



Communication in Cyberspace

Powerful Ideas Shaping Our Educational System

By David Moursund

In the September issue of *L&L* (vol. 27 no. 1), I briefly discussed 10 powerful ideas that are helping shape the present and future of information technology (IT) in education. Each of these powerful ideas cuts across many disciplines, makes effective use of IT, and has enduring value. Communication is an underlying theme in many of these powerful ideas and is especially emphasized in #1 and #8. For the whole list, visit www.iste.org/L&L.

Humans are social creatures. They have developed many different aids to communication, such as written language and the telephone. These aids to communication have helped change the world. Now many of us make routine use of cyberspace aids to communication such as e-mail, the Web, and interactive hypermedia.

Communication (reading, writing, speaking, listening, and viewing) is part of the basics of education. Logan (1995) argues that information technology is a language (a new form of com-

munication). Our educational system is faced with the challenge of deciding what we want students to learn about the cyberspace communication aids.

Synchronous and Asynchronous Communication

A face-to-face conversation is a synchronous communication. The speaker and listener alternate roles—indeed, both may talk at the same time. The telephone and videophone facilitate a synchronous *interactive* communication between people who are separated by great distances. Such a two-way communication can be carried on through the Internet.

Sending and receiving letters provides an example of an asynchronous communication. The communication may be *interactive* or *one-way*, and typically there is a substantial time delay between the sending of the communication and the receiving of the communication. The telegraph and e-mail both facilitate asynchronous communications.

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Publishing and Broadcasting

Book and magazine publications, as well as radio and television broadcasts, tend to be *one-way* communications. Of course, you can write a letter to the editor or call a talk show. Thus, these forms of communication have some of the same characteristics as synchronous or asynchronous interactive communication. However, the level of interactivity is generally quite low.

The Web and Hypermedia

At first glance, one might think of a Web site or a hypermedia document as just another form of publishing or broadcasting. But wait! A hypermedia document or a Web site can be designed so that it is interactive. In essence, the hypermedia or Web site creator can design various types of immediate response to help give the communication some synchronous interactive features. This is a new type of communication, a sort of blend between the *interactive* and the *one-way* types of communication. In the remainder of this article, I will call it *interactive broadcasting*.

One of the goals of research and development in artificial intelligence (AI) is to significantly improve interactive

broadcasting. Gradual progress is occurring in developing AI software that can “understand” incoming communications and that can respond (for example, by providing various types of written or oral output) in an “intelligent” manner. Perhaps you use a primitive form of such software to filter your incoming e-mail, dividing it into various categories, and perhaps automatically responding to some of the messages.

Some Implementation Ideas

A key idea to keep in mind is that the “older” forms of communication are not going away. A student needs to develop facility in both the older and newer forms of communication and learn when each is most appropriately used.

1. Have your students work in teams to make a list of modes of communication and classify each communication as interactive, broadcast (low or no interactivity), and interactive broadcast. The teams are to give examples of common uses of each of the modes of communication. Additional activities:
 - A. Develop a time line illustrating when each of these modes of communication was initially de-

veloped and when it came into common use.

- B. Discuss the advantages and disadvantages (strengths and weaknesses) of each of the modes of communication. Give examples for each mode of communication as to when it is particularly appropriate and when it is relatively inappropriate.
2. Have your students do research on Alan Turing (“Alan Turing,” 1998). One of Turing’s contributions to the field of computer and information science is now called the Turing Test. Turing challenged computer scientists to develop hardware and software that could carry on a conversation (for example, using e-mail) with a person. The test is to develop a conversation program that is so good that people cannot readily tell if they are communicating with a person or with a computer. Some additional activities:
 - A. Discuss with your students how a person communicating using e-mail can easily pretend to be someone else. How can you tell if the people you are communicating with are accurately representing themselves and telling the

Continued on page 31.

Letter



PEA and Beyond

Dear David:

I was intrigued about the future you so creatively developed in the December/January issue of *Learning & Leading with Technology*. This picture is most fascinating, and I feel that you are on target. Students like Saundri will find that they can best be served when their education co-exists with their lives. All too often in the past, students have been subjected to courses that do not supplement their lives.

The personal education assistant (PEA) is possibly the best reason to hope that our educational system becomes truly interactive. Saundri (and her

contemporaries) uses the resource to make her learning up-to-date and most certainly personal. In the past, it has been difficult to personalize education. I was also happy that she has the input from her classmates and her teachers. The contact with students and teachers is important. Although this contact is in cyberspace, she still has the opportunity to discuss and submit her work to all those involved in her education.

Your picture of the future is certainly most positive and exciting. Let’s hope that by 2016 all will be well with the world.

