

Chapter 6

ISD CONSIDERATIONS FOR COMPUTER-MEDIATED COMMUNICATION

Overview

Introduction

This chapter describes ISD considerations for the analysis, design, development, implementation, and evaluation of Computer-Mediated Communication. Computer-Mediated Communication enables individuals, groups, and organizations to maintain continuous communications and information exchanges. Computer-Mediated Communication expands access to human and information resources. Two of the Computer-Mediated Communication applications that can greatly impact distance learning are audiographics and computer-mediated conferencing.

Where to Read About It

This chapter contains two sections:

Section	Title	See Page
A	Audiographics	182
B	Computer-Mediated Conferencing	191

References

The material in this chapter is based on the following references:

- MIL-PRF-29612, *Training Data Products*
 - MIL-HDBK-29612-1, *Department of Defense Handbook, Guide for Acquisition of Training Data Products and Services*
 - MIL-HDBK-29612-2, *Department of Defense Handbook, Instructional Systems Development/Systems Approach to Training and Education*
 - MIL-HDBK-29612-3, *Department of Defense Handbook, Development of Interactive Multimedia Instruction (IMI)*
 - MIL-HDBK-29612-4, *Department of Defense Handbook, Glossary of Training Terms*
 - *Distance Learning Curriculum, Analysis and Media Selection*, Air University, Maxwell AFB, AL, 4 Feb 1994
 - AF Handbook 36-2235, *Information for Designers of Instructional Systems, Volume 4*
 - AF Manual 36-2234, *Instructional Systems Development*
 - AFDLO Home Page web site: <http://www.au.af.mil/afdlo/afdlo.htm>
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Section A

Audiographics

Analysis Considerations

Why Use Audiographics?

Audiographics provides real-time communication and interaction. Audiographic participants can audioconference using the telephone system, as well as share instructional materials simultaneously using computer networks. (Audiographics can also be accomplished to some degree by combining the phone system, fax machine, and hard copy delivery systems). Audiographics is usually considered to involve simultaneous transmission of audio and graphic information across a telecommunications network.

When to Use Audiographics

Audiographics can be used:

- When real-time discussion and feedback are required.
 - When collaboration is required on documents, assignments, projects, etc.
 - To provide instruction from experts at other remote sites.
 - To reduce the students' sense of isolation and distance.
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Audiographics Resource Requirements and Constraints

To determine the feasibility of using audiographics as an instructional medium, you must identify and assess the resource requirements and constraints. Audiographics is similar to audioconferencing in that it uses the telephone system. Although limited audiographic instruction can also be accomplished using only computer networks, this type of audiographics is not included in this section.

- **Equipment.** Minimum required equipment for each participant or group would include a networked computer, telephone with audio bridging capability, and a speakerphone system for larger groups.
 - **Facilities.** Facility requirements for participating sites would include reliable network access to Internet/Intranet/Electronic Bulletin Board System (BBS).
 - **Funding.** Funding may be required for PCs, software, and network systems/access if they are not already in place at all participating sites. Additional funding is also required for long distance calling fees if the DoD telephone network (DSN) would not be used.
 - **Personnel.** Other than the participants, a moderator/facilitator may sometimes be required.
 - **Time.** As with audioconferencing, development time per hour of audiographic instruction, will normally be less than other media.
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Analysis Considerations (continued)**Is Audiographics
Cost-Effective?**

If existing DoD telephone networks and computers with Internet/Intranet/BBS access are used, audiographics can be very cost-effective as an instructional delivery system. If networked computers are not available at all sites, then the cost-effectiveness of the instruction would depend primarily on the total effort and cost required to install the necessary systems.

Design Considerations

Determine the Objectives

Determine the purpose of the audiographic instruction and the specific learning objectives that must be achieved. Decide what it is you want to do and accomplish with this instructional medium.

