; videodisc player, TV monitor.
Abstract: Computer literacy course containing history of computers; overview of spreadsheets, databases and word processors; discussions on social impact of technology and ethics. Comprehensive printed materials include teacher's manual, lesson plans, and transparency masters. The videotape shows different ways that teachers have been using Computer Dimensions in the classroom.

TRAINING: Technical - Electronics & Electrical Safety

Title: Basic AC Circuits (11)
Format: Level I/III
Year: 1981 (video); 1991, 1994 (software)
Producer: VTAE (Video-Based Training and Education)
Publisher: VTAE, One Foundation Circle, Waunakee, WI 53597-8914
Telephone: 800-821-6313, 608-831-6313, fax: 608-849-2468
Hardware: IBM PC or compatible; M-Motion, VAL, Videologic, Visage, InfoWindow, Sony VIEW, VTAE
Abstract: Course covers theory, analysis and application of alternating current circuits.

Title: Basic Electricity and DC Circuits (11)
Format: Level I/III
Year: 1975, 1976 (video); 1991, 1994 (software)
Producer: VTAE (Video-Based Training and Education)
Publisher: VTAE, One Foundation Circle, Waunakee, WI 53597-8914
Telephone: 800-821-6313, 608-831-6313, fax: 608-849-2468
Hardware: IBM PC or compatible; M-Motion, VAL, Videologic, Visage, InfoWindow, Sony VIEW, VTAE
Abstract: Explains how to predict behavior of electricity with simple circuit laws. No previous knowledge of electronics is needed.

Title: Electrical Safety
Format: Level III
Year: 1991
Producer: Industrial Training Corporation
Publisher: dustrial Training Corp., 13515 Dulles Technology Dr., Herndon, VA 22071
Telephone: 00-638-3757, 703-713-3335, Fax: 703-313-0065
Hardware: PC compatible; M-Motion, Videologic, EIDS, InfoWindow, Sony VIEW, touchscreen.
Abstract: Teaches users about principles of basic electrical safety within OSHA requirements

TRAINING: Technical - Industrial & Safety

Title: Cool Water Videodisc Archive
Format: Level III
Year: 1991
Producer: Nolan Productions
Publisher: Nolan Productions
Telephone: 415-883-0187
Hardware: Macintosh, videodisc player & TV monitor
Abstract: When the Electrical Power Research Institute wanted to test a new breed of cleaner power plants, they created a demo facility in Daggett, California which succeeded in surpassing standards set by EPA. To preserve the knowledge gained by the project and to facilitate replication of the processes used, they commissioned this archive of 24 videodiscs. An interactive map of the facility combined with a powerful search engine allows quick access to information. An interactive training module provides a simulation of the startup procedure, in which the trainee must locate, identify and turn various valves.

Title: UAW-GM Health and Safety Training (series)
Format: Level III
Year: 1987
Producer: Interactive Medical Communications, Inc.
Publisher: United Auto Workers and General Motors (UAW-GM) Health and Safety Training Center, 29815 John R. Madison Heights, MI 48071
Telephone: 313-547-8546
Hardware: Zenith Data Systems microcomputer, Visage touchscreen monitor, Pioneer LD-V6010
Abstract: This series is used in UAW-GM plants across the country to teach health and safety measures to automobile plant workers. The series covers subjects such as fork-trucks, rigging, and robotics. Each course includes demonstrations, subject review, and testing to evaluate knowledge of concepts. UAW-GM has published an evaluation comparing the effectiveness of the interactive training method to the videotape-plus-instructor method.

Title: Underground Storage Tank Health and Safety
Format: Level III
Year: 1991-1992
Producer: Industrial Training Corporation, EPA
Publisher: Industrial Training Corp., 13515 Dulles Technology Dr., Herndon, VA 22071-3416
Telephone: 800-638-3757, 703-713-3335, Fax: 703-313-0065
Hardware: PC compatible; M-Motion, Videologic, EIDS, InfoWindow, Sony VIEW, touchscreen.
Abstract: Lessons include Petroleum Products; Exposure and Oxygen Depletion; Underground Storage Tank Site Physical Hazards; and Protection, Monitoring and Planning.

