The Internet and education: uses and issues

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Abstract
The purpose of this paper is two-fold. First, to provide a short overview of how the Internet, especially e-mail and the World Wide Web (WWW), is used in education for all age groups, elementary school through university and corporate training. Second, to examine current issues surrounding the use of the Internet in education. This paper will answer the question "What is the current state of the Internet in education?" Educational uses of the Internet as supplemental tools to classroom learning will be defined and discussed.

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THE INTERNET AND EDUCATION: USES AND ISSUES

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Introduction

Long before computers, long before television, even long before radio, there was distance education (Moore and Kearsley, 1996). Often referred to as distance learning or alternative learning, formal distance education in the United States before the advent of electronic media dates back to the 1880s and even further to the 1840s in Great Britain (Moore and Kearsley).

Moore and Kearsley (1996) suggest that distance education has evolved through distinct stages to achieve a very simple goal: to bridge the gap of time and physical distance between teacher and student by introducing an artificial communication medium providing information delivery and interaction. This interaction may be based on an artificial communication medium as simple and portable as a book, as complex and permanent as interactive, two-way television or a combination of communication mediums. Regardless of the medium incorporated, the goal is essentially the same and that is to extend learning beyond the limitations of time and place (Heinich, Molenda, Russell and Smaldino, 1996).

While the earliest documented home study course in the U.S. was in shorthand, distance education became formalized in 1883 when the State of New York authorized Chautauqua Institute to award degrees through correspondence study. The Colliery Engineer School of Mines in Wilkes-Barre, Pennsylvania, began a home study course on mine safety in 1890 and one year later changed its name to the International Correspondence Schools (ICS). ICS is today the largest commercial provider of home study programs in the U.S. (Moore and Kearsley, 1996).
Now, digital fiber is taking the lead role in distance education with satellite broadcasts and fiber-based transmissions now used for some form of distance learning in every state. With papers such as “America 2000, An Education Strategy” calling for educators to build instructional programs that prepare all students for the next century, distance education is again taking a prominent role as a delivery vehicle for instruction. The Internet is emerging as an important educational tool and resource to enhance traditional classroom activities and bridge time and space for distance learners (Cherkin, Kennedy and Canter, 1994).

Purpose

The purpose of this paper is two-fold. First, to provide a short overview of how the Internet, especially e-mail and the World Wide Web (WWW), is used in education for all age groups, elementary school through university and corporate training. Second, to examine current issues surrounding the use of the Internet in education. This paper will answer the question “What is the current state of the Internet in education?” Educational uses of the Internet as supplemental tools to classroom learning will be defined and discussed.
Review of Literature

History

The Internet has been called the most important innovation since the development of printing press (Reidelbach, 1996). Around 1450, when Johann Gutenberg invented movable type and introduced the first printing presses to Europe, there were only about 30,000 books on the continent, nearly all Bibles or biblical commentary. By 1500, more than nine million books existed in Europe on a variety of topics. Gutenberg’s invention was instrumental in the development of the first mass medium -- the first time information could be passed from person to person in a portable, durable and available form. For the first time, people outside the religious elite had access to written works (Gates, 1995). The Internet appears to have as significant an effect on the flow and accessibility of information in our culture as Gutenberg’s printing press had on Europe in the Middle Ages.

The Internet, literally, is a network of networks. In 1969, the U.S. Department of Defense established a network of computers called APRAnet for national defense with no central server. The design was quite simple -- in the event of attack, no central controlling server could be damaged, disabling the entire network. This system was a network of key defense contractors, universities and government labs linked via low speed telephone cables allowing the transfer of files, documents and e-mail. The National Science Foundation took control of APRAnet in 1987 and renamed it NSFNET, which is the foundation of the current Internet (Pool, Blanchard and Hole, 1995).