Determine What Approach to Use

Audiographics can be conducted using only audio communications between the participants, or combined with networked computers and other instructional media such as print materials (text, pictures, graphics, etc.), videos, and fax machines. Based on how the audiographics session will be conducted, several instructional approaches can be employed to include:

- Lectures
- Interviews
- Guest speaker presentations
- Student presentations
- On-line group collaborative activities
- Group discussions or debates
- Question and answer sessions

Determine what type of test and evaluation methods should be used to measure the students' comprehension of the instruction provided. AF HDBK 36-2235, Volume 12, *Test and Measurement Handbook*, provides general guidance.

General Design Guidelines

The same general guidelines provided for audioconferencing, also apply to audiographics since the primary instructional component of both is two-way audio. The only significant difference between the two is the supporting media technologies that are used to deliver other instructional materials.

The design of audiographic instruction should draw upon the greatest strength of audiographics which is the capability for students to see and share the same computer file or document on their individual PCs. This facilitates a high level of interactivity and collaboration among the students.

General design guidelines for audioconferencing sessions:

- Limit the number of participants if possible, to a manageable size to maximize interaction.
 - Limit sessions to 2 hours.
 - Limit key topics to 3-5 per hour.
 - Use preview, presentation, and review techniques to provide structure.
 - Ask questions and integrate student activities to facilitate interaction.
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Design Considerations (continued)

General Design Guidelines (continued)

General design guidelines for enhancing learning and learning transfer:

- Take a student-centered approach towards instruction. Provide students with the opportunity to set their own goals and objectives.
 - Encourage the practical application of content, and relate subject matter to student's needs and job tasks.
 - Instruction and learning at a distance takes more time. Be realistic in the amount of content presented, and the assignments given.
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Development Considerations

Development Techniques

When developing audiographic instruction, consider the following general techniques:

- Develop a lesson plan or 'script' of the planned session.
 - Divide the content into 10-15 minute presentation segments. Connect new information with previous information.
 - Plan/schedule breaks after 50 minutes of instruction.
 - Alternate lectures with interactive student interaction activities such as student presentations, on-line group exercises, case studies, question/answer, etc.
 - Include activities in the course syllabus/agenda that encourage independent study and student-to-student interaction.
 - Develop outlines and handouts for use during the session.
 - Develop quizzes or exercises to assess student comprehension of material.
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Audiographics Pre-Session Package

Develop a read-ahead package for the students that contains:

- Welcome letter(s) with the instructor's biography and picture.
- Class roster with background information about each student.
- Course syllabus, agenda, ground rules and protocols.
- Readings, assignments, and bibliography.
- Handouts, CD-ROMs, diskettes, graphics, charts, pictures, etc., that can be used during the session.
- Points of contact and instructions on how to connect to the conference call and network server, with phone numbers for technical assistance if disconnected.
- Critique forms (if not provided on-line).

Plan to mail the packages early so the students will have them 1-2 weeks prior to the audiographics session.

Implementation Considerations

Conducting an Orientation Session

Conduct an audiographics orientation prior to the first scheduled session to help acquaint students with the media and procedures. During this orientation:

- Introduce yourself and advise the students on how they should address you.
 - Ask the students to introduce themselves.
 - Discuss what to do and who to contact if they experience any problems.
 - Review the protocol for asking questions and making comments. Students should preface any comments with their name and location.
 - Review the procedures and protocol for collaborating on shared applications.
 - Review any other ground rules or etiquette as applicable.
 - Discuss the use of the audioconferencing and computer network systems. Encourage students to use a speakerphone or headset so that their hands will be free to take notes or work on the computer during the sessions.
 - For practice, have the students bring up a pre-selected 'demo' file from the Web/FTP site, CD-ROM or diskette provided in the pre-session package (if applicable).
 - Bring up a file for all to share as a demonstration, and allow time for everyone to manipulate the data to practice using the system.
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Conducting an Audiographics Session

To get started with an audiographics session:

- Establish the conference call 10 minutes ahead of the session start time.
 - As students join in, confirm that they have established a connection to the designated audiographics server.
 - Remind students to mute their speakerphones as appropriate.
 - At the scheduled time, either take attendance using a simple roll call or accomplish this electronically.
 - Review the agenda on-line if possible, and clearly state the purpose of the session.
 - Acknowledge and welcome any latecomers.
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Implementation Considerations (continued)