Title: Vapor Recovery
Format: CD-I

Year: 1994
Producer: Same as Publisher
Publisher: Comprehensive Technologies International, 11350 Random Hills Rd., Ste. 300, Fairfax, VA 22030
Telephone: 703-267-7200
Hardware: CD-I player, Color TV
Abstract: Overview of vapor recovery principles and safety issues involved in operating a marine vapor control system. Includes emergency shutdown procedures and a review of Coast Guard Regulations. Test results can be saved to a diskette for record-keeping purposes.

VIRTUAL REALITY

Title: Mandala System
Format: Virtual Reality
Year: 1991, 1993
Producer: Same as Publisher
Publisher: Vivid Group
Telephone: 416-340-9290, fax: 416-348-9809, vivid@gpu.utcs.utoronto.ca
Hardware: IBM, Macintosh or Commodore w/ video digitizing board, video camera.
Abstract: This 2-dimensional virtual reality system uses a video camera to allow users to enter into the computer environment as a digitized image which can interact with bells, drums, birds and other objects. Neither headgear nor data gloves are used in this system.

Glossary *of Technological Terms*

Adobe Acrobat	Created by Adobe Systems, Inc, Acrobat is a freeware file reader that decodes, reads and converts documents to the Portable Document Format (PDF). This program allows scalable graphics and type to be displayed and printed from any computer - Macintosh, Windows, DOS, or UNIX - regardless of the fonts or software programs used to create the original.
Agent	Sometimes called a Web agent, intelligent agent, or autonomous agent, this "agent" is a program which executes tasks such as filtering your e-mail and finding Web sites to suit your interests. Usually the program does this independently once you set your preferences.
Analog	This word is often used to denote the opposite of digital. It loosely means the measuring of data on more physical grounds as opposed to digital, which is precise and electronic.
Anonymous FTP	Anonymous FTP uses File Transfer Protocol to allow many users access to a set of files. Users can log in to an anonymous FTP site using the login name "anonymous." With regular FTP, the user needs a system name and password to access the site. Anonymous FTP sites usually contain public domain software or data, free for the taking.
ANSI	ANSI (American National Standards Institute) is an organization of American industry groups who work with other nations to develop standards in facilitating telecommunications and international trade.
Applet	A mini-program that can be downloaded quickly and used by any computer equipped with a Java or ActiveX capable browser. Applets carry their own software players.
Artificial Intelligence	Computer hardware and software packages that try to emulate human intelligence in order to solve problems using reasoning and learning, based on research of human thinking patterns.
ASCII	ASCII (American Standard Code for Information Interchange) files or "plain text format" files are text (letters and numbers and punctuation) that are free of any special formatting such as bold or italics. Every computer can open an ASCII file, and almost every word-processing program can make and save ASCII files. The opposite of an ASCII file is a binary file.

238.

Glossary of Technological Terms

ATM	Asynchronous Transfer Mode - A high speed networking scheme and communication protocol designed with the transfer of multimedia data in mind.
AUP	Acceptable Use Policy is the official policy statement regarding the use of a network or computer system.
Authentication	A security measure for checking a user's identity. Some Web sites require a users identity to be authenticated before they can enter. This is usually done with a password and/or username which was established prior to the user arriving at the site.
Backbone	A backbone is any central portion of a communications network where many lines come together. Backbones are designed to transport huge volumes of data before distributing it back down regional phone lines to your computer. A backbone is made up of hardware such as relays and switches in addition to high-bandwidth communications lines.
Bandwidth	The range of frequencies a transmission line or channel can carry: the higher the frequency the higher the bandwidth and the greater the information carrying capacity of a channel. On the less technical side, the term "bandwidth" is used to refer to the amount of time it takes for a Web page to fully load.
Baud	In common usage the "baud rate" of a modem is how many bits it can send or receive per second. Technically, "baud" is the number of times per second that the carrier signal shifts value.
BBS	A BBS (Bulletin-Board System) is a network comprising one or more PCS equipped with modems and special communications software which are set up for the purpose of taking calls from subscribers. Once a subscriber calls in, they can navigate the system to talk to other users or download information.
Bitmap	A map of dots or "pixels." Any picture you see on a Web page is a bitmap. Bitmaps come in many file formats such as GIF, JPEG, TIFF, BMP, PICT, PCX, and DIB.
Bookmark	A file created by a web browser that "remembers" the URL of a web site, permitting a user to return to that web site quickly at a later time by a mouse selection rather than having to type in or remember the URL.