The key to the APRAnet was a meta-level "Internetworking Architecture." In this approach, individual networks may be separately designed and developed
and have a unique interface for users as needed for the network's specific requirements and environment. Using a new packet-switching protocol known as Network Control Protocol (NCP) for communication, networks were made to “interwork” with other networks, with each network acting as a peer to one another. This is important in that each distinct network would stand on its own and would require no internal changes to connect to the Internet. The Internet as we know it today uses this key technological advance and is commonly refereed to as open architecture networking. Eventually NCP was replaced by the now-widely used Transmission Control Protocol/Internet Protocol (TCP/IP) in the early 1980s (Cerf, et al., 1998).

Packet-switching is important to Internet communication because it breaks messages into sub-parts called packets, routing these packets to their destination and once there the packets are reassembled. There are advantages to packet switching in networks. It allows several users to share the same connection because each packet is routed separately. Packet-switching allows for packets that don’t reach their final destination to be re-sent until each packet reaches the destination where the packets are reassembled. Packets can also be compressed to overcome speed constraints, especially the bandwidth limitation of older networks or modems, or encrypted for security (Hardy, 1994).

The first computer bulletin board system, or BBS, appeared around 1978. This was made possible by a growing awareness of the potential of the computer as a communications tool as evidenced by APRAnet and the availability for the first time of personal computers. Along with Usenet newsgroups and BITNET listservs, BBSs were “store-and-forward networks”, taking the technology of
e-mail systems and extending it to store messages on a server for users to access. With development of BBS software, by 1983 anyone with a personal computer and a modem could host their own computer communications system or “node.” BBS can be thought of as an electronic community. Users can access a BBS for files, discussion groups or post messages. In the past, BBS rarely had an Internet connection, but it is now quite common (Hardy, 1994).

The UNIX User Network, or Usenet, is generally considered to have begun in 1979 at the University of North Carolina to transfer content between that university and Duke University. Users can use Usenet to access and post news and views in a variety of newsgroups. A user can browse a newsgroup of interest, select an article to read and request that that article be forwarded from the host machine (Hardy, 1994). It is estimated that more than 2.5 million people read Usenet in a given month (Reid, cited in Hardy, 1994).

Two years following the development of Usenet, the first e-mail listservs were developed as BITNET, a cooperative network at the City University of New York. Using e-mail systems to distribute information, a person may send a message to a BITNET list and that message is in turn sent to all subscribers of that list. People can subscribe or unsubscribe to a list of interest with a e-mail request to the listserv host. Some listservs are open or unmoderated while others are moderated, meaning all messages are approved by one or more listserv administrators before being forwarded to all subscribers. Using moderators is also practiced in some Usenet newsgroups (Hardy, 1994).
By 1985, the Internet was well established, supporting a broad community of researchers and developers and was beginning to be used by other communities for daily communication (Cerf, et al., 1998).

In the late 1980s, a software engineer at the CERN physics laboratory in Switzerland developed a set of accepted protocols for the exchange of Internet information and a consortium of user (W3C) was formed, creating the WWW. A standard markup language, Hypertext Markup Language (HTML), was adopted for encoding information and in 1993 a group at the University of Illinois created the first WWW graphical browser, Mosaic. In 1994, some of the same students who worked on the Mosaic project at the University of Illinois were co-founders in Netscape, an Internet software company, and released a new WWW browser, Netscape Navigator, in November of that year (Reidelbach, 1996). The WWW provides Internet users with a uniform and convenient means to access the wide variety of resources available on the Internet. This includes pictures, text, data, sound and video (Gottschalk, 1996).