Conducting an Audiographics Session (continued)

Use the following instructor techniques when conducting an audiographics session:

- Speak in a normal conversational tone, and slow enough to be understood.
 - Vary the pace of the session to maintain interest and energy.
 - Engage students in discussions, on-line collaborative activities, etc.
 - Do not let one person monopolize the audio or on-line time.
 - Ask questions and direct them at individual students when possible.
 - Allow 10-15 seconds after asking a question before continuing to give the students adequate time to respond.
 - Create a matrix and keep track of each student's participation
 - Do a mid-way evaluation to ensure students' requirements are being met. You can also have students measure their own progress through self-assessment items such as study questions, checklists and self-tests.
 - Allow time for questions and answers at the end. Encourage students to also telephone, or E-mail you and/or each other with questions and comments.
 - If collaboration among students is a goal, devise activities or projects that require use of the telephone and/or E-mail.
 - Summarize the session.
 - Remind students to submit their evaluations.
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Evaluation Considerations

Evaluation of Audiographics Instruction

The evaluation process for audiographics instruction consists of a formative, summative, and operational evaluation. If the audiographics instruction was developed to support other primary instructional media, then the instruction should be evaluated as part of the primary lesson/course evaluation.

The distance learning evaluation metrics are described in Chapter 2. The general guidelines for evaluations are contained in MIL-PRF-29612 and supporting handbooks.

This section addresses the special considerations for conducting evaluations of audiographics sessions when developed as the primary instructional medium.

Formative Evaluation

The formative evaluation begins in the analysis phase and continues through the development phase of the ISD process. During the initial phases of development, the primary focus would be on the technical accuracy of the learning objectives, content, and test items.

An initial evaluation of the lesson plan/script should be accomplished. Once a 'draft' version of the audiographics session is developed, plan and conduct individual and small group tryouts of the instruction can be accomplished. General areas to evaluate include:

- Instructional session organization, structure, presentation and format.
 - Instructor knowledge, presentation and delivery techniques, and effectiveness.
 - Instructional content clarity, accuracy, relevancy, currency, effectiveness, and completeness.
 - Use, clarity, relevancy, and effectiveness of supporting instructional materials (e.g., text, pictures, graphics, diagrams, quizzes, etc.).
 - Effectiveness of interactive student activities.
 - Availability, ease of use, reliability, and effectiveness of audioconference system and equipment.
 - Availability, ease of use, reliability, and effectiveness of the computer network system and equipment.
 - Availability and effectiveness of technical support.
 - Student comprehension and accomplishment of the learning objectives.
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Evaluation Considerations (continued)

**Summative
Evaluation**

The operational tryouts for the summative evaluation of the audiographics instruction should be conducted with several of the applicable sites participating at the same time.

Results of these evaluations are used to revise and finalize the instruction.

**Operational
Evaluation**

The operational evaluation is an ongoing process that is accomplished after the formative and summative evaluations. This evaluation is based on internal and external feedback data such as:

- Instructor/facilitator comments (internal)
- Student critiques (internal)
- Test results (internal)
- Inspection and evaluation reports (external)

To ensure the quality of the instruction is maintained, conduct these evaluations on a regular basis. There is always room for improvement.

Section B

Computer-Mediated Conferencing

Analysis Considerations

Why Use Computer-Mediated Conferencing?

Computer-mediated conferencing can range from simple E-mail discussion between two people to list servers to sophisticated groupware programs like FirstClass or Lotus Notes which allow discussion among dozens of participants. Computer-mediated conferencing involves two types of interaction: (1) interaction between the learner and the material content; (2) interaction with others about the course material. Computer-mediated conferencing enables messages to be automatically sorted into pre-selected categories or “conferences” which can be followed as discussion “threads.” Computer-mediated conferencing products often include functions allowing instructors to see who has read a certain message. Computer-mediated conferencing can be done “live” via chat rooms (computer-mediated conferencing software often includes real-time chat via text and/or audio), or it can be conducted as an asynchronous learning experience via E-mail or the threaded discussions. Computer-mediated conferencing helps to develop student independence and a self-directed approach to the instruction.