Glossary *of Technological Terms*

Boolean (operators)	A system for searching and retrieving information from computers by using and combining terms such as AND, OR, and NOT (operators) to sort data.
Bot	See "Spider"
Bps	BPS (Bits Per Second) is the measure of a modem's signaling speed. However, the only term you'll hear describing new modems is Kbps, for kilobits per second -- as in 28.8Kbps, meaning 28,800 bits per second.
Browser	The generic term for any piece of software that allows users access to World Wide Web pages. Netscape Navigator and Microsoft Internet Explorer are examples of commonly used web browsers.
Cache	A cache is an area of your computer's memory or its hard drive that stores Web text and images you've already seen. When your browser asks to see those things again, the computer has them on hand and doesn't have to go get it from the Net.
CAD	A program used by architects, engineers and 3D artists who want to visualize and manipulate the objects or spatial environments they are designing. One of the most popular of these programs is AutoCAD by AutoDesk. Sometimes referred to as computer assisted design.
CD-E	Compact Disc - Erasable - A compact disc that can be recorded on, erased and recorded on again and again and again...
CD-I	Compact Disc - Interactive - A compact disc format that holds data, audio, still video and animated graphics, allowing users to navigate through static offline information. CD-I discs are only compatible with CD-I players
CD-R	Compact Disc - Recordable - A WORM (Write Once, Read Multiple) media that work just like standard CDs. The advantage of CD-R over other types of optical media is that you can use the discs with a standard CDplayer. The disadvantage is that you can't reuse a disc.
CD-ROM	Compact Disc - Read Only Memory - An optical storage technology that uses compact discs. CD-ROM technology was originally used for encyclopedias, dictionaries, and software libraries, but now they are often used in multimedia applications. One CD-ROM can hold about 600 megabytes, or the equivalent of 700 floppy disks.

240.

Glossary of Technological Terms

CGI	Common Gateway Interface - The standard for running programs on a server from a Web page. Gateway programs, or scripts, are executable programs which can be run by themselves. They have been made external programs in order to allow them to run under various (possibly very different) information servers interchangeably. Some of the most common CGI scripts found on the Web are programs which process the information a user might enter on a form or whenever an imagemap is "clicked" on.
Chat	A form of interactive online communication that allows you to have real time conversations with others on your computer. Chatting on the Internet can take place via Web pages at places known as chat rooms or on IRC channels. Either way, when participating in a chat discussion, your messages are instantaneously relayed to other members and their messages are instantaneously relayed to you.
Client	A remote computer connected to a host or server computer. Also refers to the software that makes this connection possible.
Codec	COder/DECoder - Any hardware or software mechanism that translates video or audio streams between an analog signal and a compressed digital format.
.com	A type of Internet domain assigned to URLs which are business or commercial entities.
Compression	The process of making computer data smaller so less is needed to represent the same information and, consequently, the information takes up less disk or file space and may be transmitted in less time.
Cookie	A special piece of information about you, something you clicked on, and/or your computer system which is stored in a text file on your hard drive. This information is usually accessed by a server when you connect to a Web site which wants to know some information about you or your system. One common occurance of a "handing of a cookie", would be when you as a user, log into a system through a Web site. After you enter in your username and password, a text file is saved by your browser for later access.
Country code	In a URL or e-mail address, instead of seeing the "usual" .com (.net, .org, .edu, or .gov) you may see a two letter abbreviation. This signifies the country in which the Web site originates from.

