



## **Components of a Distance Education Technology System**

Based on the model used by The Virginia Consortium for Teacher Preparation in  
Severe Disabilities

### **VIDEO-CONFERENCING UNIT**

A video conferencing unit must be purchased in order to provide real time, two-way interactive video. Newest models provide features such as HD video, dual-streaming and multipoint conferencing. Our program currently uses Tandberg 990 and Edge units.

### **VIDEO-CONFERENCING PERIPHERALS**

There are several peripheral devices available to expand the usability of the videoconferencing unit. These peripheral devices greatly increase the overall quality of instruction.

**TV Monitors:** A television monitor is necessary so that students can both see and hear the course instructor and the students at all participating universities. Furthermore, students are able to view multimedia components including video. It is recommended that the size of television monitor be at least 50 inches. While it is only necessary to have one TV monitor, it is strongly recommended that each classroom have two. When using one monitor, it is only possible to display one video source a time. For instance, if the instructor is lecturing and using PowerPoint slides, then the remote sites can only see either the instructor or the slides.

**Document Camera:** A document camera can view and capture 3-dimensional objects, flat art, documents, photos, slides, film negatives, and X-rays. With the document camera attached to the videoconferencing unit, it is possible for an instructor to display these objects in real-time for the remote sites to view during instruction.

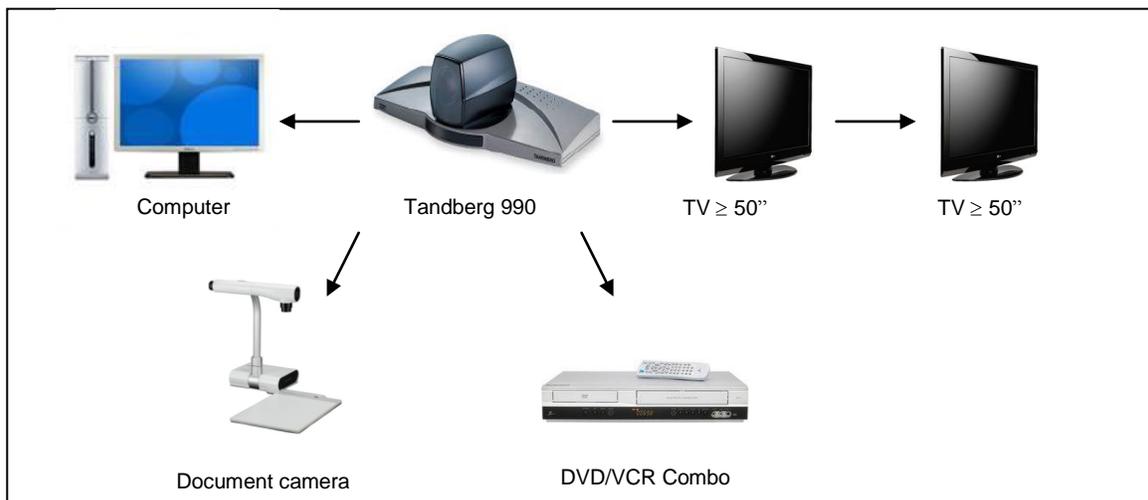
**VCR/DVD Combo:** With a VCR/DVD combo attached to the videoconferencing unit, it is possible for the instructor to show DVDs and videotapes to all of the participating sites in real-time.

**Computer:** There are many benefits for including a computer at each site. Even though it is possible for an instructor to display software applications including the Internet through the videoconferencing unit to the participating sites, students at the remote sites will only be able to see the programs but not be able to interact with the media. Including computers at each site enables students to have direct access to software applications, including the Internet. Sharing the desktop of the instructor station through Adobe Connect or GoToMyPC enables the instructor to extend beyond the PowerPoint connectivity of the videoconferencing units and thus enable students at remote sites to view web sites, software applications, etc.

### **TECHNOLOGY CLASSROOM**

All classrooms in which distance education is to be carried out should be equipped with the same technology to ensure the quality of instruction. This equipment includes:

2 IP lines	Videoconferencing Unit (\$15,000)
1 telephone line	Second camera for instructor view
Classroom Computer w/ Internet	VCR/DVD Combo
1-2 Television monitors at least 50"	Document Camera



## REMOTE SITES / ADDITIONAL UNIVERSITIES

### Media Streaming Server

The media-streaming server provides the ability to capture and archive media presentations. The consortium uses the media streaming server to record all class sessions so that students unable to participate in real time can review them later.

The media-streaming server can also provide access to individuals or small groups of students who are unable to travel to one of the video conferencing sites. The function of the media-streaming server is to capture the information presented through the videoconferencing units and then send that information in real-time through the Internet to individuals at remote sites. With the media-streaming server, students are able to connect via Internet to see and hear class presentations and discussions. Since the streaming media is presented over the Internet as one-way communication, students at remote sites will interact with professors and students using a chat room feature integrated into the media streaming web interface or via a separate telephone connection to a phone bridge.