The Internet is now comprised of about 10,000 different computer networks, still with no centralized server. The Internet is also paid for by the users -- NSFNET by the NSF, NASANET by NASA and corporations, schools and individuals paying for connections to regional Internet providers that in turn pay nation Internet providers for access. Currently, there is debate about a government proposal for turning maintenance of the Internet over to carrier such as AT&T, MCI, Bell South and possibly cable carriers. These carriers are proposing charging per packet of information delivered rather than on a time basis as is commonly the case now (Pool, Blanchard and Hole, 1995).
The power of the Internet in education and training is the ability to deliver up-to-date materials to a geographically dispersed group of learners with asynchronous or synchronous interactivity. Using HTML, the Web is platform neutral, meaning anyone can access information whether working on a Macintosh, Windows-based or UNIX system. The Internet has a variety of capabilities including e-mail, net forums, real-time conferencing, uploading and downloading of files and video. Content can be quickly developed and easily updated (Wulf, 1996). Thomas McManus, at the University of Texas, identifies the Internet as the largest and most diverse information resource in the world today. McManus states that the Internet conveys video and sound better than a book, is more interactive than a videotape and can link people from around the world cheaply (McManus cited in Wulf, 1996).

The Internet and Instruction

The Internet is the most promising progeny of the Information Age with promises to change the classroom and the community forever. The Internet, however, is old news to those in K-12 education. Educators in a small number of fanatical schools have used the various Internet tools for years to communicate and share resources with one another with enthusiasm and excitement, especially for problem solving lessons (Salvador, 1994). Simply pulling the information together and putting it on the Internet is easy but has little to do with instruction, defined as "the deliberate organization and presentation of information with the end goal of promoting specific learning" (McManus, 1996).

More and more, educators for all age groups are drawing a distinction between differing approaches to teaching. Various theories can make use of the
Internet as an instructional tool. Using a behaviorist perspective, the goal is to effectively and efficiently transfer a concise and coherent block of information from the teacher or computer to the minds of the learners. Most existing computer-based training has been designed with knowledge transfer in mind. This works well for basic skills in areas of knowledge which are defined and stable (Dodge, 1996).

On the other is a way teaching and learning called constructivism. The goal of the constructivist learning environment is not the accurate transfer of content from the teacher to the learner. Instead, the learner is given tasks and opportunities, information resources and support, and is encouraged to construct their own version of the content. This created version of content is subject to revision through feedback. The constructivist learning environment is more flexible and collaboration with other learners is stressed over individual learning. Using technology, in a constructivist environment information is presented to the learner in multiple forms from multiple sources and allows the learner to make sense of it (Dodge, 1996).

In short, a constructivist approach is more learner-focused and less teacher-focused. The emphasis is on making a set of tasks and resources available to the learner. Then creating an environment in which the learner can actively create their own meaning rather than passively absorb content as presented by the instructor. The emphasis is on case studies, problem solving and the creation of meaning (Dodge, 1996).

The Internet provides for random access to information, allowing a large variety of perspectives or readings for a learner to access. This assists in the active learning process and works to remind the student that one solution or a way of
looking at ideas is not the only one. Additionally, students provided with an environment that allows them to learn at a pace more appropriate to them, applies a personal outlook to inquiry and offers a means of building personal experience with ideas, creating a trust and confidence in the understanding of ideas (Papert cited in Hoinkes, 1995).

The Internet is an effective educational classroom tool for active, constructivist learning. Web-based instruction, as a form of distance learning, can be effectively used with either learning theory (McManus, 1996). In the hands of skilled educator, the Internet is a powerful and flexible instructional tool which can be used for communication, collaborative learning, research and information gathering and resource sharing (Story, 1996).

Communication and collaboration. The Internet connects individuals and classrooms globally, enabling and creating relationships beyond the walls of a classroom. Students interested in science can communicate directly with NASA scientists. Language students can communicate with native speakers in their target languages. Students can use Usenet newsgroups or BITNET listservs to interact with others sharing similar interests.