Glossary *of Technological Terms*

Crawler	See "Spider"
CU-SeeMe	(Pronounced "see you see me") is a free video conferencing program (under copyright of Cornell University and its collaborators) available to anyone with a Macintosh or Windows machine and a connection to the Internet. With CU-SeeMe, you can videoconference with another site located anywhere in the world. By using a reflector, multiple parties at different locations can participate in a CU-SeeMe conference, each from his or her own desktop computer.
Database	A large collection of data (visual, audio, text) stored and organized so that it can be retrieved and manipulated rapidly.
Data warehouse	A database, often remote, containing recent snapshots of corporate data. Planners and researchers can use this database freely without worrying about slowing down day-to-day operations of the production database.
Data warehousing	A generic term for a system for storing, retrieving and managing large amounts of any type of data. Data warehouse software often includes sophisticated compression and hashing techniques for fast searches, as well as advanced filtering.
Dedicated line	A telecommunications line that lets your computer have a direct, permanent connection to the Internet.
Discussion group	A group of people who exchange messages about particular topics. Often associated with newsgroups, they can also take the form of interactive message boards, thread message forums, and e-mailing lists.
Distance learning	The process by which students and teachers at different sites carry out learning and instruction via cable connection, satellite, fiber optic cable, microwave, conventional telephone lines, or computer networks.

242

Glossary of Technological Terms

DNS	Domain Name System - A database system that translates an IP address into a domain name. For example, a numeric IP address like 123.456.789.0 is converted into <abc.com>. The DNS is a static, hierarchical name service and it uses TCP/IP hosts, and is housed on a number of servers on the Internet. Basically, it maintains this database for figuring out and finding (or resolving) host names and IP addresses. This allows users to specify remote computers by host names rather than numerical IP addresses.
Domain name	The "address" or URL of a particular Web site. This is also how you describe the name that is at the right of the @ sign in an Internet address.
Download	To transfer files from one computer to another. The most common way of doing this on the Internet is by FTP.
DVD	The next-generation video CD and high-capacity CD-ROM. The disc is the same diameter as a CD-ROM, but can be recorded on both sides. Each side holds 4.7GB, equivalent to seven CD-ROMs, or 14 CD-ROMs, if both sides are used. A dual-layer version is also planned that yields 8.5GB per side, or the equivalent of 28 CD-ROMs if both sides are used. DVD players are compatible with audio CDs, CD-ROMs, CD-I discs and Video CDs. DVD originally stood for Digital VideoDisc. Since it spanned both the movie video and computer worlds, it was later called Digital Versatile Disc. Today, the acronym has become its name. DVD stands for D-V-D.
.edu	A type of Internet domain assigned to URLs which are university or other educational institutions.
E-mail	Electronic mail are electronically transmitted messages. Linked by high speed data connections that cross international boundaries, e-mail lets you compose messages and transmit them in seconds to one or more recipients anywhere in the world.
Encryption	A way of making data unreadable to everyone except the receiver. An increasingly common way of sending credit card numbers over the Internet when conducting commercial transactions.
Ethernet	A widespread networking scheme rated at 10 Mbs (megabits per second).

Glossary *of Technological Terms*

Extensions

The characters after the dot in a file's name are considered it's extension. This is used to determine how the file is formatted and viewed. For example a file named *homepage.html* means that the file is coded in HTML and therefore must be viewed with a compatible program such as a Web browser in order to see it properly. On the Internet you will come across many different file extensions such as .dcr, .mov, .avi and .au. In order to properly handle these files your browser must be configured to recognize these extensions. (See Appendix for a list of extensions).

FAQ

Frequently Asked Questions - A list of questions and answers related to a newsgroup, software, Web site, or whatever. FAQ lists prevent newsgroup discussions from being overrun by common user questions.

Fiber optics

A method of transmitting light beams along optical fibers. A light beam, such as that produced by a laser, can be modulated to carry information.

Fire wall

A device that protects a private network from the public part. A computer set up to monitor traffic between an Internet site and the Internet. It's designed to keep unauthorized outsiders from tampering with a computer system therefore increasing a servers security.

Firewire

Video capture boards that permit professional quality online video production at a reasonable price (>$5,000). Firewire acts as a conduit for video signal from a digital camera to the CPU.

Frame

A term used to describe a viewing and layout style of a World Wide Web site, it refers to the simultaneous loading of 2 or more Web pages at the same time within the same screen. Originally developed by Netscape and implemented in their Navigator 2.0 browser, today many other popular Web browsers support this feature.

Some Web sites come in two versions; a "frames" and "no frames" version. The frames version usually takes a little longer to load and may contain other "enhanced" features such as Java and Animation.

FTP

File Transfer Protocol - The common procedure or protocol used for downloading and uploading files via the Internet.

