Distance Education Technologies

In the pre-computer era, distance education courses were delivered via other communication technologies. One of the earliest forms of distance education was the correspondence course, which used print as its distance delivery medium. As new technologies developed, other forms of distance education delivery systems evolved such as radio, audio and videotapes, public television, satellite broadcasts and video conferencing.

A 1997 CAUSE publication on distance learning outlined four generations of distance learning technologies. The first generation of distance education courses were predominately one technology such as print and radio.

Second generation distance learning courses used multiple technologies without computers to deliver courses (i.e., audiocassettes, television, fax). Multiple technologies including computers and computer networking make up third generation mediums used for distance education (i.e., electronic mail, chat sessions, threaded discussions, CD Roms, etc.).

Finally, fourth generation technologies, the current generation of distance education technologies, combines the past mediums, but also adds multiple technologies including the beginning of high-bandwidth.

Although this article was published in 1997, most of the fourth generation technologies are still not fully available. We are still waiting for high bandwidth before we can fully take advantage of the fourth generation tools. (See Table 1).

Table One - Distance Learning Technologies

	1st Generation	2nd Generation	3rd Generation	4th Generation
Primary Feature	Predominately one technology	Multiple technologies without computers	Multiple technologies including computers & computer networking	Multiple technologies including the beginning of high-bandwidth
Timeframe	1850s to 1960	1960-1985	1985 to 1995	1995 to 2005?
Media	• Print (1890+) • Radio (1930s) • Television (1950 to 1960s)	• Audiocassettes • Television • Videocassettes • Fax • Print	Electronic mail, chat sessions, and bulletin boards using computers and computer networks· Computer programs & resources packaged on disks, CDs, and the Internet· Audioconferencing· Seminar & large-room videoconferencing via terrestrial, satellite, cable, and phone technologies Fax & Print	Electronic mail, chat sessions, and bulletin boards using computers and computer networks plus high-bandwidth transmission for individualized, customized, and live video interactive learning experiences. Computer programs & resources packaged on disks, CDs, and the Internet. Audioconferencing, Desktop videoconferencing via satellite, cable, and phone technologies Fax & Print

Mediums of Delivery

New digital technologies have enabled distance education to become much more interactive and collaborative compared to earlier methods of distance learning. The Internet allows students and faculty to interact more through chat rooms, threaded discussion groups, instant messenger, webcasts, and e-mail. In many cases, interaction among students and faculty, as well as student/student interaction is actually increased through online education media.

Technologies used to deliver distance education can be divided into four categories: print, video, audio (voice), and computer (data). Each medium and the technologies used are described below:

Print

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, fax, study guides, workbooks, course syllabi, and case studies.

Voice/Audio

Instructional audio tools include the interactive technologies of telephone, audio conferencing, voicemail, radio, and audiotape. Passive (one-way) audio tools include tapes and radio.

Video

Instructional video tools include still images such as slides, videotape, telecourses, satellite TV, cable, audio-video fiber-optic systems, video conferencing, high definition TV (HDTV),

Computers/Data

Computer applications for distance education include:

- Computer-assisted instruction (**CAI**) - uses the computer as a self-contained teaching machine to present individual lessons. One example of CAI would be a course that uses a CD-ROM.
- 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 instructions. Examples include; electronic mail, fax, real-time computer conferencing, and World Wide Web applications.

Video-Mediated Distance Education

Television and video technologies have been used to deliver distance education courses for many years. Education television has been delivering educational programming since 1950.

States have developed advanced fiber optic telecommunications networks to link educational sites across their states. Satellite TV and fiber optic systems provide coursework through fully interactive audio-video networks and satellite systems.

Classes are taught "live" at one site and simultaneously broadcast to students at other sites. These video networks make it possible for college classes to be delivered to sparsely populated areas that otherwise might not have enough students at any one locations.

The Public Broadcasting System (PBS) began offering telecourses to deliver education programs to colleges and universities in 1981. Telecourses are fully accredited, video-based courses delivered via public television stations.

Telecourses are complete and integrated instructional systems that generally include the television program, a textbook, study guide, faculty manual, and other instructional materials. Telecourses are still used today and are especially popular in community college systems.

Computer-Mediated Distance Education

Web-based delivery is becoming an increasingly popular technology used to deliver distance education courses. E-mail, CD-ROMs, listservs, discussion boards, and web sites are popular online components used in distance education courses today.

There are several different options available today to deliver online courses. Course management systems (CMS) are a popular tool at many colleges and universities for delivering web-based and web-enhanced courses.

Course management systems are essentially template-driven web sites which make it easier for faculty to translate their traditional in-class curriculums into web-based delivery. Course management systems focus on ease of use and generic tools such as gradebooks, quizzing tools, and communication tools.

Commercial vendors are competing to develop web-based products for use in distance education courses. The most popular online course management software platforms include:

- WebCT
- Blackboard
- e-College

Another option for creating online courses is for colleges and universities to develop their own home-grown course management systems. These are proprietary systems, which create online course templates that include many of the tools that come packaged with commercial systems.

Open-source course management software is another alternative to commercial course management systems. Open-sources software is attractive because it resides in the public domain and the underlying code can be downloaded for free.

The Open Knowledge Initiative (O.K.I.) is an informal coalition led by MIT whose goal is to "create an open and extensible architecture for learning technology specifically targeted to the needs of the higher education community.

Jones Knowledge has recently released their Jones e-education software as a free licensable online learning platform. According to their web site:

> "A simple CD installation of the free source code for Jones e-education, hosted on the server of your choice, allows for the quick launch of your online learning program. Courses developed in the authoring tool you select can be uploaded to the platform in a few easy clicks."

New digital technologies enable distance education courses to become much more interactive compared to the earlier delivery methods of distance learning. Combining new technologies with older media, a distance educator can build a successfully interactive course that takes advantage of a variety of delivery mediums. These new technologies have the potential to significantly improve distance education.

However, the technology cannot do it by itself, the real potential of these tools lies in the instructor. The instructor must incorporate and practice good instructional design if they wish to create a pedagogically sound distance learning course.

Lesson Four Links:

Readings Summary Slideshow
Self-assessment quiz
Lesson four assignments

Supplemental Online Resources:

Open-source course management systems
Edutools - This site provides an independently-reviewed analyses of selected course management software, including product comparisons, reviews, and automated decision-making tools.
Emerging Technologies and Distributed Learning
Digital Video for the Next Millennium
Distance Education & Technology

References

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Guide #7 "Print in Distance Education." Last Updated: March 5, 2003. <http://www.uidaho.edu/evo/dist7.html>.

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