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INCORPORATING INTERNET TECHNOLOGY AS AN EDUCATIONAL AND
LEARNING TOOL

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education: Instructional Technology

by
Charles Bernard Helsper

March 1998

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LEARNING TOOL


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Charles Bernard Helsper
March 1998

Approved by:


Dr. James Monaghan, First Reader

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ABSTRACT

The incorporation of technology into classrooms has been a practice for many years, but the integration of the Internet as an educational tool has a fairly short existence. Utilizing the Internet to assist in educating students, both in the K-12 and higher education areas, is becoming more acceptable today.

Explaining and discussing the advantages, and possible disadvantages of incorporating the Internet as an educational and learning tool is the main thrust behind this project. A review of the literature will give a summary on the role of computers and Internet technology in education. In addition to this written project, an on-line Educational Tutorial program was created as an introduction to the Internet geared specifically towards educators.

(<http://home1.gte.net/chelsper/index.htm>)

By visiting the on-line Tutorial, educators can:

- Learn some benefits of integrating the Internet into their classrooms
- Learn some term definitions associated with the Internet
- Follow links to download free Internet browsers
- Learn handy tips for navigating through the Internet, and
- View a list of resources for Internet books, educational links, and links for help in creating Web pages

The on-line tutorial was evaluated twice, and the results and modifications taken are covered in Chapter III. The discussion and conclusion will cover the ramifications and future of Internet integration. Finally, the appendices will cover Internet sample lesson plans, an Acceptable Use Policies example, and survey sample forms used for the paper and on-line Internet Tutorial surveys. Also included are a tree structure and screen shots of the on-line Tutorial--before and after modifications--along with a listing of Internet resources specifically for educators.

ACKNOWLEDGMENTS

I think the best instruction and nurturing received while in the IT program at CSUSB was the opportunity to be cut loose from the strict structure of classroom instruction, and being given the freedom to experiment, collaborate, and explore the many possibilities of educational technology. Being able to confer and experiment with classmates on class projects--along with the availability of professors for comments to keep you on a meaningful and focused path--was very helpful. It's this type of learning environment where my mind thrives most, and I am most grateful for the experience.

I would especially like to thank Catherine Walker for getting me started on utilizing the Internet to create productive, educational Web sites. Besides discovering all the possibilities of the Internet through her excellent teaching, I also gained a real understanding of how the Internet works, and that you are only limited by your own creativity. I cannot believe how much I've learned in her classes.

My grateful appreciation also goes to Professors Monaghan and Robertson, who not only touched on the creative side of technology, but also on the side of critically analyzing what kind of technology you are using.

Through their examples and instruction I learned that there are many critical and philosophical questions that need to be addressed when determining the use of any technology. My technological horizons are much broader thanks to their knowledgeable observations and insights.

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TERMINOLOGY

Anonymous FTP: A system where you, as a member of the Internet, can download files from certain sites without needing a login name and password. You use anonymous as your login name and your e-mail address as your password(Clark, 1995).

Bandwidth: How much data, expressed in bits per second, you can send from one computer to another in a given amount of time(Vaughan, 1996).

BBS: (Bulletin Board System) Used in networking to refer to a system for providing on-line announcements, with or without provisions for user input. Internet hosts often provide them in addition to Usenet conferences (Serim & Koch, 1996).

Bitmap: (BMP) In computer graphics, an area in memory that represents the video image. Each pixel on a video screen is controlled by bits that set color and intensity(Heinich, Molenda, Russell and Smaldino, 1996).

Bookmark: To mark a document or a specific place in a document for later retrieval. Nearly all Web browsers support a bookmarking feature that lets you save the address (URL) of a Web page so that you can easily revisit the page at a later time(Clark, 1995).

Bridge: Hardware used to expand the capability of a LAN (Local Area Network) by selectively forwarding information to another part of the LAN(Serim & Koch, 1996).

CAI: (Computer Assisted Instruction) Computer-based systems designed to help students learn subject matter of all kinds(Poole, 1995).

CD-ROM: Compact disc-read only memory. Digitally encoded information permanently recorded on a compact disc. Information can be accessed very quickly(Heinich et al., 1996).

Chat: (Internet Relay Chat IRC) A service that allows large group conversations over the Internet(Serim & Koch, 1996).

Client: A piece of software used to access the Internet that acts on your behalf. Gopher is client software that retrieves information from the Internet for you. It can also be a computer system that uses the resources of another computer on the network(Clark, 1995).

Clip art: Artwork that has been prepared, captured on magnetic disk (or compact disc), and made available to computer users to incorporate (cut, copy, and paste) into documents that they produce(Poole, 1995).

Data packets: Packets of information sent over the Internet by your computer by the Transmission Control Protocol (TCP). Each packet includes the address of the receiving computer, a sequence number, error correction information, and a small piece of your data(Vaughan, 1996).

Download: To transfer files from one computer to another. When the file is coming to your computer, you're downloading it. When it's moving from your computer to someone else's, you're uploading it(Clark, 1995).

Ethernet: A kind of local area network. There are several different kinds of wiring, which support different communication speeds, ranging from 2 to 10 million bits per second. What makes an Ethernet an Ethernet is the way the computers on the network decide whose turn it is to talk. Computers using TCP/IP are frequently connected to the Internet over an Ethernet(Serim & Koch, 1996).

Electronic mail (e-mail): Transmission of private messages over a computer network; users can send mail to a single recipient or broadcast it to multiple users on the system(Heinich et al., 1996).

File Transfer Protocol (FTP): A method by which files are transferred over the Internet(Clark, 1995).

Graphical Interchange Format (GIF): Developed by CompuServe on-line services, this graphic file format allows images to transfer over telephone lines more quickly than other graphic formats(Serim & Koch, 1996).

Graphical User Interface (GUI): The computer screen that presents the functionality of the computer to the user

via icons (pictures), pull-down menus, and point-and-click interaction(usually with a mouse)(Poole, 1995).

Gopher: A piece of UNIX software that allows you to tunnel through the Internet and retrieve information. When entering gopher, you encounter a menu that helps you navigate the Internet(Clark, 1995).

Hypertext: A system by which users can jump from site to site around the Internet by means of hyperlinks. Using these links, a user can hop around the Internet connecting to a variety of sites around a topic of interest. The World Wide Web is the Internet's best example of a hypertext based system(Clark, 1995).

Hypertext Markup Language (HTML): The language in which World Wide Web documents are written(Serim & Koch, 1996).

Information superhighway: Popular name given to the concept of an international information network of extremely high carrying capacity. Also refers specifically to the fiber optic network being constructed in North America(Heinich et al., 1996).

Listserv: It's not an acronym, but rather an abbreviation for List Server. Listserve is a set of discussion groups that meet through e-mail on the Internet. Listserve also refers to the UNIX software that manages the discussion(Clark, 1995).

Modem: A contraction of Modulator/Demodulator; the equipment that allows a computer to send and/or receive data over phone lines. It is used to convert computer signals (digital) to phone signals (analog), and visa versa. The modem may be built into a computer (internal modem), or a separate piece of equipment connected to a computer by a cable (external modem)(Armstrong, 1995).

Networking: The interconnecting of multiple sites via electronic means to send and receive signals between locations(Heinich et al., 1996).

Point-to-point (PPP): A protocol that allows a computer to use the TCP/IP (Internet) protocols (and become a full-fledged Internet member) with a standard telephone line and a high-speed modem. PPP is a new standard, which

replaces SLIP(Serial Line Internet Protocol). Although PPP is less common than SLIP, it's quickly increasing in popularity(Serim & Koch, 1996).

Search engine: A Web-based tool that finds Web pages based on terms and criteria specified(Serim & Koch, 1996).

Service provider: An organization that provides connection to the Internet(Armstrong, 1995).

Transmission Control Protocol/Internet Protocol (TCP/IP): It's an agreed-upon system of transferring data over the Internet. To use a dedicated or dial-up direct connection, you must run a TCP/IP program, unless TCP/IP support is built into your operating system(Clark, 1995).

Telnet: a) A terminal emulation protocol that allows you to log into other computer systems on the Internet. b) An application program that allows you to log into another computer system using the protocol(Serim & Koch, 1996).

UNIX: An operating system important in the development of the Internet and widely used today. Requires that the user knows commands to operate this text-based system(Armstrong, 1995).

URL (Uniform Resource Locator): The combination of letters and numbers that uniquely identifies a Web resource (Serim & Koch, 1996).

Veronica: An Internet search tool used to search gopherspace by topic(Armstrong, 1995).

Web browser: A software program that allows you to view, search, and download items from the Web. Common browsers are Netscape and Mosaic(Serim & Koch, 1996).

World Wide Web: A graphical environment on computer networks that allows you to access, view, and maintain documents that can include text, data, sound, and video(Heinich et al., 1996).

CHAPTER I. INTRODUCTION

With the arrival of technology into educational institutions, we have provided the tools for students to actively participate in their learning process. From the introduction of the movie projector, to the overhead projector, to the videodisk player, and now to the Internet.

Started as a project by the Department of Defense in 1969 as an experiment in networking and the linking of DOD and military research contractors--which included some universities conducting military research--the ARPANET (Advanced Research Projects Administration NETWORK) was created. ARPANET started with three computers in California and one in Utah as part of the experiment. The key to the project was the concept of *dynamic rerouting*, or the ability to "reroute" to another network if the network in use became disabled (Williams, 1995).

Next, to try to ease some of the burden that ARPANET was experiencing, the National Science Foundation set up five supercomputers, and eventually it's own network, NSFNET. NSFNET only permitted research and educational related information to flow through its system, but the up-

coming commercial providers allowed access to just about any information(Levine & Baroudi, 1994).

Today, the Internet is becoming more common in schools, and as a result, private companies and governments alike-- federal, state, and local--are pushing to "wire" schools at great speeds.

However, with the integration of the Internet, there arises some important questions:

- Does Internet incorporation as an educational and learning tool help create an "effective learning environment"?
- Is the incorporation of the Internet a disruptive and non-producing tool?
- Is the goal to "wire" all the schools merely a political sound-bite, overlooking the real impact the integration might have?
- Will Internet integration revolutionize the way we educate children?
- Can access to the Internet's vast library of resources provide any additional benefit in creating an effective learning environment?
- Is Internet integration another useful tool for re-organizing learning and teaching methods, including changes in the structure of educational institutions themselves?

I believe Internet integration and its applications not only can, but are changing the way we educate students. A natural progression of this process is the idea of systemic

reform, or the re-thinking of traditional teaching methods.

However, this also raises the question, and perhaps the dilemma, of whether educators have to be "reform minded" to incorporate Internet technology into their classrooms? Is Internet technology integration into classrooms seen by many educators as a true enhancement of the learning experience, or as an obstacle or even a hindrance? Is the integration of the Internet really reform or simply a pretty window dressing?

These are all good questions. Questions that every educator has probably asked or pondered when confronted with the prospect of integrating technology into their pedagogical methods. Methods for some that may have been handed-down, or have been an integral part of their teaching process for many, many years. To say that learning institutions are not going through a metamorphosis, a technological metamorphosis if you will, would be a great misconception in my opinion.

However, for teachers, change does not come without some fear, apprehension, and reluctance. Diminishing some of these fears and apprehensions, and answering some of the important and relevant questions previously raised is the main thrust behind this project. Educating teacher

populations in an informative, non-threatening way to use technology may be one of the key answers to a better "effective learning environment." An integration to benefit all students, who are in great need of stimulating, interactive, and mind-awakening experiences.

Students can successfully engage in in-depth collaborative assignments and projects using the resources of the Internet in their classrooms. Students can also use a more intense process of problem-solving--as opposed to rote memorization of facts--when using the vast resources of the Internet. In other words, "the learner is viewed as proactive, helping to shape the learning, rather than only being shaped by it"(Anglin, 1991, p.196). In addition, the role of students as isolated, passive receivers of information can be replaced by more collaboration and teamwork with their peers.