Glossary *of Technological Terms*

Gateway	A computer system for exchanging information across incompatible networks that use different protocols. For example, many commercial services have e-mail gateways for sending messages to Internet addresses.
GIF	Graphics Interchange Format - Developed by Compuserve using compression technology from Unisys. On the World Wide Web pictures and graphics you see on Web pages are usually in GIF format because the files are small and download quickly.
GIS	Geographic Information System - A computer-based analysis tool that uses data about geographic characteristics (e.g. what type of land, what is built on the land, what is under the land) to observe, predict, and plan in a variety of industrial, civic, and educational contexts.
Gopher	An Internet server document browsing and searching system that lets you look all over the Internet for texts of interest and helps you to retrieve them.
GUI	Graphical User Interface - this term refers to a software front-end meant to provide an attractive and easy to use interface between a computer user and an application.
H.320	An ITU standard for teleconferencing over ISDN and T-1 lines (digital switched media).
H.323	An ITU standard for Internet and Ethernet (packet-switched networks) videoconferencing. The standard includes specifications for multipoint conferencing, network administration, bandwidth management, and gateways that permit H.323 users to communicate with teleconferencers using POTS or digital switched lines.
H.324	An ITU standard for video conferencing over POTS. H.324 supports better video quality, higher frame rates and system/software interoperability. The establishment of the standard has encouraged videoconferencing software and hardware companies to produce a deluge of products, none of which are wholly mature as of this date.
HDTV	High Definition Television - A video system with better color and better audio than any existing TV standard.

245

Glossary *of Technological Terms*

Homepage	Sometimes written as two words (home page) - The first page on a WWW site that acts as the starting point for navigation. The primary Web page for an individual, software application, or organization. Homepages link visitors to other pages related to the site.
Host	Any computer that can function as the beginning and end point of data transfers. An Internet host has a unique Internet address (IP address) and a unique domain name.
HTML	HyperText Markup Language - The coding method used to format documents for the World Wide Web. Web pages are able to be seen due in part to HTML codes or tags as they are more commonly known, these tags are then interpreted by a Web browser (such as Netscape Navigator) which renders your Web page.
HTTP	Hypertext Transfer Protocol - The protocol that tells the server what to send to the client, so the client can view Web pages, FTP sites, or other areas of the Net.
Hypertext (hypermedia, hyperlink)	Text or images you find on a Web site which can be "clicked on" with a mouse which in turn will take you to another Web page or a different area of the same Web page; multimedia links on a Web page that lead to sound, graphics, video, or text resources.
Imagemap	An image or graphic with areas made to allow a user to click on them. An imagemap can have many different areas which are hyperlinks or "hot". These clickable areas are called links and can take you to different sections of a Web site or to other Web sites. For example, an image of a country might allow users to click on a city or region which will then bring up information or another Web page about that place.
Interactive	A computer interface in which the user's responses and choices direct the computer's presentation.
Interface	Hardware and/or software that supports communication between two components, i.e. computer-computer; computer-musical instrument; user-computer.

Glossary of Technological Terms

Internet	A system of linked computer networks, international in scope, that facilitates data communication services such as remote login, file transfer, electronic mail, and newsgroups. The Internet is a way of connecting existing computer networks that greatly extends the reach of each participating system.
Intranet	A private network inside a company or organization that uses the same kinds of software that you would find on the public Internet, but that is only for internal use. As the Internet has become more popular many of the tools used on the Internet are being used in private networks, for example, many companies have Web servers that are available only to employees.
IP address	Internet Protocol Address - The numeric address that is translated into a domain name by the DNS.
IRC	Internet Relay Chat - A live chat area of the Internet in which real-time conversations among two or more people take place via IRC software, ASCII commands, and channels.
ISDN	Integrated Services Digital Network - Provides the fastest commercially available link to the Internet. ISDN is a set of communications standards allowing a single wire or optical fibre to carry voice, digital network services and video. ISDN is intended to eventually replace the plain old telephone system or POTS.
ISO	International Standards Organization, Geneva. An organization that sets international standards, founded in 1946. The U.S. member body is ANSI. ISO deals with all fields except electrical and electronics, which is governed by the older International Electrotechnical Commission (IEC). With regard to information processing, ISO and IEC created JTC1, the Joint Technical Committee for information technology.

247.