To communicate using the Internet, educators and students use e-mail, electronic discussion, chat rooms and video conferencing (Education and the Internet, 1997). Using these tools allows the user to communicate with one person or several people at one time. And the message is not limited to text, but may include graphics, sounds and video. E-mail is the most widely used service of the Internet, with estimates suggesting that more than one billion e-mail messages are sent on the Internet each month (Ryder and Hughes, 1997).
The first commonly used educational activity using the Internet was Keypals, similar to mail-based pen-pals but adapted to e-mail use. Keypal activities are well-suited for language study and many projects emphasize the importance of students learning about other cultures through direct contact with other students. In addition to student-to-student keypal exchanges, group-to-group exchanges can involve two or more classrooms and may evolve into collaborative projects (Harris, 1995).

Collaborative learning involves communication but also involves working as a team or cooperation. The Internet offers one of the most exciting and effective ways to teach students how to both communicate and collaborate by connecting teams of students with other classrooms around the world. The creation of "telecommunities" unites students, bringing together students of different nations with varied cultures, histories and viewpoints (Andres, 1995).

To communicate with several individuals with similar interests, students can make use of Usenet newsgroups and BITNET listservs. There are now over 12,000 electronic newsgroups available on the Internet, each dedicated to a specific topic ranging from academic to topical. Newsgroups are divided into seven primary hierarchies for easier accessibility. For example, discussion relating to science-related topics are found in the science category (sci.med.nutrition, for example, is a science newsgroup inviting discussion about nutrition). A listserv is an automated form of e-mail in which a central computer distributes e-mail to all individuals who have subscribed to a particular listserv of interest as it is submitted by a member. Busier listservs deliver hundreds of messages daily to each individual subscriber (Ryder and Hughes, 1997).
Research and information gathering. Some of the most successful educational Internet activities involve students collecting, gathering and comparing information. The Internet is unsurpassed as a research tool, providing access to almost unlimited resources (Story, 1996). Using the Internet, a student can access historical data in the Library of Congress, take a virtual walking tour of the White House or conduct an on-line survey through a listserv or newsgroup.

On the World Wide Web (WWW), students can use search engines (powerful sites that will seek out information anywhere on the Internet, usually based on subject or keywords). Publishers are moving to on-line texts or companion sites for textbooks and government agencies and institutions have placed large amounts of information on-line. Compared with the traditional textbook, information obtained on the Internet is more current, offers a broader perspective on a given topic and can be quickly and easily modified and updated (Ryder and Hughes, 1997). In addition, users can easily locate and transfer entire files on the Internet, including text-based documents, video and sound clips and freeware and shareware software. Initially this was done with a knowledge of UNIX computer language to navigate through File Transfer Protocol (FTP) sites, but the WWW and Gophers have made this a simple task (Ryder and Hughes, 1997).

Resource sharing. It is both simple and inexpensive to publish work on the Internet. Resource sharing or information distribution is one of the most important ways to use the Internet (Harris, 1995). The combination of a large audience and immediate feedback can create a learning environment which fosters higher student
performance (Story, 1996). It is this feature of the Internet which draws comparison to Gutenberg's movable type and the printing press (Gates, 1995).

Resource sharing is not limited to publishing by students. Educators can browse WWW sites such as the Educational Resources Information Center (ERIC) for lesson plans and research. Index sites, such as Kathy Schrock's Guide To Educators, serve as updated and growing indexes to information on the Internet, sorted by topic for quick access. In addition, several professional listservs and discussion groups exist as a forum for sharing ideas and experiences (Wresch, 1997).

Web-Based Instruction

While the Internet doubled in size each year between 1989 and 1995, use of the Web increased ten-fold during that same time, with an estimated 3,000 new Web sites added daily as of Spring, 1996. According to Interactive Week magazine in December of 1995, close to one million children under the age of 18 access the Web on a regular basis (Reidelbach, 1996). A 1996 study from International Data Corp. predicts the number of Internet users to more than double to 200 million worldwide by 1999 (Wilkinson, 1996). Another survey indicates that although less than 20 percent of companies use web-based training, more than 70 percent of the survey respondents said their companies plan to use web-based training during by the end of 1998 (Crenshaw, 1997).