In conjunction with this written thesis, a Web Suite project was created and loaded on the Internet entitled: "Internet Tutorial for Educators" and available currently at {<http://home1.gte.net/chelsper/index.htm>}. The Internet Tutorial was evaluated with several surveys. A sample of the first survey is located in APPENDIX A; and a sample of the

second, on-line survey is in APPENDIX B as a Tutorial screen shot.

In the first survey, the Tutorial was introduced within a beginner Internet-workshop inservice. The survey was designed as a review--including survey completion--for the participating faculty at Yucca Valley High School, one of two High Schools within the Morongo Unified School District in California.

The second evaluation of the Web Suite was conducted using an on-line, fill-in form as part of the Tutorial. The users who visited the Tutorial site were given the opportunity to complete the fill-in form after the Tutorial. The on-line fill-in form was created to closely resemble the paper survey form.

The survey results provided important information on the Tutorial's perceived goals, and how it was presented and received. Also taken into account through the surveys, were any changes needed to make the Tutorial more appealing and productive. The input from these surveys provided valuable information, and was used to modify and revise the Tutorial.

In the creation of these projects--and testing when appropriate--hopefully a better understanding of the Internet as an educational and learning tool will be gained.

Providing a more effective learning environment in classrooms, using the tools that the Internet provides, is the main thrust behind this project.

CHAPTER II: Review of Related Literature

Computer Technology in Education: Computer Prevalence and Usage as an Educational Tool

Computers first began to appear in K-12 classrooms in the 1970s. The belief was that the learning process could be significantly enhanced by the addition of computer-based technologies. In addition, with the nation's development towards a high-tech information society, there was a concerned need for student preparation within the 20th century work force.

The main focus of technology, related to education, has always been a "hands-on" approach to classroom activities. The support of students in becoming technologically literate--by developing problem solving skills and a positive approach towards education--was also an important goal (Korwin & Jones, 1990).

Educational constructivists contend that children learn best when they are actively participating and engaged-in their education. According to social constructivism, there is a dual role for teachers and students to recognize and accommodate. One is the domain between what a learner can do individually, and second, what can be attained with the aid of a teacher or mentor (Ryder & Hughes, 1997). In addition,

students are likely to learn best when they are manipulating, exploring, observing, discussing, experimenting, and using various sensory modalities (Ryder & Hughes, 1997).

With the philosophy that children do indeed learn better by interacting with their learning process, Apple Computer launched the "Apple Classroom of Tomorrow" (ACOT) research project in 1985, which embraced three goals. The first was to design creative learning environments for the optimal use of technology. The second goal was to examine the effects these learning environments had in the classroom; and third, in the promotion of similar educational changes throughout the country (ACOT, 1997).

The project worked by equipping certain school districts with hardware and support in exchange for serving as a model for Apple technology. In addition, the pursuit of long-term research in instructional technology was also a goal. Apple computers, which had a 54 percent market share in K-12 schools in 1995, also offered training kits and workshops to teachers (ACOT, 1997).

The overall philosophy of the ACOT project was to empower both students and teachers technologically. Teachers would stress that students must take charge of their

education; while students expressed high levels of satisfaction, with the feeling that they learned more than in a traditional classroom(Franklin & Kinnell, 1990).

Although ACOT was important to the advancement of instructional technology, there were some problems with integrating technology into the classroom. One obstacle was that, until the mid-1980s, desktop computers were not powerful enough to run some of the sophisticated learning programs. It was a sort-of Catch 22 situation. If the computer program used graphics, the results were primitive at best; and if there were no graphics at all, the interest in the program was diminished. So the motivation to use various computer learning programs became discouraging.

Another challenge to integrating technology was and is, that computer systems are expensive, and this can greatly limit their use. Stretching the dollars to buy computer hardware and software can leave teachers without a personal computer station, and students with very little computer lab time. This gap can render the technology unused and unwanted. Also, if hardware and software were bought some time ago, upgrading would be needed to run today's programs, which can also hamper buying new equipment.

Markwood (1993) echoes some these obstacles to computer integration:

- Instructional networks are costly to develop, including both the hardware and software
- Computer illiteracy still largely exists, including little or no access at all to computers and computer networks
- Students must be highly motivated and proficient in computer operations to succeed

However, apart from these obstacles, the literature does indicate that computer technology is playing a major role in education today, and in many cases for the better. For example, elementary school teachers provided with computers tend to increase their use of computers for administrative applications, especially record keeping and grading (Gianocavo, McLain, DiStefano, & Noonan-Sturm, 1996).

In addition, teachers use their time more effectively using templates, gradebook programs, and other teacher productivity tools; and less time is spent on administrative chores, devoting more time to student contact (Weast, Parry, & Peterson, 1993).

Another important outcome of computer applications is that teachers with computers report significant pedagogical changes. These changes include increases in the amount of

project-based activities and inquiry oriented instruction, increased collaboration with teachers, and more communication with their students (McMillan & Honey, 1993).

The benefit to students has also been widely recognized. Whether it's Science, English, or Math, the advantages of incorporating computers as a learning tool has been positive. For example, in Math, students who used computers had more positive attitudes about themselves as mathematicians, about math in general, and showed significant gains in problem-solving abilities and content knowledge (Funkhouser, 1993).

Additional literature shows that computer-based, functional math environments provide more control and flexibility than traditional materials; which can help to blend objects and symbols in a visual approach where real manipulatives are not workable (Char, 1993). In addition, Children using computers in mathematics are more independent learners, and prefer learning on computers to learning with worksheets or precision teaching (Vacc, 1992).

According to Poole (1995), some advantages of computers in education include:

- Facilitating self-paced learning by individualizing learning and giving immediate reinforcement and feedback

- By being a multimedia tool, computers can integrate graphic, print, audio, and video capabilities to effectively link various technologies
- They are interactive, allowing the incorporation of various software packages producing flexibility and maximizing learner control
- They also increase access by allowing linking to local, regional, and national resources and individuals regardless of location

Computer integration can be applied across the curriculum and grade levels as well. For example, computers can help elementary students of all abilities to learn science content and to increase their logical thinking and problem-solving skills (Kirkwood & Gimblett, 1995). Also, using computer word processing results in fewer grammar, punctuation, and capitalization errors, especially among students with low abilities (Cheever, 1987). Also, when children use a computer to study spelling, they are more engaged, and as a result achieve higher spelling scores (MacArthur, Haynes, Malouf, Harris, & Owings, 1990).

Another consideration to consider when integrating computer technology into education is the time requirement. From lesson planning to actual exercises, the time required is enhanced when using the computer. When students are working together conducting research, presentations, and

data analysis, the time allotted must be increased to allow for completion. In addition, teachers must also be allotted extra time to learn and prepare for computer-based instruction.

Internet Technology in Education:
Values and Obstacles to Incorporating Internet Technology
into Education

In the beginning, the Internet was mostly populated by computer scientists, academics, graduate students, and engineers. However, around 1980, universities began changing from a centralized host system to a distributed workstation-based plan because of a need to put more power at the desktop, and the revolution in education had begun (Benson & Fodemski, 1996).

The new desktop single workstations needed an operating system that would allow easy connection between the stations, and that's where UNIX was introduced. UNIX is an operating system developed by AT&T and the University of California at Berkeley, and was provided for free to educational institutions (Levine & Baroudi, 1994). However, with the addition of all these new users, the system began to overload.

By the late 1980s, because of this overload, the National Science Foundation (NSF) created a network to ease

the burden, called the NSFNet. NSFNet was faster and bigger, and provided a crucial network system to control the enormous demand. However, this system was expensive and complex to maintain, and as more powerful workstation computers became available, the arrival of Internet commercial providers began(Williams, 1995).

In 1991, The High Performance Computing Act of 1991 was created by the US Legislature. The goal of the Act was for researchers, universities, primary schools, and government entities to be hooked-up to one main network--the National Research and Education Network(NREN)--for the transmission and exchange of information. So the drive was on by government and commercial agencies to make the Internet as fast, accessible and informative as possible.

According to Williams (1995), some of the provisions of NREN related to classroom activities include:

- Investing in basic research and education, and promoting the inclusion of high-performance computing in educational institutions at all levels
- Promoting greater collaboration among the government, federal laboratories, industry, high-performance computing centers, and universities
- Stimulating research on software technology
- Increasing access by educators and students to high-performance computing resources, and

- Training researchers, educators, and students in high-performance computing

So the federal government was working to provide educational users with access to high-performance computing systems, electronic information resources, libraries, and research facilities. According to QED (1997), the estimate is that US school districts will spend \$5.2 billion on educational technology during the 1997-'98 school year, which is up from \$4.3 billion in 1996-'97.

Until late 1993, the Internet's unexciting, text-based appearance and cryptic commands were too complicated for everyday use, particularly in the classroom. Understanding the hard to decipher commands in connecting to the Internet--besides climbing the steep learning curve required learning the multiple Internet commands--discouraged many in education from exploring the Internet's educational possibilities. This limited the rate of Internet integration into the classroom. However, with the arrival of the World Wide Web, and the software available to search and browse the Internet, the integration became much easier.

The Internet is a new form of communicating and accessing information, available to everyone; and allows students to collect more ideas and up-to-the minute

information immediately. Telecommunications can provide a natural setting for inquiry-based skills. The collection of information for later analysis, along with the digesting and evaluation of findings, can instill very good study techniques. This forum can be particularly helpful for instruction that involves problem solving, decision making, and other critical thinking skills (Barron & Orwig, 1995).

In the case of the Internet, students are encouraged to explore various sources, generate questions, and seek answers to their questions. Also advocated is the process of solving problems by gathering information, guidance, and support from individuals or resources on the Internet. This form of learning is contrasted with passive learning where the learner is viewed as a sponge whose primary purpose is to memorize details, and to listen but not inquire (Ryder & Hughes, 1997).

Students learn in different ways, and they learn better when they can relate their personal experiences and perceptions to the learning task. Learning with the Internet can allow students the opportunity to acquire information or approach tasks in different ways. Generating artifacts for learning--essays, journals, videos, class presentations, information placed on the home page of an Internet site--in

a manner that best characterizes the students' style of learning can be very productive (Ryder & Hughes, 1997).

Cooperative efforts--students working together--tends to encourage active learning; allow students to entertain diverse points of view; and create a climate for mutual support and respect. The Internet extends cooperative learning arrangements beyond the walls of a classroom to involve students on a national or international level (Ryder & Hughes, 1997).

Learning reflects demands of the real world, and is likely to promote generalized strategies when it occurs in meaningful, authentic contexts. For example, students are more likely to gain an understanding of life in Russia by participating in an e-mail project with participants of that country, rather than by just reading a page or two from a textbook (Ryder & Hughes, 1997).

Students can do numerous activities on the Internet, including:

- Visit museums
- Tour the White House
- View photos from satellites
- Participate in global discussion groups
- Hear live transmissions from distant locations

- Have actual face-to-face video conferences with individuals from various occupations and geographical locations

The Internet's main functions are to navigate, locate, gather, and disseminate information. In addition, there are many things educators can do using the Internet. For example, Benson & Fodenski (1996) identify some ideas:

- Access a variety of resources not readily available elsewhere
- Obtain hundreds of ready-to-use lesson plans
- Get copies of software application for such things as grading, tutoring and skill building; including games that teach, and applications that allow you to create such things as customized maps.
- Obtain documents, reports, and articles to help in lesson planning, classroom management, discipline and more.
- Log on at your convenience to the local public or university library to reserve books or do research.
- Find information about special projects and opportunities available on a local community network or bring a distant community into your classroom.
- Share ideas and resources with peers and experts from a much broader group concerning administration, technology planning, or classroom projects.
- Gain support from others facing the same issues and difficulties as yourself.
- Work with others as a tutor or mentor, or on research & development projects that you would not be able to otherwise afford or attend due to finances and location.