Glossary of Technological Terms

ISP	Internet Service Provider - A company that provides access to the Internet. Before you can connect to the Internet you must first establish an account with an Internet Service Provider (ISP). ISP's have a wide range of prices and packages for users to choose from. There are accounts custom tailored for high level users and Web designers and accounts for the more moderate Internet user. The best thing to do when choosing an ISP is to be sure they have a local access number so you won't have to dial long distance to connect, also try to get an account that offers unlimited access as well as storage on the company's server to house your own Web site.
ITU	International Telecommunications Union - A branch of the United Nations that coordinates and standardizes telecommunications technologies.
Java	A programming language that is specifically designed for writing programs that can be safely downloaded to your computer through the Internet and immediately run without fear of viruses or other harm to your computer or files. Using small Java programs (called "Applets"), Web pages can include functions such as animations, calculators, and other fancy tricks.
Javascript	A scripting language for Web pages. Scripts written with JavaScript can be embedded into HTML documents. With JavaScript you have many possibilities for enhancing your Web page with interesting elements. It makes it easy to respond to user initiated events (such as form input). Some effects that are now possible with JavaScript were once only possible with CGI. Javascript gives a developer the ability to create really sophisticated Web pages. JavaScript is intended to provide a quicker and simpler language for enhancing Web pages and servers.
JPEG	Joint Photographic Experts Group - One of two types of graphic formats used on the World Wide Web the other being a GIF. The benefit of using JPG images is the higher color and resolution you can have which is 16 million colors as opposed to the 256 color limitations of GIF files. JPEG is an algorithm for compressing still images. Motion-JPEG, a variation of JPEG, is used to compress moving images.
LAN	Local Area Network - A network that connects computers in a small area (like a room, a building, or a set of buildings.)

Glossary *of Technological Terms*

Leased line	Refers to a dedicated phone line that is rented for exclusive 24-hour, 7-days-a-week use from your location to another location.
Listserv	A software program developed by L-soft International, Inc. for setting up and maintaining e-mail discussion groups. Though "Listserv" actually refers to one particular software program, the word listserv has, like "Kleenex" and "Band-Aid," come to be a generic term for any online mailing list.
Lurker	A visitor to a newsgroup or online service who only reads other people posts but never posts his or her own messages, thus remaining anonymous.
Mail filter	A program that allows a user to sort e-mail messages according to information contained in the header (e.g. From, To, Subject, Date).
Megahertz	A measurement of frequency or rate of vibration of a signal. One hertz = one cycle per second; one megahertz (MHz) = 1 million cycles per second. In computers, the specification Mhz refers to the computer's speed in processing digital information.
MIDI	Musical Instrument Digital Interface - This is a connectivity standard which enables you to hook together computers, musical instruments, and synthesizers to make and orchestrate digital sound. Pronounced "middy," the term is used to describe the standard itself, the hardware that supports the standard, and files that store information that the hardware can use. MIDI files are like digital sheet music--they contain instructions for musical notes, tempo, and instrumentation--and are widely used in game soundtracks and recording studios.
MIME	Multipurpose Internet Mail Extensions - The standard for attaching non-text files to standard Internet mail messages. Non-text files include graphics, spreadsheets, formatted word-processor documents, sound files, etc. An e-mail program such as Eudora is said to be "MIME Compliant" if it can both send and receive files using the MIME standard. When non-text files are sent using the MIME standard they are converted (encoded) into text - although the resulting text is not really readable.

Glossary *of Technological Terms*

MMX	A CPU chip developed by the Intel Corporation which will enable greater handling of multimedia such as video and audio on the desktop as well as over the Internet. Software developers can takle advantage of MMX technology to deliver a new generation of higher-performance multimedia and communications applications.
Modem	MOdulator, DEModulator - A device that you connect to your computer and to a phone line, that allows the computer to talk to other computers through the phone system. Basically, modems do for computers what a telephone does for humans.
MPEG	Motion Picture Experts Group - Audio and video files found on the Internet are sometimes in this format.
Multimedia	The capability of a computer to display information in multiple forms - e.g. text, sound, picture, animation, video, often in a way that invites user interactivity. Most multimedia programs are either games or educational/training programs that are available on CD-ROM.
Netiquette	The rules of etiquette that govern online interaction on the Internet.
Newsgroups	A part of the Internet which allows users to "post" and "reply to" messages from other users. A discussion forum similar to that found on local BBSs.
Node	Any single computer connected to a network.
OCR	Optical Character Recognition - The machine recognition of printed characters. OCR systems can recognize many different fonts, as well as typewriter and computer-printed characters. Advanced OCR systems can recognize hand printing. Using a scanner and OCR software, documents can be"digitized,"allowing for electronic searches for certain words, dates, numbers, etc., without having to manually input the data.
Packet	The unit of data sent across a network.

