# Evolving Communication to Inform and Educate

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## INTRODUCTION

With the incorporation of new and evolving communication technologies, such as satellites, compressed video, and computers, education has taken on a new "flavor" in recent years. In the classroom, computer presentation software and multimedia computer workstations are becoming the chalkboards and overhead projectors of a new generation. More schools are getting "wired to the Internet (Slater, 1996), universities are placing entire degree programs on the World Wide Web (Thorson, 1989), and corporations are investing millions into professional development using computers and television (Arnall, 1987; Bruce et al., 1991; Galagan, 1989; Portway, 1993).

With this emphasis on communication technologies as a means of teaching students, professional educators and corporate businesspeople will have to learn how to leam by and teach with these evolving communication technologies, both in the classroom and at a distance. This paper examines some of these communication technologies and their use in information dissemination, some major educational concerns related to them, options for using communication technologies in the classroom, implications for professionals, and major policy issues.

## COMMUNICATION TECHNOLOGY

Many people have expressed concerns about teaching with new communication technologies. "Why change?" they ask. "We've been doing fine for years teaching our courses the way we've always taught our courses." That may have been true for the past and for the present, but the future may very well belong to those who incorporate communication technology-mediated education. In classrooms, technology can aid in students' retention of information. Studies have shown students at a distance do as well or better than their student counterparts in traditional classrooms (Chu and Schramm, 1975; Whittington, 1987). Using new technologies means communication no longer has to occur in "real time" (synchronous). The asynchronous ("non-real-time") communication that technology-mediated instruction allows means information can be moved to the people who need it, at their time, at their location.

Communication technologies have advantages beyond their demonstrated educational effectiveness. In the case of teaching to students at a distance, instructors do not have to invest large amounts of travel time going to and from a distant location. Travel costs also are cut considerably. As a result of the up-ffont time that goes into planning a distance education program, instructors have noted that their teaching materials (videotapes, computer programs/applications, detailed printed hand-outs, computer graphics) are better than those they would design for a regular "face-to-face" classroom.

Teaching with communication technologies does have drawbacks, though. Interaction tends to be stilted; communication seems impersonal because it is not "really" face to face. Start-up costs tend to be expensive. And faculty do have to invest a great deal of up-ffont time to develop their classes.

### Communication Technologies in the Classroom

The face of classrooms is changing. Multiple media-- or multimedia -- is the "buzz word in education today. Computers with video, audio, and text capabilities, linked to CD-ROMs, videodisk players and the Internet, have taken "multimedia" to a new level. Students now can reach beyond the constraints of their classroom's four walls. For example, many universities are placing classroom material on-line for students on-campus, not just for those at a distance. On-line manuals and textbooks in hypertext and hypermedia formats are becoming commonplace. Lectures can be live (synchronous) or on demand (asynchronous) through World Wide Web pages in a hypertext format (Kouki and Wright, 1996; Oakley, 1997). Libraries are placing relevant material directly on the World Wide Web. Listservs (electronic mailing groups) are used in an ever-growing number of classes so students can discuss subjects of global interest to other students in their class. Instructors use "virtual" office hours through e-mail to stay in contact with students throughout the day or night. Following are some other examples of new classroom technologies and their uses.

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**Computer slide/graphic programs (Powerpoint, Harvard Graphics, Persuasion).** More instructors are using computer graphics programs, instead of transparencies, to display their classroom notes, video, graphics, and photographs with a small laptop computer, coupled with a high-intensity overhead projector. If the room has a network connection, material from the Web also can be shown. Once the notes are input in the computer, instructors can easily revamp them for future classes, place them on the Web, or print out notes for student use.

**Multi-user dimension (MUD) environments.** This new Internet tool is for real-time, text-based, multi-party communication. These computer programs offer their userstext-based shared virtual environments that they can explore using simple commands. Users meet, have brainstorming sessions, and exchange information via computer.

**Multimedia computers in the classroom.** Multimedia computers with CD-ROMs, installed in classrooms and networked to the Internet, allow instructors to bring a new dimensionto the learning environment. Students can read text, seegraphics and video, and hear audio.