Benson & Fodemski (1996) also describe various things students can do on the Internet:

- Access a variety of resources that would otherwise be unavailable to them, such as touring a Smithsonian history exhibit, or following along with a frog dissection at their own pace.
- Get copies of software applications such as games for entertainment purposes well as math and science programs for help with their class assignments and research papers.
- Discover that students are valued by what they say and how well they say it rather than their age, appearance, dialect, ethnic background, race, gender, or physical differences.
- Ask experts' questions and work with people of all ages, including adults across the globe, to tutor or participate in research and development; or join the on-line staff of a kids-only publication.
- Log on to the local public and university libraries to check whether an item is available, or to do research.
- Find information about one's community or special interests through local or distant community information networks, locating festivals or events pertaining to a particular family interest or finding an on-line field trip for the class.
- Talk in real-time as fast as they can type--or talk with the use of voice input software--with kids on different continents simultaneously.
- Learn to use and benefit from the Internet whether the students are gifted and talented, or learning disabled.

Many leading K-12 schools are part of this explosive growth. Schools who use the Internet do not simply bring students into the future of information technology, they turn their students into something education reformers have been talking about for years, "lifelong learners". Teachers who work the Internet into their curricula turn students into independent learners rather than absorbed listeners (Ellsworth, 1994).

The 105,544 public and private schools in the US should not be left behind during this technological revolution. Evidence of a growing separation of society into technological have and have-nots requires that children of all backgrounds have access to an information technology that is sweeping through all levels of government, business, and education. The Internet is exploding so quickly that statisticians cannot keep pace.

As an example, according to Gianocavo et al. (1996), these statistics show a revolution in the making:

- The Internet grows by at least 10% per month.
- At least 160 countries are connected to the Internet and is growing
- Almost 200 US daily newspapers offer electronic versions on the Internet.
- Schools in 41 states are fully connected to the Internet. The states with the most "wired" schools are: Arkansas

(140); California (64); Pennsylvania (45); Florida (44); New York (43); Tennessee (25); Oregon (20).

- As many as 8,000 k-12 schools were estimated to be on the Internet as of Winter 1996, a number estimated to be growing by 15% per month.

However, there is the belief that the educational process cannot depend solely upon the "teacher-as-expert model". Education is more than a one-to-one, or even one-to-many communication experience. No longer is the teacher the dispenser of knowledge as previously experienced. Rather, the teacher is the experienced, directing force in the student's learning process concerning the discovery of knowledge (Gianocavo et al., 1996).

The Internet is a very timely tool for educators who are reform-minded, concerning education. If educators believe information is the cornerstone of knowledge, understanding, and power; then universal access to world wide databases and up-to-the minute, global information-- along with people-to-people networking--can be instrumental in providing students with educational tools and challenges. (Gianocavo et al., 1996).

In using the Internet as an educational tool, we can teach students to search, retrieve, collect, and exchange information. What is more important, they will learn to

analyze, write about, and then publish information on any imaginable topic. This process of information gathering, analyzing, writing and publishing is important in the new information age.

The benefit of multimedia instruction is that it provides information through multiple sensory channels, allowing students with various learning styles to absorb and apply the knowledge (Barron & Orwig, 1995). From elementary school to high school, from school-to-work programs to higher education, teaching the value of the Internet can be a key ingredient to success and achievement in the job market of the future (Gianocavo et al., 1996).

Several studies were conducted in 1993, one named: "The Impact of School Library Media Centers on Academic Achievement" (Lance, Welborn, & Hamilton-Pennell, 1993); and the other named: "The Power of Reading" (Krashen, 1993). These studies explored the impact of the availability of media library resources on academic achievement. These in-depth studies came to a powerful conclusion, that student achievement was directly linked to the availability of resource materials and an active school library media center.

The studies were in accordance with another study conducted at the Department of Education entitled: "Becoming a Nation of Readers"(Anderson, 1983). This study found that students encouraged to explore and read on their own did better academically in almost all fields of study. The Internet is indeed the ultimate library resource, with its powerful, global resources it can help facilitate these positive factors in and out of the classroom.

Technology Inservicing:
Feasibility and Implementation of Teacher
Technological Training

In looking at the literature dealing with Inservice and staff development involving technology, there seems to be a consensus that one of the biggest failures in integrating technology is the lack of appropriate staff development. Not preparing educators sufficiently to integrate and implement new technological techniques is a major obstacle in proper technological integration(Rogers, 1996).

Staff development is one of those critical components necessary to make the integration of technology-based instruction effective. The practice of developing and training staff members to implement new methods into the classroom has been part of the educational process for many

years. However, the inservicing and training of staff for integrating new technological techniques is relatively new.

One of the biggest complaints expressed by teachers is that they are inadequately trained on using new technological equipment and techniques in their classrooms. Creating, designing, and conducting inservice staff development programs is one way to ensure that educators are properly trained to implement new technological tools into their classrooms.

According to Bulkeley (1988), there are some major points in the area of technology inservicing and implementation that should be addressed:

- With the demands of a heavy teaching schedule, class size, and other responsibilities, the energy and commitment to implementing computer-based teaching and learning are sacrificed
- Considerable preparation for using computer-based instruction is required, even for well-trained teachers
- A large number of university and college schools of education still do little to prepare teachers for a technology-based curriculum
- Strategies for implementing technology are bleak as teachers have inadequate opportunities for proper training and poor access to technology

However, there are some avenues of improvement available. Several remedies include:

1. Providing each school building with a fully equipped computer lab
2. Allow for the access of one computer for every teacher for his or her own administrative and self-training use
3. Utilize mastery-level teachers to help in the training of peers in basic computer skills and technology integration in their classrooms

According to Poole (1995), the following is a list of necessities that should be used in implementing technology:

- Active support must come from the top
- A nondictatorial approach is always best
- Every school should have a core of computerists
- Teachers must come first
- The parents and students must be involved in the evolutionary process
- An ongoing technology training program must be in place
- Teachers must be given time and freedom to restructure their curriculum around the technology

Another important aspect is that technology should never be forced on teachers, but teachers must be given the opportunity to prepare for the changes that technology will bring. Also, technology integration needs to be thoughtful and productive. If computer systems are poorly integrated, teachers may resist accommodating technology into their curricula altogether.

CHAPTER III: Incorporating Internet Technology as an Educational and Learning Tool

Applications of Internet Technology: Internet Technology's Current Use as an Educational Learning Tool

Currently, the Internet is used as an educational tool in a number of ways. Creating productive lessons using the advantages of the Internet has been in practice for some time (see APPENDIX C for Internet sample lesson plans). Some of the basic Internet functions that students, teachers, parents, and administrators can use include:

<u>Communication:</u>	<u>Internet Tool:</u>
Person-to-person	E-mail, Internet Relay Chat (IRC)
Person-to-many	E-mail, Listserv, newsgroups
Many people-to-many people	E-mail, Listserv, newsgroups, IRC
Person-to-computer	Telnet, FTP, Gopher, WWW
Person-to-many computers	Veronica, Gopher, WWW
Computer-to-person	Personal news service, Beepers
Computer-to-many people	Custom news services
Computer-to-computer	Indexing, updating, monitoring

Besides these basic functions, searching the Internet for up-to-date and relevant topical subjects is also possible, and can be very productive in education. Some of the most productive outcomes of using the Internet for educational goals include many innovative ideas. For example, creating an Internet connection can provide students in rural settings a sense of personal involvement in the larger world.

By allowing rural schools to establish an Internet communication link with others around the world without leaving the classroom can create a real sense of participation. A feeling of participation that rural schools may not otherwise acquire without the Internet.

Another good example of using the Internet in today's classrooms is in the gathering, evaluating, organizing, and analyzing of very current information. Whether it's information about the US economy, NASA's planetary statistics, pictures and data, or political information from the White House or Congress, the possibilities are endless.

When schools use the Internet to exchange information with other schools on various topics--with the responses being almost immediate--the learning process and experience can be very exciting. Using the Internet to get students to

compare their own cultures' perspectives--regarding various topics with viewpoints and perspectives from other countries--can instill a real relevance into the learning experience. Providing students with the tools to study current information that they might not ordinarily have access to can really broaden and enhance their school journey.

The Internet is also becoming used as a valuable resource for educational materials. As textbooks become outdated--sometimes before they are published--and budgets for materials being limited, finding information using the Internet is providing to be very cost effective. Because libraries and media centers are having a hard time keeping-up with the stream of new information, Internet usage is saving time and money(Ryder & Hughes, 1997).

Students are using the Internet in their classrooms in numerous ways. Clark (1995) describes some of the Internet applications being used by students:

- Sending and receiving e-mail for correspondence on school related topics, or personal interests
- Retrieving, deciphering, and absorbing information from numerous topical databases available to search
- Joining discussion groups (Newsgroups) to send and receive feedback on school and personal topics

- Downloading software programs to assist in classroom instruction
- Playing games with players around the world expanding their interpersonal social and communication skills

In today's classroom, teachers are integrating a methodology that enables students to construct their own knowledge. Project-based, cross-curriculum learning is being conducted--and in part led by--students around the country (Serim & Koch, 1996). Students are becoming active participants in their learning process, and also taking responsibility for developing lifelong conceptual techniques.

Serim & Koch (1996) echo some of the differences between the student of yesterday, and the student of today, as far as participants in their educational journey:

<u>Yesterday's Student</u>	<u>Today's Student</u>
Passive receiver of knowledge	Constructor of knowledge
Rote memorization within the walls of the school	Involved in real-world problem solving in and out of school
Work alone on planned curriculum materials	Collaboration to solve problems
A consumer of textbooks	An evaluator of information

The concept of practice-by-doing--or a hands-on approach--where small groups can explore, discuss and collaborate their experiences after using the Internet, can create a very powerful learning environment. By providing a more pronounced, collaborative learning environment in accessing current information and connections on the Internet, retention and productivity can be greatly enhanced.

Educational Web Suite:
Creation and Purpose of Educational
Web Suite

The educational Web suite--Internet Tutorial for Educators--was created using several software programs. One was entitled *HTML Builder*, which is an HTML editing tool available for free from the Internet. *HTML Builder* allows the user to simply click on one the desired buttons in the program's toolbar to add HTML tags automatically. The addition of images, sounds, lists and tables for example was accomplished by the click of a button, and then by adding the desired content. This function saved an enormous amount of time for this author.

The other software tool used in the suite's creation was *Multimedia Explorer*, and allowed for the viewing of all pictures, animation's, and sound files within one program.

The user could also manipulate the viewing object to the desired effect, such as flipping, mirroring, copying and moving. This program also saved a considerable amount of time in the Web Suite's creation, and is available off the Internet as shareware.

The purpose and goal of the Tutorial's creation was to provide a simple introduction into the workings of the Internet, aimed specifically at educators. The Tutorial explains some very elementary aspects of the Internet, and encompassing how and why it can be used as a learning tool. Various Internet functions were also covered, including e-mail, listservs, newsgroups; and some miscellaneous links are also provided for educators.

A tree structure of the Tutorial was also created, including the rationale for the different choices made in its creation. In addition, screen shots (i.e. pictures of the actual Web pages as they are seen on the Internet) were also created to provide a look at the Tutorial in permanent form. The tree structure and screen shots can be seen in Appendix B of this paper.

Besides a basic introduction into using the Internet, the Tutorial also includes some helpful Internet tips,

various education-specific sites, and some Web page creation links such as clipart and HTML information.