Using the Internet, and more specifically the WWW, to link to one another, universities, colleges and other schools communicate with mobile populations and reach nontraditional students in a way not possible a decade ago. One of the first ways schools have used the WWW is for publishing administrative handbooks and
course information otherwise found in school catalogs, handbooks and course guides. Professors joined by creating course home pages by which a student could access a syllabus, reading list and use e-mail to interact with students. Soon after, entire courses were moved on-line. Development has been driven by many factors, including tight budgets for classroom space and personnel but also the high demand by students for such offerings (Waltz, 1996). It should be no surprise that institutions entirely on-line such as The Open University of Catalonia would soon follow.

Many Internet-based training courses for companies are based on existing Computer-Based Training (CBT) (Crenshaw, 1997). CBT, which has its beginnings in the late 1960s and early 1970s, is typically something self-contained or standalone and allows learners to learn at their own pace. With CBT, interaction is with the machine -- there is no interaction with an instructor (Fritz, 1997). But the trend in the business sector is to use the Internet's ability to incorporate interactivity. Live courses make it possible for learners and students to meet on-line for instruction (Crenshaw, 1997). In addition, a growing number of virtual schools nationwide are opening their doors with the intention of expanding the reach and resources of traditional school.

This past fall, the Virtual High School Project welcomed its first class. This project has received a $7.4 million technology grant from the U.S. Department of Education and will offer 600 high school students in 13 states the chance to learn on-line. Mindquest, an alternative public cyberschool in Bloomington, Minnesota, has also turned to the Internet as a delivery method for education. And last year,
12,000 students in Utah earned at least one credit through Utah's statewide Electronic High (Harrington-Luecker, 1997).

In 1995, the world's first virtual campus, The Open University of Catalonia (OUC) opened in northeastern Spain. While other schools have made use of the new technologies, but the OUC is the first teaching institution to be entirely built around communications technology. The first group of 200 students began working on degrees in either business studies or educational psychology with law, engineering, English, Catalan and statistics to be added in the near future. Basic course materials are mailed to students throughout the region. But students use personal e-mail to hand in essays and communicate with lecturers and other students. Students have access to the Internet, a virtual library and a virtual cafeteria. Face-to-face meetings are held twice a semester in the form of study meetings. By the year 2000, the OUC expects to enroll 11,000 students (Warden, 1995).

In Wisconsin, the Wisconsin Technical College System (WTCS) is using the Internet for "any time, any place and any pace learning." When the state mandated the use of technology to make educational and job-related training available to the state's five million residents, even those in the most remote regions, the Internet offered a way to make courses available to students that had distinct advantages over previous attempts based on CD-ROM and TV-based training. The WTCS' CD-ROM approach was hampered by the expense and logistics of updating CD-ROMs while television failed to offer a flexible schedule in addition to expense. In addition to the WTCS' campuses, public buildings such as schools and libraries will be equipped with Internet-ready systems (Crowley, 1997).
Proponents of net courses are quick to point out advantages: students can proceed at their own pace; net courses are not time- or distance-sensitive; and net courses can take advantage of the tremendous amount of resources available online, such as graphics and databases, in instructing students (Harrington-Luecker, 1997).

Can the Web Really Change Instruction?

There are many claims and promises associated with the Internet: the ability to reach remote students; learning anytime, any place and any pace; lower costs in a time of limited budgets; the end of education as we have come to know it. It would seem only a matter of time before the Internet replaces classrooms entirely, in both education and corporate training.

Gordon Davies, Commissioner for Higher Education in Virginia, posed three questions regarding the use of technology to address problems in higher education: Does it make learning more accessible? Does it promote improved learning? Does it accomplish the above while containing, if not reducing, the per unit cost of education? (Davies cited in Owston, 1997).