### Communication Technologies at a Distance

In this section, the major technologies available for distance education and their advantages and disadvantages (Smaldmo, 1995) will be briefly outlined. "Low-tech" methods (Table 1) can be characterized by limitedbr nointeractivity between instructor and student. "High-tech" methods (Table 2) allow more interactivity through more advanced technology.

### Implications for Professionals

This section describes some of the implications professionals will have to consider as they develop programs to be taught with communicationtechnologies. Although this section focuses more on a distance education model, many of the methods apply when incorporating technology in the classroom.

**Teamwork.** Providing instruction to students at a distance is not the responsibility of the instructor alone. In the distance education framework, teamwork, comprised of instructional designers, television-production specialists, computer specialists and other technical support personnel, becomes important in the development and dissemination of instructional materials (Brinkley et al., 1991; Collins and Murphy, 1987; Kelly, 1990).

Instructors or subject matter specialists are experts in their areas of content. Subject-matter specialists should not become technology experts; rather, they should be able "to understand the basics of the technology and how communication is being mediated" (Thach, 1993, p.295). The distance education instructional designer must function in relationship to the infrastructure as a reference for the resources available in that academic institution, must know how certain technologies and media work, and must serve as an intermediary and mediator between the instructor and technical specialists (Brinkley et al., 1991). Educational technologists, such as computer specialists and educational television producers, have the production expertise to assist in the development of the program or course. Because of their professional backgrounds, they understand the specific instructional design needs dictated by the requirements of the media (Smith, 1991) and how to better provide instruction through this form of mediated communication (Garrison, 1989; Hart, 1984).

Support staff ensure that all of the little details are taken care of so a distance education program can run smoothly and successfully by handling such tasks as student registration, materials duplication and distribution, and facilities scheduling. Site facilitators should be able to handle technical problems that may arise at the sites and be well-versed in interactive strategies to involve the students as much as possible in the course activities.

**Instructional Design.** Instructional design is important in any educational setting and is defined by Gaff (1975) as the systematic and continuous application of learning principles and educational technology to develop the most effective and efficient learning experience for students. Several instructional design models exist for teaching with technology (Kemp, 1985; Murphy and Taylor, 1993; Price, 1994). In any instructional design model, the following questions must be asked. The instructional design elements then will be discussed.

What is the need for the distance education program?
What are the goals and objectives?
Who will be the learners?
What will be the subject content (message)?
What teachmg methods and media will be used?
How will learners be assessed?
How will the courseor lesson be evaluated with a view to improvement?

A needs assessment, to determine why the instruction is required, should take place before the rest of the design process is undertaken. Goals and objectives structure the instructional plan of action. A goal is a

general statement of what you hope the course (or program) will achieve, perhaps expressed in terms of what you, the teacher, will be presenting to the learner. An objective is a statement of what learners should be able to do (or do better) as a result of having worked throughthe course (or program).

In any instructional environment, it is imperative to know as much about the learner -- the intended audience -- as possible. The audience for each course most likely will be somewhat different. However, there are some common characteristics regarding the "distance learner." Distance learners tend to be older, have established jobs and families, are self-motivated, expect limited interaction with their instructors, and are usually excited about taking a much-needed distance education program.

The message should be decided even before a medium is chosen. What are you trying to say? Is it appropriate for communication technologies? How is the best way to integrate the message with the technology? The technology should be selected to meet the needs of your class. The medium/media choice should come after you decide what you want to say. In your courses, you want to provide media variety to your students, integrate voice, video, and data technology with print resources.

Assessment and evaluation should be components of any instructional endeavor. Assessment can take the form of a needs assessment to determine why the course is necessary and student assessments (tests and assignments). Evaluation should be part of the course throughout the span of its existence -- through formative evaluations given during a semester and a summative evaluation given at a course's completion. The purpose of the evaluation should be improvement of the course. Revisions should be done as a direct result of the evaluation process and feedback from colleagues and content specialists. Because assessment and evaluation is so important, yet often overlooked, in the design of a technology-mediated program, a closer look at assessment and evaluation components is provided here.