By accessing the Tutorial Web site, hopefully educators who are new to the Internet will get an introduction into its capabilities and advantages for use in the classroom. The Tutorial is one aspect of using the Internet as an educational tool, and where a background to begin implementation can be created.

Educational Web Suite Testing and Evaluation:
Evaluation Procedure, Results, Inferences and Corrective
Steps Implemented

The Tutorial was tested using several basic evaluation forms. The first survey involved teachers and administrators from the Yucca Valley High School in California. The participants were asked to evaluate the Tutorial, and then complete the brief paper survey as part of an Internet-workshop inservice. The inservice encompassed a Powerpoint presentation, consisting of an introduction and activities related to the Internet, along with an evaluation of the Tutorial Web Suite(See APPENDIX A for sample of paper survey).

For the first evaluation, a total of 20 surveys were collected, and a breakdown of the results for the Pre-test follows:

Paper Survey Questions:

Paper Survey Results:

1) Are you a teacher?	Yes: 15 No: 5
2) Do you have access to a computer at your school?	Yes: 14 No: 1
3) Do you have access to the Internet at your school?	Yes: 14 No: 1
4) How much computer experience have you had?	None: 7 Moderate: 12 Extensive: 1
5) How much Internet experience have you had?	None: 13 Moderate: 7 Extensive: 0
6) Have you ever created a Web Suite?	Yes: 0 No: 20
7) Do you have a computer at home?	Yes: 12 No: 8
8) Do you have Internet access at home?	Yes: 8 No: 4

The Post-test results were:

Paper Survey Questions:

Paper Survey Results:

1) Was the on-line Tutorial Visually appealing?	Yes: 16 No: 0 Somewhat: 4
2) Was the goal clear?	Yes: 18 No: 1 Somewhat: 1
3) Was the Tutorial easy to use?	Yes: 14 No: 0 Somewhat: 6
4) Was the Tutorial enjoyable?	Yes: 14 No: 0 Somewhat: 6
5) Was the Tutorial informational and helpful?	Yes: 15 No: 1 Somewhat: 4
6) Was the Tutorial too technical?	Yes: 0 No: 18 Somewhat: 2

7) Was the Tutorial understandable?	Yes: 15 No: 0 Somewhat: 5
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The final portion of the paper evaluation form asked what things could be done to change the Suite for the better, and what things were liked. A synopsis of those results and Web Suite modifications follows:

Paper Survey Results:

Modifications Made:

The music was found to be distracting and inappropriate for the Web Suite	The music files were removed from the Tutorial to prevent distraction
Some of the colored text was found to be confusing in regards as to whether it was linkable or not	The text color was changed to one uniform color to prevent confusion on whether it was linkable
The images were well-liked and regarded as appealing	The images were left intact because no negative effects were determined
Several of the colored backgrounds were distracting and made viewing of the text difficult	A light background was placed on all the Tutorial pages for easier viewing of the content
Some of the animated icons were misunderstood to be linkable, and also perceived as distracting from the content	Icons were changed to non-animated and uniform color versions to prevent confusion on their linkable properties and their distraction from the content

After the modifications to the Tutorial were made as a result of these paper survey conclusions, the Tutorial was tested a second time using an on-line survey that was added to the Internet Tutorial. The results of the second, on-line

survey are below. Users were given the option of completing the survey after viewing the Tutorial. The make-up of the on-line survey form was almost identical to the paper survey form (See APPENDIX B, Tutorial screen shots, for sample).

A total of 16 on-line surveys were generated, and a breakdown of the results follows:

On-line Survey Questions:

On-line Survey Results:

1) Are you a teacher?	Yes: 12 No: 4
2) Do you have access to a computer at your school?	Yes: 7 No: 5
3) Do you have access to the Internet at your school?	Yes: 4 No: 3
4) How much computer experience have you had?	None: 0 Moderate: 15 Extensive: 1
5) How much Internet experience have you had?	None: 0 Moderate: 16 Extensive: 0
6) Have you ever created a Web Suite?	Yes: 1 No: 15
7) Do you have a computer at home?	Yes: 13 No: 3
8) Do you have Internet access at home?	Yes: 9 No: 4
9) Was the on-line Tutorial Visually appealing?	Yes: 15 No: 0 Somewhat: 1
10) Was the goal of providing a tutorial on the Internet clear?	Yes: 12 No: 1 Somewhat: 3
11) Was the Tutorial easy to use?	Yes: 15 No: 0 Somewhat: 1
12) Was the Tutorial enjoyable?	Yes: 15 No: 0 Somewhat: 1

13) Was the Tutorial informational?	Yes: 14 No: 0 Somewhat: 2
14) Was the Tutorial too technical?	Yes: 0 No: 15 Somewhat: 1
15) Was the Tutorial understandable?	Yes: 14 No: 0 Somewhat: 2

The final portion of the on-line evaluation form--like the paper format--asked what things could be done to change the Tutorial for the better, and what things were liked. A synopsis of those results and modifications follows:

On-line Survey Results:

Modifications Made:

There was no method for returning to the top of the page for review when at the page bottom	A "Back to the Top" link was applied to the bottom of all pages to make navigation easier
Background was still found to contrast negatively with the text color	Changed the background color to a lighter shade, and the text color to a darker shade to make viewing more appealing
The images were, as in the first survey, well-liked and regarded as appealing	The images were again left intact because no negative effects were determined
One of the links was found to be dead	Replaced the link to prevent a linking error
Fill-in form was well-liked and clear	Fill-in form was left intact because no negative effect was determined

The evaluation results from both the paper and on-line surveys were extremely valuable, as they provided important comments and information. Incorporating the survey results

into the Web Suite's modifications will hopefully create a better on-line Tutorial for educators to experience and use.

CHAPTER IV: Conclusions and Discussion on the Implementation of the Internet as an Educational and Learning Tool.

Internet Incorporation: How Integration can Benefit Classroom Activities

Classroom activities can benefit by integrating Internet technology in a number of ways. First, addition of the Internet can increase the resources available for the busy teacher to use in classroom instruction. Second, Internet integration can create real-life experiences and activities, along with meaningful personal exchanges for the students.

The emphasis on today's classroom instruction is no longer one where the teacher holds all the knowledge, and then regurgitates it; but where students learn to locate, evaluate, and apply the information in order to be creative and to solve problems. By using the vast resources of the Internet in the classroom, students are given the opportunity to gain access to the world's cumulative knowledge (Armstrong, 1995).

In an Internet accessible classroom, the teacher becomes a facilitator of the learning process, instead of the exclusive deliverer of information. The role of the teacher shifts from simply delivering memorized facts, to helping students really participate in their education.

Armstrong (1995) relates some of the changing roles of teachers:

- Helping students formulate interesting questions and areas of study
- Locate informational resources that relate to the topics
- Help evaluate the information's quality, relevance, meaning and application
- Becoming organizers of an interactive learning experience
- Conducting opportunities to perform real experiments and research
- Help to gain access to the world's wealth of information on various topics
- Assist in conversing with on-line experts
- Organize a connection to share knowledge with other students all over the world

In addition to creating a better and more effective learning environment for the student, the enhancement of the teachers' environment is also improved. The teacher may feel that, with the capabilities of the Internet now in their classrooms, they are relieved of the pressure to "know everything". Learning along with the students can create new challenges and vigor for educators. With up-to-the-minute information at both the students and teachers' fingertips, the empowerment of having these vast resources in the classroom can indeed create a better learning environment.

Acceptable Use Plan:
Conditions and Criteria for Technology
Related Acceptable Use Plan

Acceptable Use Plans help to define permissible behaviors by students and staff members who use information systems within a school's jurisdiction. The main question surrounding acceptable use policies today is in how much and what kinds of Internet access should students have. Protecting students from potentially damaging experiences--but at the same time allowing access to informational resources and the protection of individual rights--is also a key consideration.

The protection of children and students has always been paramount. Whether it's locking certain rooms that contain dangerous chemicals, to erecting fences around swimming pools, society has always tried to prevent harm to children. With this practice and philosophy in mind, schools who are connected to the Internet are creating and instituting acceptable use policies(See APPENDIX C for sample).

Probably the biggest problem facing schools initiating these policies is where to draw the line between honoring and respecting a student's rights, and creating a "do not trespass" territory on the Internet. The Internet is a portal to vast amounts of information, some of which is

informational and resourceful, and some of which is offensive and disturbing.

Besides the potential dangers that the Internet may contain, it does offer the student current and useful insights and opportunities for learning. For example, a student may obtain recent data and information about various topics and subject matter that can be more useful and valuable than what their school library can provide. Students can also communicate globally with many experts, as well as other students, by using electronic mail.

So the final question lies in what kinds of information you want to deny access to, and what kinds of access do you want to allow. Schools must come up with procedures and policies that meet the needs of the whole student population.

There are some basic guidelines for creating an acceptable use policy. First, emphasize guidance rather than censorship, and select sites that support the curriculum. Resources that have been tested and regarded as valuable and acceptable for classroom use can be bookmarked. Also, guide students toward developmentally appropriate information, and allow latitude if the students' parents approve.

Next, differentiate between supervised, curriculum-related, and self-governing use of the Internet. When curriculum-related instruction begins, the students are provided with acceptable Internet sites to their curricula. The students are instructed that they may only link to those sites, and any linking to non-approved sites will be dealt with negatively. In dealing with self-governing use, permit students who have parental consent to perform independent research; but try to prevent the two groups from working in the same lab or area, as problems may arise.

Besides establishing some guidelines for accessing Internet information, there are software programs available that block certain subject-area Internet sites called filters. However, use of this software raises several questions. Do you in effect take parental decision-making out of the picture when using the software? Does such blocking of information violate freedom of access to information that should be, to some, a family decision?

Some would argue that only parents have the right and the responsibility to restrict information-access concerning their children, and their children only. Also, that parents or legal guardians who do not want their children to have access to certain information, materials or facilities,

should discuss their feelings with their children. Because, as the thinking goes, school decision makers cannot assume the rôle of parents nor enter the province of parental control in the special connection between parent and child. However, there is still the belief that school staff and administrators have a public and professional responsibility to provide equal access to all resources for all the students.

Conclusion:
Project Summary

In this project covering the incorporation of the Internet as an educational and learning tool, the merits and possible shortcomings of integration we're explored. With the creation of this written project and the on-line Internet Tutorial, hopefully a more educated choice can be made as to whether Internet integration is the right choice to enhance instructional goals.

The drive to "wire" our nation's schools for telecommunications is being advanced from every quarter. Local, state, and federal governments alike are all on a mission to greater, global access for our schools. We may never see another technological push as great as this one involving our schools. With all the attention and press this

desire is creating, the result for many is that this endeavor must be a worthy one.

However, as commendable and noble as this mission may prove to be, I think we need to be very observant of the surrounding requirements that technological advances can and do require. Some observations:

- Will teachers and administrators be trained to integrate, use, and implement the new technology to its fullest potential?
- Will teachers, administrators, and parents be kept abreast of the ever-changing possibilities and requirements that technology offers?
- Will there be regular inservice and training classes for teachers, administrators, and parents alike in order to be kept technologically literate?
- Will there be an Acceptable Use Policy produced to provide direction and guidelines for the technology's use?
- Will there be support for future technological needs as they arise?

Having the desire to "wire" our schools for better access to the world's resources, while at the same time providing our children the knowledge to be prepared for the 21st workforce is admirable. However, without the required training and on-going support needed to incorporate, implement, and constantly monitor the technological changes;

this technological revolution may be short-lived, and possibly doomed to extinction.

By creating this Master's project, hopefully a more educated decision can be made as to the role of technology, specifically the Internet, into our childrens' future. The Internet is a powerful tool. However, with power there comes responsibility. Responsibility at all levels, including education.