New developments in the area of computer-mediated conferencing include:

- Groupware: includes E-mail and shared databases.
 - Synchronous communication: real-time communications involving voice and video images.
 - Audio mail and Video mail: similar to E-mail but the messages are audio messages and or video messages.
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When to Use Computer-Mediated Conferencing

Computer-mediated conferencing is most appropriate for:

- Student administration and the dissemination of course information.
 - The distribution of instructional courseware and materials.
 - A means of correspondence between instructors and students.
 - Threaded discussions and group instruction.
 - Courses designed to promote higher order learning such as analysis, synthesis and evaluation
 - Courses where group discussion is required
 - Seminars and talks by subject matter experts
 - Courses requiring cooperative learning or group learning
 - Courses requiring written products
 - Courses where learners are encouraged to share their own personal experiences
 - Students whose mobility is limited
 - Support in courses based on other delivery media.
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Analysis Considerations (continued)

Computer-Mediated Conferencing Resource Requirements and Constraints

To determine the feasibility of using computer-mediated conferencing as an instructional or support medium, you must identify and assess the resource requirements and constraints. If a computer-mediated conferencing capability already exists, then determine if it will meet requirements.

- **Equipment.** Minimum required equipment for each participant would include a properly configured computer with access to Internet/Intranet or other telecommunications system.
- **Facilities.** No specific facility requirements other than student access to a facility with the required equipment.
- **Funding.** Funding may be required for PCs, software and network systems if they are not already in place at all participating sites. Additional funding may also be required for network access and services if not presently available.
- **Personnel.** Technical support personnel would be required to maintain the computer-mediated conferencing system (in-house or contract). Also, assess user computer skills to determine if that will be a constraint, and whether training will be required. Instructor personnel may require the assistance of others to respond to E-mails; the administrative burden of individualized communications placed on instructor staff must be factored into instructor requirements.
- **Time.** If the computer/network system are not already in place, a significant amount of lead time will be required. If the computer/network system exists, then time required for a computer-mediated conferencing system should not be a constraint.

Is Computer-Mediated Conferencing Cost-Effective?

If computer-mediated conferencing computer/network system capabilities already exist, then computer-mediated conferencing should be very cost-effective. The availability of PCs with access to the LAN/WAN will probably be the most significant factor in the cost analysis.

Design Considerations

Determine the Objectives

Determine the purpose of the computer-mediated conference and the specific learning objectives that must be achieved. Decide what it is you want to do and accomplish with this instructional medium.

Determine What Approach to Use

There are four types of computer-mediated conferencing interaction that will need to be considered in determining the approach to be taken in the design and development of computer-mediated conferencing:

- Learner and instructor
- Learner to learner
- Instructor with content
- Learner with content
- Learner and other on-line resources

Frequently, E-mail and bulletin board applications would be used together to provide instruction, information, and interaction.

Design Considerations

Computer-mediated conferencing requires adjustments in communication, teaching, and learning strategies to make it feel and function like a traditional classroom. That's quite a challenge given that most computer-mediated conferencing learners are not likely ever to meet one another in person and the fact they will only communicate through a personal computer. The challenge for the designer is to transform the desktop computer into a virtual classroom. Use the following to increase the effectiveness of learning via computer-mediated conferencing.