**Teaching Strategies.** For the most part, effective distance teachmg requires enhancing existing skills, rather than developing new abilities. For example, educators will have to "chunk" their instruction more, by spending no more than 10 to 15 minutes lecturing without some type of "break." The "break" allows students to process what they have just been exposed to. Also, educators must prepare for the course in advance and not wait until the day before (or morning of) a class to get ready. This helps to allow for time to built in for course materials sent in the mail to get to their intended destinations.

**Interaction.** Distance education requires different communication methods than those needed in traditional classrooms (Zvacek, 1991) because information technologies are predominantly visual, as opposed to the textual and auditory environment of the conventional classroom (Dede, 1991). Designing systems of feedback is of concern in mediated communication (Garrison, 1989). However, interaction does not have to occur in "real time" to be effective. "Virtual interactivity," occurring through asynchronous means, such as computers (e-mail), facsimile, and surface mail, is effective in bridging the communication gap between instructors and off-campus students who view videotape programs in their homes (Russell, 1994).

Perhaps the biggest headache for faculty members in the distance education environment is the lack of nonverbal cues. Not being able to gauge how well one is teachmg has been seen as a disadvantage of a distance education system The educator must have confidence in yourselfthat the content is what should be taught The feedback from the formative evaluations, the telephone calls and electronic mail messages will help gauge the teaching's effectiveness. The key, then, *to* interactivity is thoughtful instructional design that takes into account teachmg objectives, creative teaching methods, and appropriate distance delivery technologies (Murphy, 1992). For example, educators should call on sites, because rarely will someone break in with a question. And when an educator asks a question *to* a site, the educator should employ the "10-second rule" -- wait at least 10 seconds before saying anythng else or going to another site. This allows students some time *to* think about a response.

## MARKETING

Probably the area that is thought about the least in a distance education production is marketing. But without some marketing plan, a distance education program is doomed from the point of view of low enrollment. The consideration of marketing a program should come on the very heels of the idea for the program itself. When identifying the audience, thought should be given about how to let the target audience know about the distance education production. With no audience, there is no program.

After a target audience is identified, the next step is to advertise. People need to know how the course would benefit them. Some places or ways that agriculture-related programs may advertise are the following: word of mouth and direct contact, commodity

magazines and newspapers, other organizations that are partners in the distance education program, paid advertisements on radio and television stations, newsletters and fliers, and county Extension agents.

## EMERGING POLICY ISSUES

Evolving communications technology and information delivery systems have precipitated some emerging policy issues. To date, major policy issues appear to be the determination of user needs, the financing of technological infrastructures, the resolution of communications, property rights, and the professional development of instructors. In some cases, market forces will have a major impact upon the resolution of these policy issues. However, other issues will necessitate public policy resolution at governmental or legal levels. Major examples of emergmg policies issues are included in this section.

### User Needs

Which users will receive the primary attention, and which of their needs will be addressed? In the agricultural sector, evolving communications technology can be used to work with the infrastructure serving farmers (agribusiness, extension agents, federal agency personnel, and others). Alternatively, evolving communication technology may be used directly with production and marketing firms.

User needs may be met in a variety of ways: formal degree programs, college credit courses, short courses, and seminars, to name a few. If profits can be realized from providmg these types of mformation, competition can be expected in the private sector as well as from competing universities and other public sector institutions. Determining user needs has always been a difficult process, as many Extension and Soil Conservation Service personnel can testify.

### Financing Technological Infrastructures

Start-up and maintenance *costs* may be significant in the provision of distance education technology, and in the enhancement of classroom settings with modern multimedia equipment. Satellite delivery systems include uplink and downlink equipment, transponder *costs,* faculty development costs, and materials. Two-way audio-visual systems also may have considerable start-up and maintenance costs.

The manner in which these costs are financed will influence the adoption rates of evolving communications technology. User fees, tuition charges, and other assessments may cover part of the *costs.* However, most public institutions will require some "up-front" funds to initiate their programs. To date, the response is very different between states. States such as Iowa, Georgia, and Maine have made major financial commitments to distance education. Many other states have done little.

### Property Rights

Classroom instructors have long been sensitive to the reproduction of notes and classroom materials for sale. Computer users have become increasingly sensitive about property rights in the utilization of computer-based materials. Communications property rights can be expected to become increasingly more complex with the advent of new technology.