APPENDIX A: Sample Paper Web Suite Evaluation Form.

Pre-test:

1) Are you a teacher?

- Yes
- No

2) If yes to #1, do you have access to a computer at your school?

- Yes
- No

3) If yes to #2, do you have access to the Internet at your school?

- Yes
- No

4) How much computer experience have you had?

- None
- Moderate
- Extensive

5) How much experience have you had with the Internet?

- None
- Moderate
- Extensive

6) Have you ever created a Web suite?

- Yes
- No

7) Do you have a computer at home?

- Yes
- No

8) If yes to #7 do you have Internet access at home?

- Yes
- No

Post-test:

1) Was the on-line tutorial visually appealing?

- Yes
- No
- Somewhat

2) Was the goal clear?

- Yes
- No
- Somewhat

3) Was the tutorial easy to use?

- Yes
- No
- Somewhat

4) Was the tutorial enjoyable?

- Yes
- No
- Somewhat

5) Was the tutorial informational and helpful?

- Yes
- No
- Somewhat

6) Was the tutorial too technical?

- Yes
- No
- Somewhat

7) Was the tutorial understandable?

- Yes
- No
- Somewhat

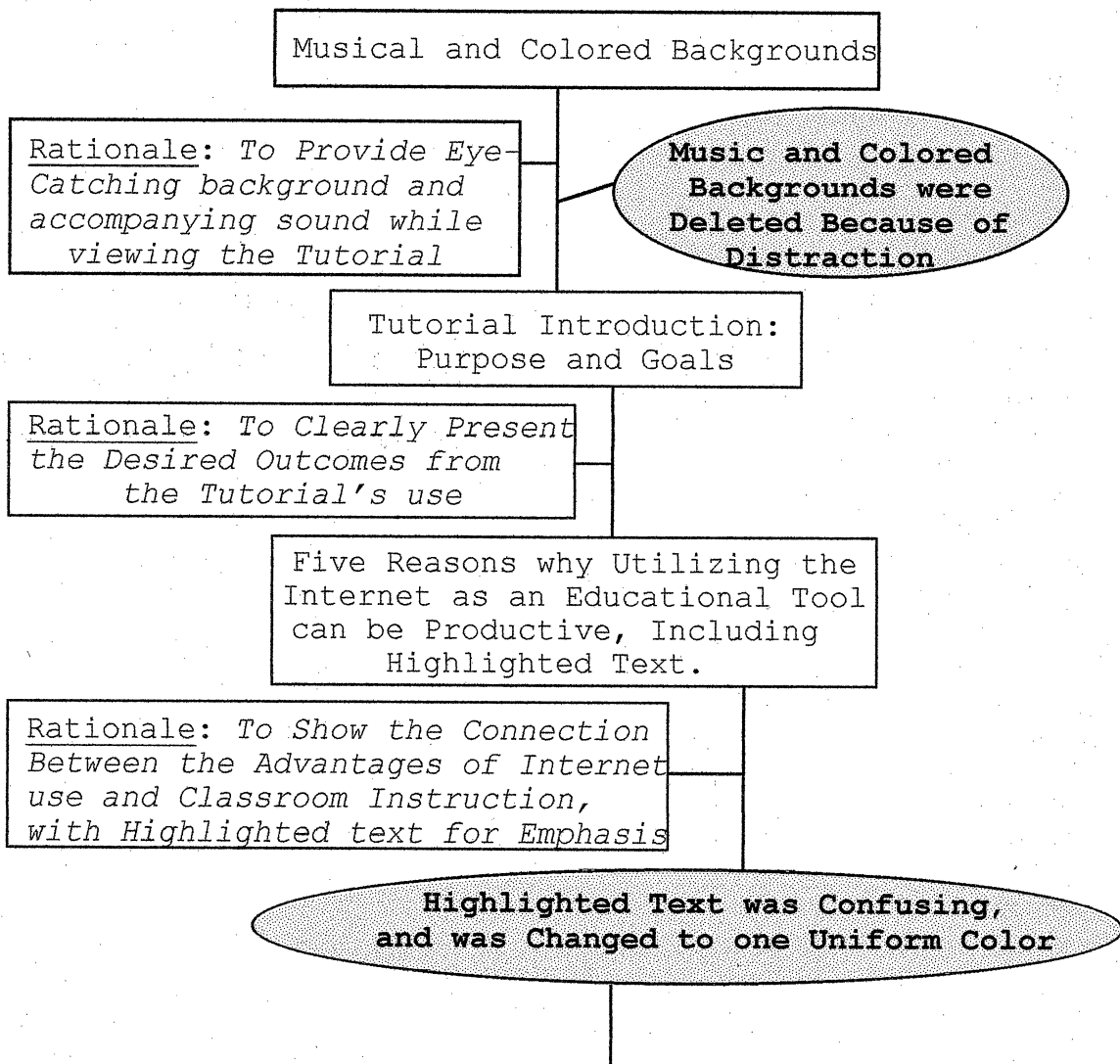
8) What did you enjoy about the tutorial?

9) Is there anything you would change about the tutorial?

APPENDIX B: On-Line Tutorial Tree Structure, Rationale, and Tutorial Screen Shots Including Survey Form

The Tutorial tree structure consists of both the pre-modification's structure and post-modification's structure to the on-line Tutorial. The original structure is notified in block diagrams, whereas the modified structure is notified by gray oval diagrams with the text in bold.

WEB PAGE #1



Definitions of Various Internet Terms Highlighted with Animated Icons

Rationale: To Familiarize the User with Internet Terms Highlighted with Animated Icons for Emphasis

Animated Icons were Changed to Non-Animated Because of Linkable Confusion

Links to Internet Browser Makers are Included for Downloading if Users Desire.

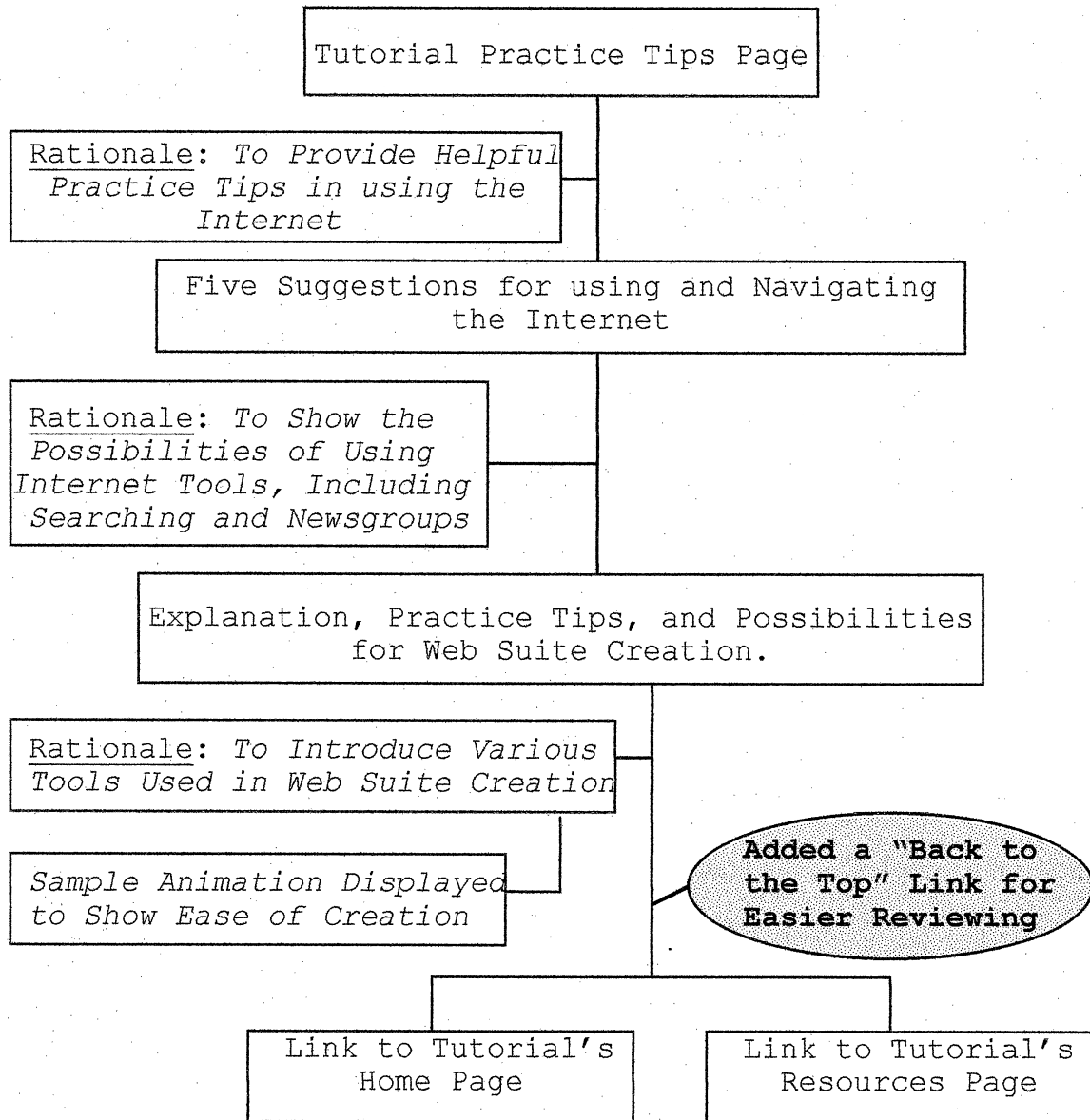
Explanation of Various Internet Features

Rationale: To Highlight Some Internet Features that can be Useful in Classroom Instruction

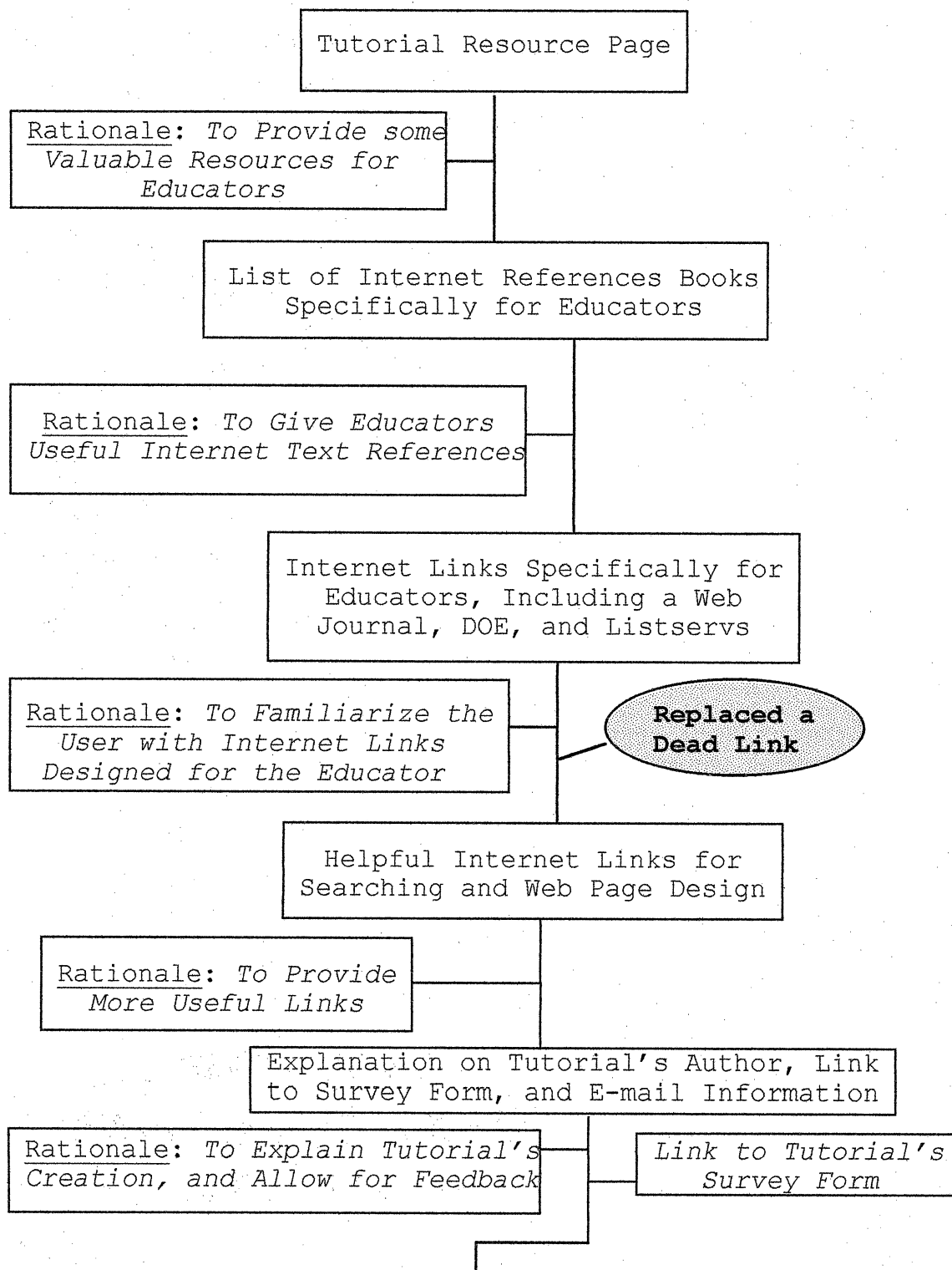
Added a "Back to the Top" Link for Easier Reviewing