250

Glossary of Technological Terms

Packet switching	The method used to move data around on the Internet. In packet switching, all the data coming out of a machine is broken up into chunks, each chunk has the address of where it came from and where it is going. This enables chunks of data from many different sources to co-mingle on the same lines, and be sorted and directed to different routes by special machines along the way. This way many people can use the same lines at the same time.
PC Card (PCMCIA)	A computer device packaged in a small card about the size of a credit card and conforming to the PCMCIA (Personal Computer Memory Card International Association) standard. PC Cards provide additional memory (ROM or RAM), modem and fax modem capabilities, and can even acts as portable disk drives on portable (laptop) computers.
PDA	Personal Digital Assistant - A handheld computer with options such as handwriting recognition, fax, and E-mail capabilities. Pen-based (vs. keyboard) input systems are common in PDAs.
PDF	Portable Document Format - The file format of documents viewed and created by the Adobe Acrobat Reader, Acrobat Capture, Adobe Distiller, Adobe Exchange, and the Adobe Acrobat Amber Plug-in for Netscape Navigator. This file format was developed in hopes to standardize formatting of documents that are used on the Internet. (See Adobe Acrobat).
Platform	The type of computer or operating system on which a software application runs. For example, some common platforms are PC, Macintosh, Unix, and NeXT.
Plugin	A smaller "add-on" computer program which works in conjunction with a larger application. Usually a plug-in enhances the capabilities of the program it is "plugged" into. Web browsers like Netscape Navigator have many plug-ins which allow a user to do everything from viewing QuickTime VR animations to visiting VRML worlds to hearing RealAudio.
POTS	Plain Old Telephone Service
PPP	Point-to-Point Protocol - Communication protocol used over serial lines to support Internet connectivity.

251

Glossary of Technological Terms

Protocol	A specification that describes how computers will talk to each other on a network.
QuickTime VR	Software for Macintosh and Windows which brings virtual reality to your desktop without any special equipment. Use it to experience a 3D photographic or rendered representation of any person, place or thing. Use your mouse and keyboard to rotate objects, zoom in or out of a scene, look around 360 degrees, and navigate from one scene to another.
RealAudio	Progressive Networks' RealAudio client-server software system enables Internet and online users equipped with conventional multimedia personal computers and voice-grade telephone lines to browse, select, and play back audio or audio-based multimedia content on demand, in real time. This is a real breakthrough compared to typical download times encountered with delivery of audio over conventional online methods, in which audio is downloaded at a rate that is five times longer than the actual program; the listener must wait 25 minutes before listening to just five minutes of audio.
Remote terminal	It is possible to login to a remote computer by using an application program based on TELNET - a terminal emulation protocol made for this purpose. The user can therefore enter commands on a keyboard attached to their local computer and access files etc. on a remote computer that may be located anywhere in the world.
Search engine	A program which acts like a library card catalog for the Internet. Search engines attempt to help a user isolate desired information or resources by searching for keywords that the user specifies. Commonly used search engines include: Yahoo!, AltaVista, Excite, Webcrawler, InfoSeek, HotBot, and Lycos.
Server	A host computer on a network that answers requests for information from it. The term server is also used to refer to the software that makes the process of serving information possible.
SGML	Standard Generalized Mark-up Language - An ISO standard for defining the format in a text document. An SGML document uses a separate Document Type Definition (DTD) file that defines the format codes, or tags, embedded within it. Since SGML describes its own formatting, it is known as a meta-language.