As an example of the complexity, consider inter-university cooperation in the provision of courses. At some universities, it is extremely difficulty to transfer credits from other universities. Some universities cannot offer distance education courses unless students are fully matriculated. Some colleges do not wish to relinquish the provision of some of their courses to competing state universities for fear of losing state financial support.

### Professional Development

The advent of modem communication technology and information delivery systems has resulted in a major need to retrain generations of instructors. The ability to use modern educational technologies is probably at least as demanding as the ability to use modem laboratory research equipment. Many faculty historically only used overhead projectors, blackboards, and slide projectors. Moving to higher-level technologies will require major human capital investments. Determining who supplies this training, and how it is financed will be major factors in the evolving communications movement.

The resolution of the above emerging policy issues will require major private sector initiatives and public sector investments. The current conservative political environment and interest in "budget cutting" will unquestionably influence public expenditures for communications technologies and information delivery systems.

## CONCLUSIONS

Educators will have to stay abreast of communication technologies in order to inform and teach effectively in the future. Not only that, but communication technologies also will affect how educators receive information. For example, many academic journals already seek manuscript submissions in an electronic format, and produce on-line editions of the journals.

Universities and corporations are promoting research and products on the Web. Communication via e-mail with colleagues across campus, the state, country, and world, many times, is easier and less expensive than "conventional" communication with telephone or the Postal Service. Many professors are using Web sites, instead of formal textbooks, with which to teach courses.

Communication technologies for classroom and distance instruction will continue to evolve, expand, and improve. As has been shown in this paper, evolving communication technologies are causing educational methodologies to change, as well. Educators, themselves, will have to become life-long learners so their teaching methods will evolve as the technology evolves. But educators will not have to do it alone. They can make the transition with assistance from educational technology experts and instructional designers and through the suggestions presented in this paper.

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**Tabk 1. "Low-tech" methods.**

| | Advantages | Disadvantages |
|---|---|---|
| ***Audio* cassettes** | Portability<br>Student can work at own pace<br>Support materials (print)<br>Students can review audio tapes | Low completion rate<br>Lecture-style presentation<br>Time-delay<br>Difficulty in communicating between teacher and student |
| ***Video* cassettes** | Use of motion and audio<br>Student can work at own pace<br>Students can review videotapes | Same as audio cassettes<br>Lecture-style presentation (although can be supplemented with video segments) |
| ***Radio*** | Audio -- listen to teacher<br>Review materials (print)<br>Similar to on-site lectures | Same as audio cassettes<br>Student can't work at own pace (specific time) |
| ***Compuier programs (Computer-aided instruction)*** | Same as video cassettes | Access to computer<br>Difficulty in communicating between teacher and student |
| ***Broadcast and* cable *TV*** | Motion and audio<br>Review materials (print)<br>Similar to on-site lectures | Same as audio cassettes<br>Student can't work at own pace (shown at specific times) unless videotaped<br>Lecture-style presentation (although can be supplemented with video segments) |

**Table 2. "High-tech" methods.**

| | Advantages | Disadvantages |
|---|---|---|
| ***Computer conferencing (Internet/World Wide Web, audiographics, "chat" groups)*** | Many courses offered this way<br>Students can read teacher's presentations<br>Work at own pace<br>Review computer materials<br>Live dialogue with e-mail | Access to a computer<br>Time-delay for written materials<br>"Computer phobia" |
| ***Ardioconferencmg (Use*** of telephones to bring many people together in an audio-only format.) | Access to telephone<br>Listen to teacher's presentation<br>Student can work at own pace<br>Live dialogue with teacher and other students | Long-distance charges<br>Time-delay for written materials<br>Limited conversations |
| **Satellite** | Motion and audio<br>Can see and hear teacher's presentation<br>Student can review (iftaped)<br>Students can *speak* to teacher via telephone | Access to facilities<br>Weather/technical problems<br>Expensive<br>Students can't work at own pace (shown at specific times) unless videotaped<br>Time-delay for written materials |
| **Two-way audio/video conferencing (CU/See Me, compressed video, microwave)** | Review materials<br>Students can see and hear teacher and be seen and heard | Technical problems<br>Costs of greater bandwidth<br>Access to classroom (or computer)<br>Poor video quality<br>Time-delay for written materials |