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Design Considerations (continued)**Design Considerations (continued)**

- Do a thorough needs analysis at the beginning to determine learner needs; is computer-mediated conferencing appropriate for application for the learner needs?
- Identify appropriate learning objectives
- Design activities that promote interaction:
 - Brainstorming
 - Case study
 - Q&A session
 - Small group discussions
 - Learning partnership, dyads
 - Team presentations
 - Role playing
 - Guest speakers
 - Learner-to-learner teaching
 - Debates
- Create a balance between independent, interactive and inter-dependent course activities
- Use metaphors or analogies that learners can easily relate to previous learning experiences. Words like campus, schoolhouse, library, etc. can provide comfortable links to learner new to computer-mediated conferencing; here's a list of ideas:
 - Orientation
 - Goals
 - Assignments
 - Readings
 - Conference room
 - Chat room
 - Feedback
 - Cyber Café

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Design Considerations (continued)

General Computer-Mediated Conferencing Functions

The design of computer-mediated conferencing applications should support the following general functions:

To allow students:

- Access course information and materials.
- Exchange information and ideas with others.
- Ask/answer questions.
- Work on assignments alone or collaborate with others.

To allow instructors to:

- Administer and manage course information and materials.
 - Distribute student assignments and provide feedback.
 - Communicate with the students.
 - Facilitate interaction and collaboration on instruction provided.
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E-mail Design Features and Capabilities

The E-mail application would not be specifically designed and developed. If an E-mail system is not already in place or available on each PC to be used, then a COTS E-mail application may need to be selected for use by some of the individuals. In most cases, this selection would be based on personal preferences unless one is provided or dictated. The most popular E-mail applications available today, all have similar features and capabilities. Any of these client applications would most likely be acceptable for use.

General Bulletin Board Design Guidelines

Bulletin boards should be designed to provide information and encourage student interaction. They should:

- Allow instructors to post course information such as schedules, assignments, reference information and sources, etc.
 - Allow instructors to provide files containing courseware and other instructional materials that can be downloaded by the students.
 - Provide access control on appropriate root directories, system files, etc.
 - Establish discussion groups that allow students to read what others have written, and respond to the author publicly or privately.
 - Allow students to post new ideas, opinions, or requests to the discussion group.
 - Allow students to sort discussion group messages by date, author, subject or topic.
 - Provide a knowledge base with general information, frequently asked questions (FAQ), etc., that can be searched using keywords or phrases.
 - Provide links to other important sites and reference sources.
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Development Considerations

E-mail Development

In preparing for sending out E-mail, consider accomplishing the following:

- Create forwarding accounts (mailing lists) for individual classes or groups.
 - Create E-mail form letters or “templates” that can be re-used for normal, recurring correspondence and course administration.
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Bulletin Board Development

Determine first what computer will be used as the server, and whether it has the capacity to support the planned computer-mediated conferencing applications and functions. Once you’ve identified the server, develop the content that will be posted or accessed on the bulletin board, to include:

- General course information such as objectives, requirements, schedule, etc.
 - Student assignments, required readings, tests, reference materials, etc.
 - Class rosters with student names, background information, E-mail addresses, etc.
 - Discussion groups and topics that will be used for the course.
 - Technical support information, points of contact, links, etc.
 - Resource list with sources of information and links to electronic libraries and other appropriate sites.
 - Electronic evaluation and feedback forms.
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General Development Guidelines

- Need to state up-front that a student’s grade is directly related to their participation.
 - Must personalize or humanize this high tech instructional approach.
 - Make personal contact with the learner via letter or phone call before the course begins.
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Development Considerations (continued)

**General
Development
Guidelines
(continued)**

- Create an orientation program:
 - Agenda.
 - Course syllabus.
 - Readings.
 - Handouts; incorporate graphics, charts, pictures, etc., that can be used during the session.
 - Assignments.
 - Class roster with background information about each participant.
 - Bibliography.
 - Instructor biography with a picture.
 - Instructions on how to get connected.
 - Ground rules.
 - Phone number for technical assistance.
 - Evaluation form.
 - Mail out so learners will have the packet 1-2 weeks in advance of the first session.

- Provide a tutorial on how to use the software prior to the first class.

- Post a “How to Take an On-Line Course” on a Web site.

- Encourage learners to develop their own learning strategy:
 - Establish a study pattern.
 - Aggressively seek clarification and feedback.
 - Become comfortable with the technology.
 - Manage information overload.
 - Decide on when and how often to contribute.