252

Glossary *of Technological Terms*

Shareware	Software available for downloading on the Internet that you can try before you buy. Users who want to continue to use the program are expected to pay a registration fee (rarely more than U.S. $100). In return they get documentation, technical support, and any updated versions.
Shockwave	A Web browser plugin which provides for Macromedia Director movies to be viewed on WWW pages. Shockwave is a key component of Macromedia's solution for interactive professionals who develop digital media for the WWW.
Signature file	A file automatically attached to outgoing e-mail messages and postings to newsgroups, which commonly includes name and contact information. Analogous to letterhead.
Spam	To send identical and irrelevant postings to many different newsgroups or mailing lists. Usually this posting is something that has nothing to do with the particular topic of a newsgroup or of no real interest to the person on the mailing list. The name comes from a Monty Python song and is considered to be a serious violation of netiquette.
Spider	A program that monitors the Internet for new web or ftp sites, or other publicly accessible documents, and automatically catalogs them in a database searchable by a search engine.
Streaming Audio **Streaming Video**	One-way transmission of audio or video over a network in which both the client and server cooperate for uninterrupted sound. The client side buffers a few seconds of data before it starts sending it to the speakers, which compensates for momentary delays in packet delivery.
Surf	To browse or "look at" information on the World Wide Web by pointing and clicking and navigating in a nonlinear way (meaning anywhere you want to go at anytime).
SVGA	Super Video Graphics Array - An enhancement of the VGA standard of graphics display. SVGA can support up to 256 colors simultaneously and has a resolution of up to 1024 horizontal lines and 768 vertical lines.

253

Glossary *of Technological Terms*

T-1

A leased line connection capable of carrying data at 1,544,000 bits-per-second. At maximum theoretical capacity, a T-1 line could move a megabyte in less than 10 seconds. That is still not fast enough for full-screen, full-motion video, for which you need at least 10,000,000 bits-per-second. T-1 is the fastest speed commonly used to connect networks to the Internet.

T-3

A leased line connection capable of carrying data at 44,736,000 bits-per-second. This is more than enough to do full-screen, full-motion video.

Tag

A tag is used to describe a type of command or instruction usually in regard to HTML or Web page code. HTML tags look like this:
 , <font size=1>, <body> or <html>, always with a pair of brackets (<>) surrounding the specific instruction.

Telemedicine

The use of modern telecommunications and information technologies for the provision of clinical care to individuals at a distance and the transmission of information to provide that care. Telemedicine is not one specific technology but a means for providing health services at a distance using telecommunications and medical computer science. It spans every echelon of health care, from first responder/emergency medical systems to tertiary medical specialty consultations and home care.

Telnet

An Internet program for connecting to a remote host or server.

UNIX

A multiuser, multitasking operating system originally developed by AT&T, UNIX is written in C. Because C compilers became available for many different hardware platforms, UNIX was ported to a wider variety of machine families than any other operating system, and UNIX thus became synonymous with "open systems." UNIX was used to develop the Internet's communication software protocols.

Videoconferencing

Conducting a conference between two or more participants at different sites by using computer networks or the Internet to transmit audio and video data.

VGA

Video Graphics Array - A graphics display standard that supports 256 colors and 640x480 resolution.

254

Glossary of Technological Terms

Virtual Reality	Interactive technology that simulates the real world. Users can control virtual reality programs through sensor-loaded gloves and headsets. Headsets are equipped with video monitors that can give viewers the feeling of movement through 3D "virtual environments."
VRML	Virtual Reality Modeling Language - VRML is an open, extensible, industry-standard scene description language for 3-D scenes, or worlds, on the Internet.
WAIS	Wide Area Information Server - A client-server information system that lets users search through databases with a single user interface.
WAN	Wide Area Network - A network that connects computers over a large geographic area.
WebTV	WebTV is a new way to access the Internet from your TV. You don't need a computer and there's no software to load. All you need is a television, a phone line, and a WebTV Internet terminal, and you can access the Internet.
WWW	World Wide Web - a global (Worldwide) hypertext system that uses the Internet as it's transport mechanism. In a hypertext system, you navigate by clicking hyperlinks, which display another document which also contains hyperlinks. What makes the Web such an exciting and useful medium is that the next document you see could be housed on a computer next door or half-way around the world. The Web makes the Internet easy to use.
WYSIWYG	(Pronounced "Why-see-wig") What you see is what you get.
Zine (E-zine)	A publication or magazine published in electronic form.