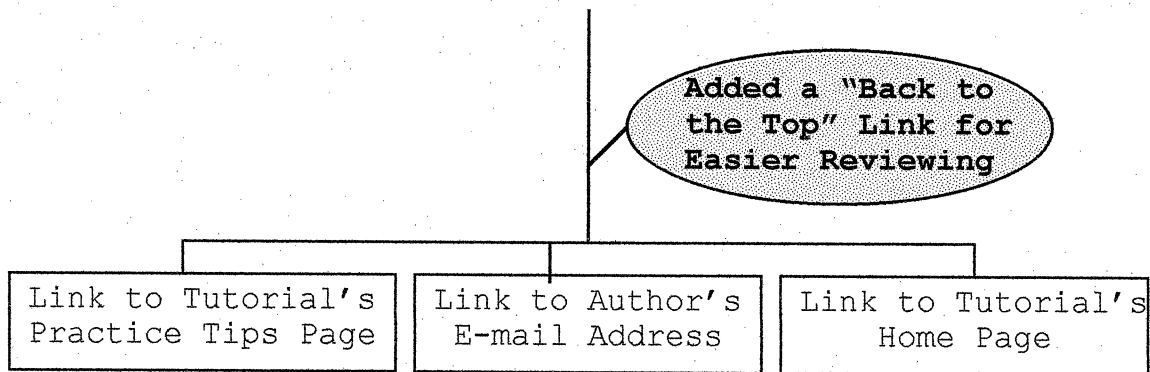
Link to the Tutorial's Practice Tips Page

WEB PAGE #2

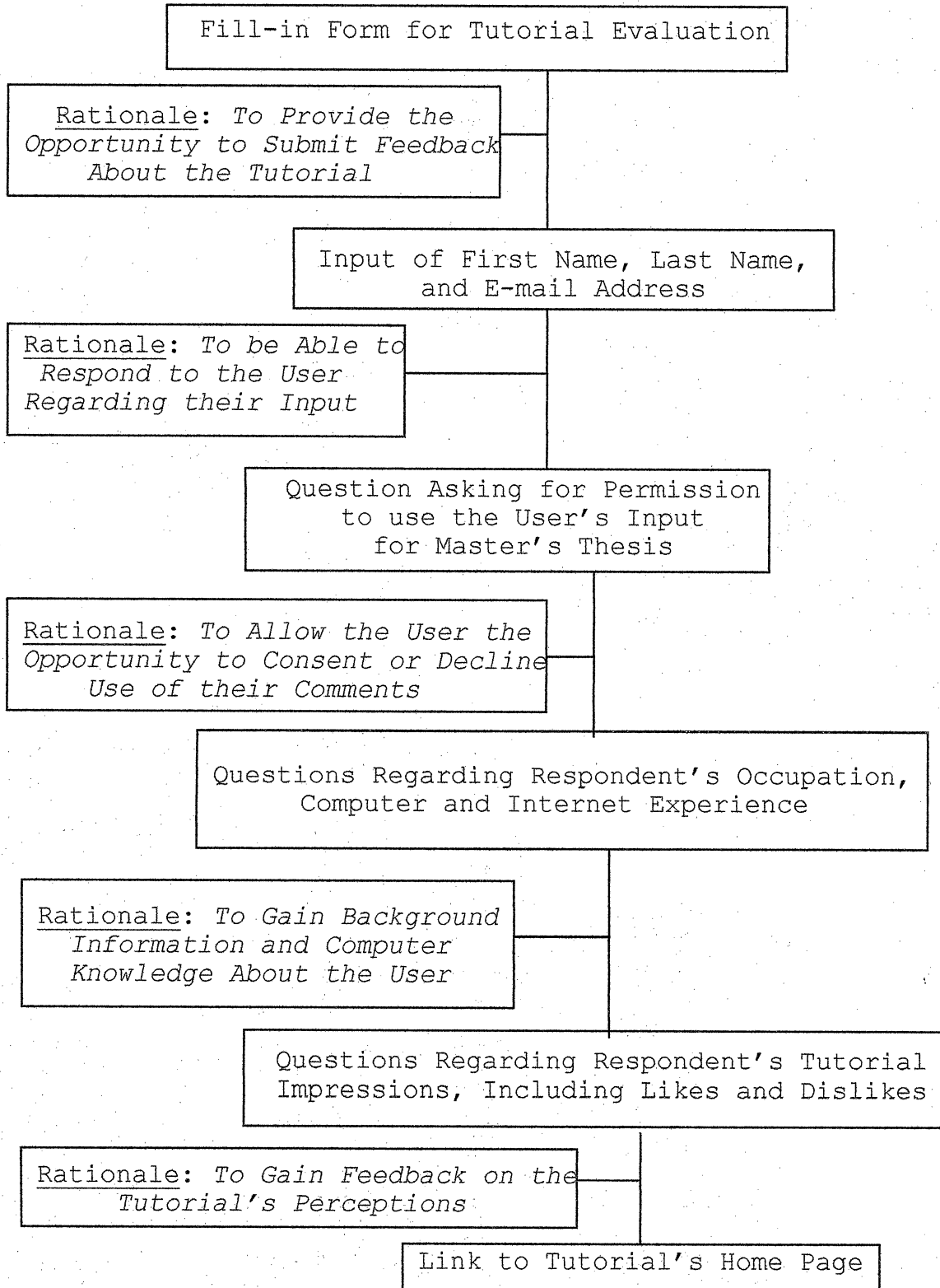


WEB PAGE #3

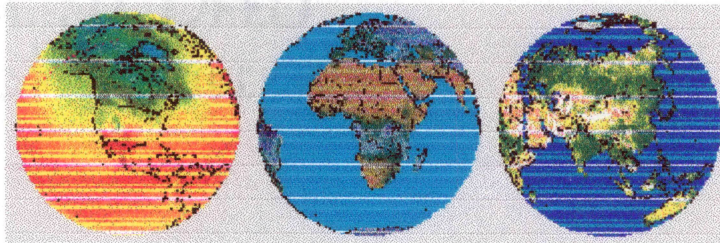




WEB PAGE #4



Welcome to the Internet Lesson Tutorial for Educators!



Welcome! In this hands-on Internet Tutorial you will be shown some of the advantages and highlights of using the Internet (the "Net") to enhance and supplement your lessons! This tutorial will help guide you through the steps to access and use the Net to make learning more interesting, interactive, and informative!



But first, let me try to answer a question that some of you may have from the very start: Why *should I* use the Net in my school? Ahh....a very good question. With the goal of creating an *effective learning environment*, the advantages of implementing and using the Net can include:

- **You, as educators, can provide learning environments where students are active and involved in cooperative projects that encompass the real world**
- **Students can then focus and drive their learning by pursuing some of their interests, and then taking responsibility for conducting and managing their own projects**

- **An alternative to rote memorization in a passive receiver role, students can practice problem-solving skills in collaboration with others**
- **And finally, the Net can provide students with complete, timely information, and allow for the communication with peers and experts on numerous topics**

One more point for all you educators out there, YOU can also search the Net for peers and education specific topics for your professional development! Other educators who have developed skills and knowledge can be a wealth of information to make your teaching responsibilities more understandable and effective!



OK, to start let's cover some of the basics of the Internet:

- **What exactly is the "Internet"?**
The *Net* is a global collection of interconnected computer systems linked by cables and phone lines. In essence, it's an electronic frontier for communicating and exchanging ideas and resources!
 - **How do I access the Internet?**
Access to the Net is really the ability to experience a wealth of information, and you access it by way of a Net "provider"(ISP). This provider has computer equipment that, once you are signed-up, allows you to go through them(the provider) to get onto the Net's huge collection of resources!
-



Next, what are some of the terms used in reference to the Net?

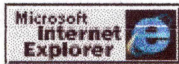
- ***World Wide Web* (the "Web"):** The graphical portion of the Net. Each separate page has its own address called a URL (Uniform

Resource Locator), and can contain one or many links to travel(surf) elsewhere on the Net.

- **Browser:** A program used to view information on the Net. The two most popular are:



Click to download Netscape Navigator for free.



Click to download Internet Explorer for free.

- **Home Page:** An opening or welcome screen to a Web site, which can have more than one reference screen.
 - **Link:** A connection instrument used between text and/or pictures on different Web pages. The links can be in different colors and are usually underlined, and clicking on the link takes you to a different Web page.
 - **Search Engines:** Programs on the Net that search for different Web pages after you have entered different words, phrases, or concepts on the topic(s) you are searching for.
-



Next, what are some of the features of the Internet?

- **E-mail:** E-mail allows you send messages through the Net. You need an e-mail program--usually included with your browser--to send and receive messages. You get your own personalized address, and you can also send attachments (Files, URL Links) in addition to creating a list of correspondents using the e-mail program's address book
- **Bookmarking:** This feature allows the user to mark and save favorite Net URLs to their browser for later linking without

having to search the Net over again to find the link.

- **FTP (File Transfer Protocol):** The protocol used on the Internet for sending files. There are a series of computers that hold distribution software files that allows you to download the software programs of your choice, and they use the FTP.
- **Freeware and Shareware:** Freeware is software you can download for free. In most cases the author still has the copyright to the program, and may ask you to do, or don't do something(s) after you download the software (e.g. don't change the program in any way). Shareware is similar to freeware, but a fee - - usually very small - - is asked if you intend to keep the program.

Ready to go to the Tutorial Practice Tips Page? Just click your waiter!



(Please Note: This Web suite is copyrighted by Charles Helsper. All tools were used with the understanding that they are royalty-free, if you find any violation of copyright please notify the author at once. (Mozilla was created by Netscape) This information may only be distributed and duplicated if permission is granted by the author in response to a written request. Thank you!)

Welcome to the Tutorial Practice Tips Page!