**Other User
Information**

Develop handouts or other appropriate materials that provide computer-mediated conferencing procedures and protocol, as well as information on how to use the applications. Include this type of information in the FAQ section or a separate section of the bulletin board.

Implementation Considerations

E-mail and Bulletin Board Considerations

Consider the following actions when implementing the computer-mediated conferencing applications:

- Assign user names and passwords to the students if not already done.
 - Review all resource lists and links provided in the bulletin board and update them as required.
 - Send out a welcome “test” message to all students that requires a reply.
 - Initiate and conduct a group discussion as an orientation for students, and ensure all students participate.
 - Give students assignments that will require the use of E-mail and the bulletin board.
 - Monitor all discussion groups, intervening only if necessary.
 - Provide timely feedback and responses to student questions, test results, etc.
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Implementation

- Begin course with introductions to help create a friendly learning environment.
 - Consider establishing a buddy system where learners are partnered with other learners.
 - Ask learners for their personal goals or objectives for the class.
 - Explain on-line ‘netiquette’.
 - **Keywords.** Use keywords in E-mail subject line for easy reference.
 - One-message, one-topic rule. Discuss only one idea in each message supported by examples.
 - **Short messages.** No one wants to read a 500-word E-mail, so shorter is better. Try 2-3 short messages rather than 1 long one.
 - **Typos.** For discussion E-mails, do not worry about typos or grammar errors. Forgive others’ typos by focusing on what they are saying, not format.
 - **Tone.** Watch the tone of your E-mails by writing in a conversational style, as if you were there in person. Use “emoticons” to express your emotions.
 - Model appropriate interaction and facilitation techniques to the learners.
 - Announce theme of each thread and the agenda for it.
 - Keep the discussion on track by weaving together various discussion threads and course components.
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Implementation Considerations (continued)

Implementation (continued)

- Remember role of instructor has changed to one whose primary role is to guide and support the learning process.
 - Promote peer learning by encouraging participation and asking as many questions as you answer.
 - Allow time for learners to learn.
 - Set reasonable time limits for responses realizing that not all learners have daily access to the Web.
 - Be timely in responses.
 - Reinforce positive behavior; correct inappropriate behavior.
 - Insist on retaining original messages when responding to someone via E-mail.
 - Do not lecture and avoid an authoritarian style.
 - Present opposite views.
 - Seek learner feedback.
 - Ask direct questions.
 - Conduct polls.
 - Tie discussion to participants' comments made earlier.
 - Compliment participants.
 - Conclude threads clearly, so there is no doubt you are moving on.
 - Use technical support.
 - Remind participants to submit their evaluations.
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Evaluation Considerations

Evaluation of Computer-Mediated Conferencing

The evaluation process for E-mail and bulletin board applications would normally be accomplished as part of the evaluation of the primary instructional media. The distance learning evaluation metrics are described in Chapter 2. The general guidelines for evaluations are contained in MIL-PRF-29612 and its supporting handbooks.

This section addresses the special considerations for conducting evaluations of computer-mediated conferencing when developed as a collateral instructional media.

Computer-Mediated Conferencing Evaluation Considerations

As part of the evaluation and quality improvement process, on-line electronic student critique forms and automatic E-mail "comment" links provided on the bulletin board can be used to provide timely feedback to instructor.

Following are general areas to consider in the evaluation of computer-mediated conferencing:

Technical:

- Availability and reliability of computer-mediated conferencing computers.
- Network access and reliability.
- Availability and effectiveness of technical support.
- Computer-mediated conferencing server access and reliability.

E-mail:

- E-mail client application (functionality, reliability, etc.)
- Instructor use and application.
- Student use and application.
- Usefulness and instructional effectiveness.

Bulletin Board/Discussion Software:

- Design, structure and format.
 - Instructor use and application.
 - Student use and application.
 - User friendliness and readability.
 - Clarity, relevancy, currency, and effectiveness of content.
 - Resource/site links.
 - Usefulness and instructional effectiveness.
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