Accessibility has different interpretations. But providing educational opportunities to those who are limited by distance, time or another factor is nothing new for education as stated earlier. The Internet is simply the newest tool for education, for colleges and universities, in the K-12 sector, alternative schooling and home schooling (Owston, 1997). In business, a geographically-dispersed work force is one of several key trends cited as making centralized training no longer effective (Rand, 1996). Technically speaking, the Internet allows for quicker and more intimate interactivity and more flexibility than previous methods...
of distance education, offers a variety of capabilities and is easily updated. But the Internet has some built-in barriers as well. These include computer hardware and software limitations, limited bandwidth resulting in slow load times for media-rich materials such as large graphics and video segments on-line and unreliable Internet links which have changed their addresses or disappeared without warning (Wulf, 1996).

Other factors play a role in accessibility, at home and at school. White students in high school and college are more likely than black students to have computers in their homes and use the WWW, according to the results of a Vanderbilt University survey. While 73 percent of white students had a home computer, only 33 percent of black students did. The same survey went on to report that although 78 percent of the nation's public schools have some sort of Internet access, only 63 percent of schools with a high percentage of poor or minority students are connected (Walden, 1998).

From an income standpoint, the wealthy in America are information rich. Households earning $75,000 or more annually are ten times more likely to be using the Internet than those earning less than $30,000. This information gap also applies to nations. According to Juniper Communications, of the nearly 24 million households connected to the Internet in 1996, two-thirds were in North America, 16 percent in Europe and 14 percent in the Asia Pacific (Tapscott, 1997).

According to the Center for Education Statistics, in 1996, 58 percent of schools where more than one-third of its students are eligible for free or reduced-priced lunch were connected to the Internet while 78 percent of schools were only one in then students were eligible for the same lunch discount had access (Tapscott,
Tapscott cites figures supplied by the Alliance for Converging Technologies reporting that the average ratio of students to computers in U.S. public schools is expected to reach nine-to-one at the beginning of the 1998 school year. However, the ratio of students to multimedia computers (with the capability to access the Internet) will only be 33 to one. Furthermore, fewer than 15 percent of instructional classroom have Internet connections, meaning that for many schools Internet access is limited to the library or a staff room (Tapscott, 1998).

Can the Web improve learning? Some argue that any effects on learning can’t be demonstrated because any improvement in learning would stem from instructional design, not the medium used (Clark as cited in Owston, 1997). This follows fifty years of research on instructional media which indicate that no significant effects on learning. The key, therefore, appears to be in how the Internet is used as a tool in instruction (Owston, 1997).

The Web appeals to the way students prefer to learn because for students through college and university ages, the computer is an integral part of life. Schools recognize that and are placing computers and the Web in the forefront as a learning tool (Owston, 1997). This is a tool which can be used not only for content delivery and communication as commonly done for higher education and training. As a tool for project-based work and resource access, the Web is used in developing critical thinking skills and problem solving, enforcing active learning by participants at the K-12 level. The Internet provides numerous resources to access including external experts, newsgroups and software archives (Dodge, 1996). As for business, Rand also cited the emergence of a work force characterized by active and visual learning styles (the MTV/Nintendo generation) rather than the
more passive and verbal learning styles of the past as a key trend leading to the use of what she calls "smart technology" in training (Rand, 1996).

The Web clearly provides for flexible learning in colleges and universities and in the workplace. Students can gain knowledge without being on a campus or in a corporate classroom. Instructors can supplement office hours with e-mail interaction, provide materials on-line as a web page or as files to be downloaded (and students and upload assignments) and collaborate with colleagues (Owston, 1997).

Containing the costs of education. Internet connection, computer hardware and software resources are typically shared on a campus. When a school begins to offer several on-line courses and other materials, the burden on a campus computing infrastructure can be enormous. Many college and university courses available today have been developed by faculty members on their own initiative, resulting in hidden costs. Institutions must consider full-time instructional support staff to assist faculty in Web site development and on-going maintenance. In the K-12 sector, the cost is less because offering Web-based instruction is not the most common use of the Internet (Owston, 1997).

