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Teleconferencing Technologies Comparison Matrix

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Technologies continue to become more dominant in supporting learning for K-12, higher education, training, telemedicine, military and other industries. Just in time learning continues to be a need that can be met easily by technology. Older technologies continue to adapt to new needs and should be considered in the choices for learning environments. The following matrix provides an overall comparison of the existing technologies. Recording or copying tapes must be done with permission from the originator.

	Audio Conferencing	Audiographic Conferencing e-Conferencing	Computer Conferencing	Video Conferencing	Satellite Video Conferencing	Microwave Video Conferencing	Cable and Broadcast Video Conferencing
Configuration	Two-way Point-to-point Multipoint Multiple Sites	Point-to-point e-conferences updated versions being delivered via phone and internet	Two-way Point-to-point or multipoint, two or several sites	Two-way Point-to-point or multipoint, two or several sites	One way Point-to-multipoint	Two-way Point-to-point, multipoint	One-way Point-to-multipoint
Primary Uses	Meetings and classes requiring verbal exchanges	Meetings and classes requiring verbal interaction; exchange of documents, drawings, charts, e-conference PowerPoint presentations	Asynchronous classes and synchronous use through chat, e-mail, Internet phone services.	Meetings and courses requiring motion images of participants or activities	Meetings and classes between sites that do not have land connections. Uplink/downlink trucks can bring to remote areas or buildings without satellite up/downlink facilities	Classes for K-12 and higher education, business meetings	K-12 and higher education delivery of educational programming on educational channels that are set aside by providers.

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Video Capability	None	Audiographic had still video, one direction at a time. e-conference has streaming video, QuickTime movies	Streaming video QuickTime movies, synchronous or real time through video conferencing software such as CUSeeMe	Compressed video using CODECs (coder/decoder) Full motion to compressed versions	Compressed to full motion	Compressed to full motion	Full motion
Audio Capability	Fully interactive	Fully interactive	None to fully interactive	Fully interactive	Usually one way, two way provided through call back number, e-mail, fax	Fully interactive	Usually one way, two way provided through call back number, e-mail, fax
Graphics Capability	Usually none unless delivered prior to the conference.	Variety of graphics can be shown	Variety of graphics, PowerPoint slides, animation	Variety of graphics, TV production abilities, ELMO, overhead cams	Variety of graphics, TV production abilities, ELMO, overhead cams	Variety of graphics, TV production abilities, ELMO, overhead cams	Variety of graphics, TV production abilities, ELMO, overhead cams
Multiple Intelligences/ Learning Styles Met	Auditory Print meets reading and graphics	Auditory Audiographic meets reading, visual and graphics	Reading, visual graphics, hands-on through simulations, kinesthetic, auditory	Visual, graphics, emotional, auditory, print provides reading and graphics.	Visual, graphics, emotional	Visual, graphics, emotional	Visual, graphics, emotional
Closely Resembles	Telephone Conversation	Someplace between a telephone and in-person meeting	Varies from simple e-mail to an in-person meeting	In-person meeting	Viewing television program	In-person meeting	Viewing television program

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Transmission	Analog, usually terrestrial or Internet delivered with software	Analog or digital, usually terrestrial for domestic connections. e-conference via Internet and telephone or all Internet. Wireless, cell phone, and cable.	Digital and analog via terrestrial or satellite channels, wireless, cell phone, cable	Usually digital, via terrestrial or satellite channels	Analog or digital via satellite	Usually digital, via terrestrial towers. Can be uplinked to satellite, or carried via broadband	Analog and increasingly digital. Towers carry local broadcast signals. Signal are picked up by cable head-in and retransmitted. National signals are picked up via satellite at the head-in and retransmitted
Cost	Equipment \$100 to \$7,000 per site; transmission, standard telephone connection rates; bridging services.	Equipment \$3,000 and up per site; transmission, standard telephone connection rates or digital data rates bridging services additional. e-conferencing computer, client/host software, service fees	Computer, ISP, transmission, host/client software for learning environment. Internet computers available for \$200. Multisite licensing fees for learning environments range from nothing to \$5,000 or more	Depends on size of system and equipment chosen. Up to \$50,000 per room is still considered average. Transmission costs vary between fixed fee lines, dynamic ATM (asynchronous transfer mode), or other services	Receive sites can be established by downlink dishes that may cost as little as \$100. Uplinks still average \$300,000 for installation. Satellite transponder costs may range from \$150 for non-prime C-band to \$600 for full Transponder	Depends on size of system and equipment chosen. Up to \$50,000 per room is still considered average. No microwave transmission fees but equipment may be \$30,000 for two sites.	Requires only television antennae or a cable drop coaxial line. Pay for monthly use of cable box and transponder access.
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Special Strengths	Readily available equipment and transmission facilities; least expensive of the	Readily available transmission; excellent merging of video and computer	Ability to interact when convenient or in real time; use bandwidth needed for	Ability to interact visually in real time; can use video tapes and typical meeting	Transmit uniform messages simultaneously to large audience; low cost per	Lends itself to hybrid networks	Transmit uniform messages simultaneously to large audience; low cost per