The Net is *very easy* to use. Here are some steps that should make it easier:

- 1. After you have selected a search engine to use (AltaVista, Yahoo, etc.) you should start your search with a topic or subject in mind. This makes your searching much easier than just heading-out onto the Internet empty-handed.
For example, if you are interested in finding information related to space exploration, you may want to use the search words "space," "NASA," "exploration." The search may respond with some useful links. If not, you can modify your search by either adding or deleting some terms.**
- 2. A second option is to use an Internet phone book. (See the "Netpages" link on the Resources page.) They can reduce your searching time greatly. They are arranged by subject and alphabetically by name.**
- 3. Also helpful are Usenet newsgroups' FAQs lists. Usenet groups are set up by people who share common interests. Most Internet hosts have a link using a "news reader" program--needed to view**

Usenet materials--already available for you to use. You simply subscribe to the groups that share your interests.

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5. One final tip about searching and linking is that sometimes addresses change, and when you follow a link you may get an error message. A new link may be provided for you, or the page may have been withdrawn completely.
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What about creating Web Pages?

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Web pages can contain all kinds of goodies!

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For example, I made this animation--and you can do it too--in less than 20 minutes: [Creating](#)
- You can include lesson plans for your students to view and download either from home or from school!

- **And you can also post various topics and links for you and your students' personal and professional interests!**



Click in the classroom to go to the Tutorial Resources page!

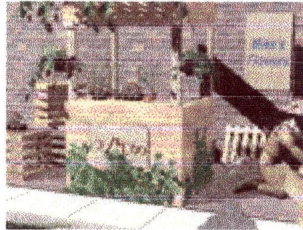


Click here to go back to the Home page!



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






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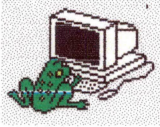
-  **T.H.E. Journal Web Site.** This excellent Web site offers resources and articles dealing with teachers and technology!
 -  **The United States Department of Education (DOE) Web Site.** This Web site has news and resources for almost all aspects of education, including the full text of many DOE publications!
 -  **Educational Listservs.** This Web site has links to many different educational listservs! (A listserv is a group of e-mail participants who communicate back and forth via e-mail on specific topics.)
 -  **Instructional Technology Connections.** This Web site has tons of great resources for teachers dealing with technology and education!
 -  **University of Colorado-Denver K-12 and Beyond Resource Pages.** This Web site has some great resources for K-12 teachers!
-



Finally, here are some great miscellaneous links!

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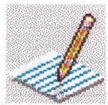
-  **The Clip Art Connection.** This site has some great animation, and most of them are free! Also, there are great tips and links to creating your own animation!

-  **Builder.** This site is a great source for learning Web page design! Try it! You'll be amazed at how easy it really is!

About this Tutorial's creator:

Hello, my name is Charles Helsper and I am a graduate student at the California State University in San Bernardino. As part of my Master's project, and in addition to my written thesis, I created this Internet tutorial for teachers and students to access and use in the hopes that the power of the Internet can be used educationally to its fullest potential! A survey of the Tutorial was also created to acquire some valuable feedback from YOU!, including how the Tutorial has helped and how it could be better! So, if you could take several minutes and complete the brief survey, I would sure appreciate it!! Thank You! Survey Form Here!

Also, you can send me an e-mail and I will respond as soon as possible!



chelsper@gte.net

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Fill-in Form for Evaluation of the Tutorial Web Suite.

First Name:

Last Name:

E-Mail Address (Optional):

Is it permissible to incorporate your responses into an evaluation summary?

Yes

No

1.) Are you a teacher?

Yes

No

2.) If yes to #1, do you have access to a computer at your school?

Yes

No

3.) If yes to #2, do you have access to the Internet at your school?

Yes

No

4.) How much computer experience have you had?

None

Moderate

Extensive

5.) How much experience have you had with the Internet?

None

Moderate

Extensive

6.) Have you ever created a Web Suite?

Yes

No

7.) Do you have a computer at home?

Yes

No

8.) If yes to #7, do you have Internet access at home?

Yes

No

9.) Was the online Tutorial visually appealing?

Yes

No

Somewhat

10.) Was the goal of providing a tutorial on the Internet clear?

Yes

No

Somewhat

11.) Was the Tutorial easy to use?

Yes

No

Somewhat

12.) Was the Tutorial enjoyable?

Yes

No

Somewhat

13.) Was the Tutorial informational?

Yes

No

Somewhat

14.) Was the Tutorial too technical?

Yes

No

Somewhat

15.) Was the Tutorial understandable?

Yes

No

Somewhat

16.) What did you enjoy about the Tutorial?

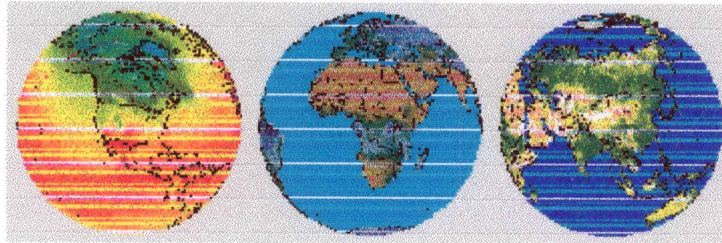
17.) What would you change about the Tutorial, good or bad? (Be Honest)

Thank you for your responses!!



Click here to return to the Home Page!

Welcome to the Internet Lesson Tutorial for Educators!



Welcome! In this hands-on Internet Tutorial you will be shown some of the advantages and highlights of using the Internet (the "Net") to enhance and supplement your lessons! This tutorial will help guide you through the steps to access and use the Net to make learning more interesting, interactive, and informative!



But first, let me try to answer a question that some of you may have from the very start: Why *should I* use the Net in my school? Ahh....a very good question. With the goal of creating an *effective learning environment*, the advantages of implementing and using the Net can include:

- **You, as educators, can provide learning environments where students are active and involved in cooperative projects that encompass the real world**
- **Students can then focus and drive their learning by pursuing some of their interests, and then taking responsibility for conducting and managing their own projects**

- **An alternative to rote memorization in a passive receiver role, students can practice problem-solving skills in collaboration with others**
- **And finally, the Net can provide students with complete, timely information, and allow for the communication with peers and experts on numerous topics**

One more point for all you educators out there, YOU can also search the Net for peers and education specific topics for your professional development! Other educators who have developed skills and knowledge can be a wealth of information to make your teaching responsibilities more understandable and effective!



OK, to start let's cover some of the basics of the Internet:

- **What exactly is the "Internet"?**
The *Net* is a global collection of interconnected computer systems linked by cables and phone lines. In essence, it's an electronic frontier for communicating and exchanging ideas and resources!
 - **How do I access the Internet?**
Access to the Net is really the ability to experience a wealth of information, and you access it by way of a Net "provider"(ISP). This provider has computer equipment that, once you are signed-up, allows you to go through them(the provider) to get onto the Net's huge collection of resources!
-



Next, what are some of the terms used in reference to the Net?

- ***World Wide Web* (the "Web"):** The graphical portion of the Net. Each separate page has its own address called a URL (Uniform

Resource Locator), and can contain one or many links to travel(surf) elsewhere on the Net.

- **Browser:** A program used to view information on the Net. The two most popular are:



Click to download Netscape Navigator for free.



Click to download Internet Explorer for free.

- **Home Page:** An opening or welcome screen to a Web site, which can have more than one reference screen.
 - **Link:** A connection instrument used between text and/or pictures on different Web pages. The links can be in different colors and are usually underlined, and clicking on the link takes you to a different Web page.
 - **Search Engines:** Programs on the Net that search for different Web pages after you have entered different words, phrases, or concepts on the topic(s) you are searching for.
-



Next, what are some of the features of the Internet?

- **E-mail:** E-mail allows you send messages through the Net. You need an e-mail program--usually included with your browser--to send and receive messages. You get your own personalized address, and you can also send attachments (Files, URL Links) in addition to creating a list of correspondents using the e-mail program's address book
- **Bookmarking:** This feature allows the user to mark and save favorite Net URLs to their browser for later linking without

having to search the Net over again to find the link.

- **FTP (File Transfer Protocol):** The protocol used on the Internet for sending files. There are a series of computers that hold distribution software files that allows you to download the software programs of your choice, and they use the FTP.
- **Freeware and Shareware:** Freeware is software you can download for free. In most cases the author still has the copyright to the program, and may ask you to do, or don't do something(s) after you download the software (e.g. don't change the program in any way). Shareware is similar to freeware, but a fee - - usually very small - - is asked if you intend to keep the program.

Back to the top

Ready to go to the Tutorial Practice Tips Page? Just click your waiter!



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Welcome to the Tutorial Practice Tips Page!



The Net is *very easy* to use. Here are some steps that should make it easier:

- 1. After you have selected a search engine to use (AltaVista, Yahoo, etc..) you should start your search with a topic or subject in mind. This makes your searching much easier than just heading-out onto the Internet empty-handed.
For example, if you are interested in finding information related to space exploration, you may want to use the search words "space," "NASA," "exploration." The search may respond with some useful links. If not, you can modify your search by either adding or deleting some terms.**
- 2. A second option is to use an Internet phone book. (See the "Netpages" link on the Resources page.) They can reduce your searching time greatly. They are arranged by subject and alphabetically by name.**
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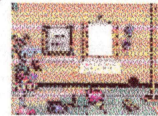
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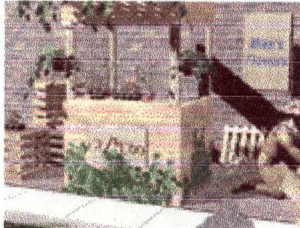


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






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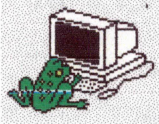
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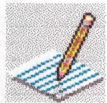
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Thank you for your responses!!

Back to the top



Click here to return to the Home Page!

APPENDIX C: Sample Lesson Plans Utilizing the Internet

These sample lesson plans can help educators integrate the Internet into their classroom curriculum. By utilizing these lesson plans, a connection can be made between the learning experience and the Internet technology available to educators. Each lesson plan lists the appropriate grade levels, major objectives, time line, summary, and assessment.

Sample Social Studies Lesson Plan

Title: "The Electronic Tourist"

Author: Elaine Baker, Garden Valley School, Garden Valley, ID.

Grade Level: 2-12

Major Objectives:

- * to provide students in a rural setting sense of personal involvement in the larger world
- * to build students' confidence in their writing abilities by providing them with many opportunities for short communications
- * to provide development of students' word processing skills

Time Line: one semester

Telecommunications Resources: e-mail

Summary:

Identify two to five schools that would like to participate in the project. Teachers at the schools determine timelines and deadlines, create a pool of question's students can ask, and determine community features to emphasize. Each student composes and types an introductory paragraph, including his/her name, age and interests, one special feature of the local area, and two questions about the other school's area. The paragraphs for a class are compiled and sent by e-mail to the other schools. Students receive and study information

from other schools and prepare questions about the other school, along with statements about their locale that they think might interest other students.

Two more exchanges should take place during the project. To conclude the project, students at all schools prepare a travel brochure or newsletter, including information they have determined will be of the most interest to the other schools. Each student also chooses one of the other schools to "visit" and prepares for the visit by deciding what to wear, what to take, how to get there, how much money it will cost, how long to be gone, and what to do upon arrival. Students present their plans orally, in written form, as an art project, or by any other means.

Assessment:

Student exchanges, travel brochures, newspapers, and planned visits are evaluated (Armstrong, 1995).

Sample Math Lesson Plan

Title: "Economics and Telecommunications"

Author: Warren Baker, South View Junior High School, Hope Mills, NC.