Administrators tend to view the Internet as distance learning favorably for two reasons: it is a way of attracting a new market of students who typically don't enroll (distant students, non-traditional students, students employed full-time, disabled students for example) and educational policy makers (state legislators, governors, university trustees) are looking to technology as a means for more cost-effective education. With K-12 school enrollment larger than peak baby boom
enrollment and the rise expected to continue until the year 2006 before leveling, college enrollments are expected to also explode (Kaplan, 1996).

The cost factor naturally applies to the corporate training world as well. Typically, using these technologies reduce training time by as much as 50% over classroom delivery. Because of the active nature of learning, there is a higher mastery and retention of material. The exciting visual components (graphics, animation, digital video) and audio components (voice-over narration and sound effects) create an exciting learning experience. And with this technology making it possible for employees to learn on their desktop computers or on their home computers, the costs of traditional training such as trainers, classrooms and travel expense is greatly reduced. By using an “Intranet” -- a network which is private or proprietary to the corporation -- companies can take advantage of an existing company-wide computer network, allowing them to allocate more money to developing the on-line materials. Training offered on a company’s Intranet is usually set up behind a security “firewall” to prevent unauthorized users from accessing company information (Rand, 1996). A firewall is a security system that not only prevents intruders from entering but also can be set up to prevent legitimate users from getting out to the Internet from the company’s network or Intranet (Engst, 1994).
Conclusion

Why teach on-line? Why use the Internet in education or training? Will the Internet prove to be the beginning of the end of traditional instruction as we have come to know it?

There are still bugs to be worked out in the on-line world: technology constraints; projects rushed simply to get on-line without proper planning or instructional design; forcing the use of the technology in a situation in which it is not needed; forgetting that the actual goal is not the technology but rather the delivery of material to the learner is a useful and easy-to-use form. These are among many concerns when considering the use of the Internet at an educational tool.

And there are broader concerns. Rupman and Logan (1996) state that learning is more than a cognitive activity -- it requires a social component so the learners will know why they are learning, how to use what is learned, how others use what is learned and how what is learned is understood by others. In short, information needs relevance. Rupman and Logan are strong advocates of the social component in learning, stating that people need a "connectedness" or a sense of belonging reinforced by a sense of accomplishment that the social component offers.

Creating this social component or sense of belonging is a key factor in creating a learning environment. This is difficult to achieve in any setting, but particularly difficult in any form of distance learning, an area in which the use of the Internet and particularly the WWW is growing at an incredible pace. The key to achieving this social component lies in interactions. Moore (cited in Rupman and
Logan, 1996) identified three key types of interactions in distance learning: learner-content, learner-instruction and learner-learner. A fourth interaction, learner-interface, was added later (Hillman, Willis and Gunawardena cited in Rupman and Logan, 1996). The learner-interface interaction refers to removing technology as a barrier -- making it invisible. To make the learner-interface interaction successful, both the instructor and learners must be comfortable with the technology; the correct technology must be selected for the task and there must be a conscious effort to not place unnecessary emphasis on technology (Rupman and Logan, 1996).

The belief in the power of information as an important factor in our everyday lives was acknowledged nearly two hundred years ago when Thomas Jefferson wrote “Information is the currency of democracy” (Hites and Ewing, 1996). Access to the Internet in this, the Information Age, promotes educational, health and economic benefits as well as the ability to become informed citizens. In a speech about the National Information Infrastructure (NII), Vice President Al Gore “challenged his audience to connect every classroom, library, hospital and clinic to NII by the year 2000 so that all Americans can benefit from the communications revolution” (Gore, cited in Hites and Ewing, 1996, p. 1). In doing so, Gore echoed Jefferson’s belief in the importance of information.

It seems the Internet is fast becoming the information delivery tool of choice as well as a primary educational tool. What Rand called smart technologies -- Internet, Intranets and the Web -- will hold a prominent place in education and training until at least something better comes along. And something better will come along.
References