	teleconferencing technologies, variety of service companies to meet needs easily and immediately. Productive for people who have met, are just meeting, or may meet in the future.	technologies	content; collaborate on documents. Uses and equipment continue to grow. Multimedia and access throughout the world	media; growing number of public sites and shared facilities	person reached		person reached
Limiting Factors	Inability to share visual images.	Audiographic equipment incompatibility. e-conference: Requires two lines for telephone and Internet modem access	Need for software, telecommunications connections, a second telephone line is preferred by most home users as the modem ties up one line while being used.	Equipment incompatibility at some speeds	Special resources for program production. Satellite transponder costs are high for occasional ad hoc users.	Number of classroom that can interact is limited by technology. Averages between 6 and 12 depending on system. Classroom cost is still high	Special resources for program production

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Typical Users	All business, education, and training	All business, education, and training	e-mail, classes, increasingly for higher education, training, and K-12.	K-12, higher ed, medical, training	Training and military, K-12 programming distribution, medical	K-12, higher ed, training	K-12, higher ed
Other Advantages	Tape and playback for absentees provided by services or by originator with tape machine. Reduces travel for ongoing needs and bad weather.	Work on documents together; save and e-mail to all. Audio tape or digital capture and playback through audio streaming on e-conference software	Access global resources through Web. Ability to post material quickly for use by many people. Archived documents provides complete record.	Meetings/classes can be videotaped and redistributed or made available through libraries. Real-time, synchronous	Meetings/classes can be videotaped and redistributed, aired or made available through libraries. Real-time, synchronous	Meetings/classes can be videotaped and redistributed or made available through libraries. Usually real-time, synchronous	Meetings/classes can be videotaped and redistributed or made available through libraries. Real-time, synchronous or tape delay
Participant Print Materials	Fax, e-mail, snail mail materials prior to the audio conference or place on the Web	Fax, e-mail, snail mail materials prior to the audio conference or view during e-conference, or place on the Web	Provide through Web pages, e-mail attachments to group, or text through online book stores that ship books and materials overnight	Fax, e-mail, snail mail materials prior to the video conference or view during e-conference, or place on the Web	Fax, e-mail, snail mail materials prior to the satellite video conference or view during e-conference, or place on the Web	Fax, e-mail, snail mail materials prior to the microwave video conference or view during e-conference, or place on the Web	Fax, e-mail, snail mail materials prior to the broadcast or view during e-conference, or place on the Web

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Learning Environment	Usually included in an overall learning environment plan, but no software is required.	Created by the audiographic or e-conference software	Wide variety of software, Some is IMS/ADL standards compliant. May include chat, white boards, audio/phone, ability to work on documents together	Set by instructor through calling on all sites. Web environment may also have influence if used	May be set only by the satellite delivery. Augmented by web or other chosen environments.	Set by instructor through calling on all sites. Web environment may also have influence if used	May be set only by the cable or broadcast delivery. Augmented by web or other chosen environments.
Variations	Audio tape Streaming Audio	Audio tape record and file of graphics	Saved files from learning environment, documents, graphics become permanent record of the class	Taping the session provides archive and allows instructor to see him/herself at work. Tape allows students to view at their convenience.	Taping the session provides archive and allows instructor to see him/herself at work. Tape allows students to view at their convenience.	Taping the session provides archive and allows instructor to see him/herself at work. Tape allows students to view at their convenience.	Taping the session provides archive and allows instructor to see him/herself at work. Tape allows students to view at their convenience.