By the way, in 2016 I will be 68 years old and, I hope, retired. My only hope is that those entering the profession will see

the impact this picture has on their peers and their students.

PS. I am glad that you didn’t call the personal education assistant “PEA-Brain.”

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- truth? What can you do to protect yourself from fraud and deception in this type of communication?
- B. Extend the discussion in (A) to Web sites. How can you assess the quality of the content of a Web site? What are similarities and differences between communicating with a person through e-mail and communicating with a person through his or her Web site?
3. Have your students work in teams to develop rubrics for evaluating the quality of the communication in an interactive hypermedia or Web document. Each team is to find examples of very good communication and of relatively poor communication. Each team is to do a presentation to the whole class, illustrating their rubrics with examples of good and poor communication.
 4. The tools (plough, hammer, bicycle, etc.) that humans have developed and pass on from generation to generation can be thought of as a form of one-way communication. But with IT and AI, we can now have interactive tools—tools that have a certain degree of intelligence. Divide your class into teams. Each team is to select a tool that does not currently contain IT and AI. The team is to propose IT/AI-based modifications to the tool to make it more useful, user friendly, easier to learn how to use, and so on. Each team is to do a presentation to the whole class.

Final Remarks

The ISTE National Educational Technology Standards (NETS, 1999) emphasize communication. Among other things, these standards specify that students are to learn to read and write interactive hypermedia. Interactive hypermedia is to be one of the routine, everyday modes of communication to be used by students and their teachers in the learning and teaching process. This is to occur throughout the curriculum, at all grade levels, as one component of students learning to communicate.

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Online Supplement

Ten Powerful Ideas Shaping the Present and Future of IT in Education

By David Moursund

In the September 1999 issue of L&L, I listed 10 powerful ideas that are helping shape the present and future of information technology (IT) in education. Each of these powerful ideas cuts across many disciplines, makes effective use of IT, and has enduring value.

1. **Connectivity.** IT has facilitated the development of a Global Digital Library as well as other huge databases that are in routine use, and IT aids in communication among people. The world is being changed by communication systems that cut across national boundaries. Mobile computing is making access possible anywhere, anytime to information and to people. This supports increased educational emphasis on understanding and on library research skills, as compared to rote memory.
2. **Information appliances** (Norman, 1998). We are still in the early stages of a megatrend toward computers becoming invisible—much in the same way that electric motors are built into all kinds of appliances and are no longer emphasized. When a technology reaches the appliance stage, the focus switches from learning the technology to learning to solve problems and accomplish tasks using the appliance.
3. **Effective procedure.** An effective procedure is a detailed step-by-step set of instructions that can be mechanically interpreted and carried out by a specified agent, such as a computer or automated equipment. Procedural thinking includes developing, representing, testing, and debugging procedures.
4. **User interface.** We all understand the significance of the development of the graphical user interface that includes the mouse. We are just at the beginnings of routine use of voice and virtual reality as part of the human/machine interface.
5. **IT as integral part of the content of non-IT disciplines.** Logan (1995) points out that IT is a language that cuts across all disciplines and is increasingly part of the content of various disciplines. Examples include spreadsheets, geographic information systems, computer-aided design, and mathematics systems such as Mathematica and Maple. This trend means that each discipline-oriented teacher needs to have an increasing amount of knowledge of roles of IT in knowing and doing the discipline.
6. **IT-assisted problem solving.** One of the most useful strategies in problem solving is breaking big problems into smaller, more manageable subproblems. Increasingly, IT is a tool that can solve these subproblems—thus, greatly increasing the problem-solving capabilities of computer users.
7. **Modeling and simulation.** The 1998 Nobel Prize in chemistry was awarded to two computational chemists. Computer-based modeling and simulation are now powerful aids to knowing and doing all of the sciences as well as many other disciplines such as economics and business. For example, a spreadsheet is now a

routine aid to developing business models.

8. ***Communication in Cyberspace.*** This includes desktop publishing, desktop presentation, e-mail, videoconferencing, and interactive hypermedia. IT has opened up entirely new ways to communicate in both synchronous and asynchronous modes that include text, graphics, sound, color, and video.
9. ***Empowering students through project-based learning (PBL).*** IT is a powerful aid to doing the work on a project and to representing the results of this work. PBL is an excellent vehicle for implementing constructivism, cooperative learning, and collaborative problem solving (Papert, 1980; Moursund, 1999).
10. ***Lifelong learning—anywhere, anytime.*** IT has added new dimensions to learning, such as distance learning, computer-assisted learning, intelligent computer-assisted instruction, and learner-centered software. Progress in learning theory, brain theory, and artificial intelligence is being incorporated in software that is designed to help people learn—often in a “just-in-time” environment.

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