### Bridge/Gateway

The bridge and gateway further extend the consortium's capability to broadcast courses to sites across the state. Using the videoconferencing equipment alone, it is often possible to only include four sites in a videoconference session. With this technology, however, it is possible to add additional remote classroom sites to the videoconference session. Specifically, with the bridge/gateway system it is possible to add up to 20 sites at one time using 786kbps IP connectivity (varies based on equipment and bandwidth).

Add-on components allow users to connect to videoconference sessions using high speed internet with a webcam and headset microphone. Using programs such as Tandberg MOVI or Tandberg Conference Me, at home participants are able to participate in class as live interactive videoconferencing sites.

## **Research on Differences in How Instructors Teaching in the SD Consortium Interacted with Students at Local and Remote Locations**

### Overview

A dissertation research study was conducted in the SD Consortium's multi-point distance education environment to examine differences in instructor interaction and immediacy behaviors based on student location at local or remote sites.

### Methodology

Specific instructional behaviors were defined and data was collected on how often five instructors directed these behaviors to students at local and remote sites in their classes. Data was also collected on how often students at local and remote locations participated in class discussion.

The behaviors studied fell into three categories:

1. Interaction Behaviors: communication, participation and feedback between students and teachers. The behaviors collected included:
  - a. Comment: a statement that provides information in response to a question or as part of lecture or content presentation
  - b. Question: a request for information or feedback
  - c. Interruption: verbally speaking while another person is speaking to address content or engage in another interaction behavior
2. Immediacy Behaviors: communication behaviors that establish a connection between people. The immediacy behaviors collected included:
  - a. Use of student name: speaking a student's name
  - b. Positive interjection: a short, verbal utterance that to encourage the student to continue speaking. Can be a word or a sound, i.e. "Interesting", "Mmm hmmm", "Go on"
  - c. Positive response: expression of approval or appreciation for student contribution, praising the student, i.e. "Good job", "You're correct"
3. Content of Interaction Behaviors
  - a. Social: comments or questions that are of an entirely personal nature, i.e. "How are you?" "Did everybody have a good weekend?"
  - b. Procedural: comments or questions that are about the management and expectations of the course, i.e. "The test is on Tuesday."
  - c. Material: comments or questions that are about the content of the course the course. i.e. "What is a communication board and who might use one?"

Frequency data was collected using a coding system that included who the speaker was, to whom it the behavior was directed, whether it was a comment or question, and what the utterance was about.

### Data Analysis

Qualitative data from instructor interviews was analyzed using a grounded theory approach and was compared to what is generally found in videoconferencing literature concerning the teaching experience. Behavioral data was analyzed both based on local or remote populations, and by individual site. Three data analysis measures were used: statistical to determine the magnitude and direction of differences between populations, percentage to examine the distribution of

behaviors across all sites regardless of their size, and per capita to determine the per student average for behaviors directed to each population.

## Results

The prevailing literature finds that teachers in videoconferencing generally interact more frequently and engage in more immediacy behaviors with local students than with those at remote sites. It also holds that students at remote sites interact less frequently than those located in the same room with the instructor. The results of this study conflict with that literature in most respects. The study's main findings are:

1. There was no clear difference in instructor interaction behaviors based on student location
2. Students in the remote population interacted with the instructor more frequently than students in the local population
3. The instructors engaged in more immediacy behaviors with the remote population
4. Students who received more immediacy behaviors from the instructor interacted more frequently
5. Instructor interaction and immediacy behaviors were more closely related to student behavior than to student location.

## Implications for Practice

There are several implications for practice:

1. Use of interaction strategies: the instructors in this study used interaction strategies that are specifically designed for the environment. These included:
  - a. Directing questions to specific locations and alternating them among the sites
  - b. Actively drawing in less active sites and quieting more dominant ones during discussion
  - c. Frequent use of small group discussion that combined remote locations into groupings and having students at each site report on that work
  - d. Using a posting application in the web conferencing system during small group and electronic polling during lecture, allowing students to respond to discussion both verbally and in written form.
2. Ensuring that remote students have ample access to the instructor. Local students have greater access to the instructor before and after class time, being able to ask questions more easily than their remote counterparts. Soliciting and addressing remote student questions and needs first may alleviate some of the impact of that difference.
3. Using camera angles, lighting and placement of remote student displays to promote engagement. If students at remote sites cannot clearly see the instructor, they may not participate as frequently. Similarly, if the instructor cannot clearly see remote students, they may not interact with them as easily or frequently.
4. Active emphasis on immediacy behaviors: the sites that received the most immediacy behaviors from the instructor interacted the most frequently. Additionally, instructor immediacy behaviors had a greater statistical impact on student interaction than instructor interaction behaviors. This suggests that actively focusing on personal connections with students at remote sites may be as effective in encouraging student participation as a focus on more content-related interactions.