Grade Level: 9

Major Objectives:

- * to retrieve information via telecommunications
- * to improve students' ability to identify problems and plan solutions
- * to gather, evaluate, organize, and analyze information
- * to increase understanding of various terms and concepts in economics, particularly as they relate to the stock market and corporate structure in the United States

Time Line: 10 class periods

Telecommunication Resource: access to an on-line news service

Summary:

Students first participate in a discussion about the stock market and investing. One student then demonstrates getting on-line with a news service that includes investment information. The student accesses a well-known company's record and searches for specific data, such as "Analysts'

Ratings," "Price-Earnings Estimates," or "Five Year Income Summary." Data is saved to disk and printed. After students learn about subsidiaries and divestment, they log on to the on-line news service and access data about a conglomerate. They discuss the impact of a conglomerate and its subsidiaries on the United States economy. Students retrieve sales and profit data on a selected company and use graphing software to plot a line graph of the information. All information is prepared in a report to share with others. A possible extended assignment might be to assign students, individually or in small groups, to access data and prepare reports such as company profiles, using both communications and word processing software.

Assessment:

Students are evaluated on their participation in various aspects of the project and on the reports they prepare, using the information they collect (Armstrong, 1995).

Sample Language Arts Lesson Plan

Title: "Young in the Thirties, Old in the Nineties"

Author: John Kraaer, Sanderumskolen, Odense, Denmark.

Grade Level: 9-12

Major Objectives:

- * to interview older people and obtain their viewpoints
- * to prepare the information gained in a visual presentation
- * to exchange information with another school via telecommunications

Time Line: three weeks

Telecommunications Resources: e-mail

Summary:

In this project, all teachers from most disciplines can participate, so that all classroom activities relate to the topic. Contact a local senior citizen center (a place where older people can meet and pursue hobbies) to locate interview subjects. During the first week, students read short stories and pertinent history books and watch films and/or attend a play at a local theater written in the thirties.

At the end of the first week, students select one of four themes on which to focus their information search: (1) work and spare time in the thirties; (2) housing conditions in the thirties; (3) the political situation in the thirties; (4) interviews with older people about these topics. During the second week, students interview senior citizens or ask questions of guest teachers who are selected because of their knowledge of senior citizens' concerns. Students also take a walk in an area built in the thirties, guided by an estate agent. During the third week, students compile their information, write a report on what they have learned, and share it via e-mail with students in another country, who do the same. Students also create posters for an exhibition, illustrating what they have learned.

Assessment: Students are evaluated based on the posters they create for the exhibition and the e-mail messages they send (Armstrong, 1995).

Sample Science Lesson Plan

Title: "Earthlink"

Author: Rita Henry, Glen Ridge High School, Glen Ridge, NJ.

Grade Level: 10-12

Major Objectives:

- * to isolate and define local environmental events that are linked to regional, national, and international trends
- * to link environmental events and trends to their impact on human and environmental problems
- * to engage science students in the creative process that guides the successful communication of science knowledge, along with its attendant social responsibility
- * to use telecommunications resource tools

Time Line: 2-3 weeks

Telecommunications Resources: access to the Internet, video conferencing (optional)

Summary: Divide students into small groups. Each group selects an environmental topic. The groups research their topics using on-line resources and traditional library sources. Each group assembles their data using word

processing, spreadsheet, and/or database software, as appropriate.

Students include statistics and information in their reports to achieve the following objectives: link local/regional events to national/global events; analyze the source and scope of problems and describe and estimate their impact; report and suggest local, regional, and global solutions. Using telecommunications and video conferencing (if available), students share their reports with another student group studying the same topic. After sharing their reports with other students, groups gather additional information and prepare a comparative study as an addendum to their reports.

Assessment: Students are evaluated on the basis of the kinds of information they locate and retrieve, the appropriateness of tools they use to analyze and display data, and the quality of their reports and addenda (Armstrong, 1995).

Sample History Lesson Plan

Title: "Discovering Perspectives on Historical Events"

Author: Margo McAlear, Park Tudor School, Indianapolis, IN.

Grade Level: 9-10

Major Objectives:

- * to get students to compare their culture's perspective of a given historical event with viewpoints from other countries
- * to provide students with the tools to weigh evidence and reach conclusions on the basis of facts to which they ordinarily might not have access
- * to develop and experience effective uses of telecommunications

Time Line: year-long

Telecommunications Resources: e-mail and access to conferencing or an electronic bulletin board

Summary:

In this year-long project, participating classrooms around the world agree on 5 to 10 dates when they will go on-line to share front page newspaper headlines, all from the same day. Individual students are assigned to type in the front

page headlines and perhaps a bit of background to each headline. Participating classrooms also decide whether they will share their interpretation of the different headlines with each other after the data is received.

After practice in on-line communication and analysis, the second half of the year is devoted to discovering as much as possible about three or four events or time periods in history, as portrayed in high school history textbooks.

Students and teachers from the participating classrooms agree on the events to be covered and post information on-line based on their text's coverage. As in the first half of the year, participating classrooms decide whether to share their insights once the information has been received.

The project builds on telecommunications skills learned in the first half of the year and provides a chance to learn in greater depth about how different countries see the same event. Students are then responsible for writing a report of the events, based on the information they have gained through the telecommunications process. Students gain invaluable insights regarding decisions that textbook editors must make in deciding to include or exclude certain facts or perspectives.

Assessment:

In the first half of the semester, students are evaluated on their ability to make inferences about each country's choice for its front page headlines, as well as spotting differences in terms used to describe the same event. In the second semester's project, students are given a pretest on the event/time period that will be the subject of discussion.

Students write about what they think texts from the participating countries will cover. After receiving the necessary information from around the world, each student writes an essay that includes material or perspectives from the other countries. Teachers also keep a log of the number of times students ask about another country's view of an event before starting the project and the number of times after the project is completed (Armstrong, 1995).

APPENDIX D: Acceptable Use Plan Policies and Guidelines
Sample

A. Each public school corporation in (your state) should adopt an Internet acceptable use policy which:

1. Describes general instructional philosophies and strategies to be supported by Internet access in the schools.
2. Describes the process for governing local Internet system security, user accounts and user privileges.
3. Describes sanctions to be taken when violations of the policy occur.
4. Makes specific reference to prohibiting the use of the schools' Internet resources/accounts:
 - a. To access, upload, download or distribute pornographic, obscene or sexually explicit material.
 - b. To transmit obscene, abusive or sexually explicit language.
 - c. To violate any local, state or federal statute.
 - d. To vandalize, damage or disable the property of another person or organization.
 - e. To access another person's materials, information or files without the implied or direct permission of that person.
 - f. To violate copyright, or otherwise use another person's intellectual property without their prior approval or proper citation.
5. Requires that parents be notified that their students will be using school corporation resources/accounts to

access the Internet, and provides parents the option to request alternative activities not requiring Internet access.

6. requires the permission of and supervision by the school's professional staff for a student to use a school account or resource to access the Internet.
7. indicates that the educational value of student Internet access is the joint responsibility of students, parents and employees of the school corporation.
8. makes the school corporation's Internet policies and procedures available for review by all parents, guardians, staff and members of the community.

b. each public school corporation in Indiana must provide staff and student Internet users guidelines for:

1. responding to unsolicited on-line contact.
2. safe-guarding personal information, such as name, address, telephone number, etc.

APPENDIX E: Internet Resources for Educators

Ten Popular Gopher Sites:

1. The United States Department of Education, which has information dealing with educational issues.

Gopher to: gopher.ed.gov

2. NASA, which has mission information, pictures, and even lesson plans.

Gopher to: spacelink.msfc.nasa.gov

3. The White House, which has many government resources.

Gopher to: gopher.esa.doc.gov

4. California Department of Education, which has information related to California's educational issues

Gopher to: goldmine.cde.ca.gov

5. The Weather Machine, which includes forecasts, satellite photos and current weather maps of the United States.

Gopher to: wx.atmos.uiuc.edu

6. The Education Resource Information Clearinghouse (ERIC) has reference materials and resources for educators, including lesson plans.

Gopher to: ericir.syr.edu

7. Consortium for School Networking (CoSN), includes development and use of computer Network technology in K-12 education.

Gopher to: digital.cosn.org

8. Internet for Minnesota Schools, which houses many K-12 educational links.

Gopher to: Informns.k12.mn.us

9. North Carolina State University's "Library Without Walls", which contains dictionaries, indices, and literature subject guides.

Gopher to: dewey.lib.ncsu.edu

10. Ohio Education Computer Network, which is designed for K-12 students to use.

Gopher to: nwoca7.nwoca.ohio.gov

Ten popular FTP sites:

1. The United States Supreme Court Rulings.

FTP to: ftp.cwru.edu

2. The Smithsonian Institution, which offers graphics and text files related to the Smithsonian.

FTP to: photol.si.edu
(/pub/)

3. Stanford University education and reference materials.

FTP to: sumex-aim.stanford.edu
(/pub/)

4. The University of Michigan library of Macintosh files.

FTP to: mac.archive.umich.edu
(/mac/00help0/)

5. Washington University DOS and Windows files.

FTP to: wuarchive.wustl.edu

6. IPAC Extragalactic Database. Infrared Processing and Analysis Center is a project of the California Institute of Technology Jet Propulsion Laboratory. This site contains extensive cross-identifications for over 200,000 objects, including galaxies, quasars, and infrared and radio sources.

FTP to: ned.ipac.caltech.edu
(pub/ned)

7. Macintosh Science and Technology Archive, which specializes in Macintosh computing and programming, and also includes materials on biology, geology, physics, and chemistry.

FTP to: ra.nrl.navy.mil
 (/MacSciTech)
File: _readme.txt, _all_files.txt

8. Energy and Climate Information Exchange (ECIX). This site's goal is offer free information aimed at educating environmental groups and the general public on the potential of energy efficiency and renewable energy sources.

FTP to: igc.org
 (ECIX)

9. Earthquake Information. This site contains information for public use on recent events reported by the USGS National Earthquake Information Center.

FTP to: geophys.washington.edu
 (/pub/seis_Internet)

10. University of California at Berkeley Open Computing Facility. This archive contains many full-text documents, including works by Lewis Carroll, Shakespeare, and E.E. Cummings.

FTP to: ocf.berkeley.edu
 (Library)

Ten popular Telnet targets:

1. NASA Spacelink classroom activities.

Telnet to: spacelink.msfc.nasa.gov
Login: guest

2. The Library of Congress.

Telnet to: dra.com

3. The National Institutes of Health.

Telnet to: nih-library.nih.gov

4. Weather information, including forecasts, earthquake reports, ski conditions, and water temperatures.

Telnet to: wind.atmos.uah.edu 3000

5. Worldwide Library Access.

Telnet to: laguna.epcc.edu
Login: library

6. University of Kansas History information.

Telnet to: ukanaix.cc.ukans.edu
Login: history

7. The National Archeological Database Information Management System. This site contains information related to archeological information.

Telnet to: cast.uark.edu
Login: nadb

8. The Learning Link, which includes information about technology, lesson plans, and great educational ideas.

Telnet to: sierra.fwl.edu
Login: newuser
Password: newuser

9. Science and Technology Information System. This site provides National Science Foundation (NSF) publications, including the NSF Bulletin, program announcements, general publications and reports.

Telnet to: stis.nsf.gov
Login: public

10. SpaceMet Internet. An on-line service for educators and students who are interested in space and space-related topics.

Telnet to: spacemet.phast.umass.edu

Ten popular Web sites:

1. US Department of Education/Office of Educational research and Improvement

URL: <http://www.ed.gov/>
E-mail: wwwadmin@inet.ed.gov

2. Clearinghouse for Subject-Oriented Internet Resource Guides at the University of Michigan.

URL: <http://www.lib.umich.edu/chhome.html>

3. The Department of Instructional Technologies at San Francisco State University, which has many K-12 resources and job listings.

URL: http://130.212.25.153/dit_home_page.html

4. NASA's Network Applications and Information Center (NIAC), which includes scientific, educational, and government resources.

URL: <http://niac.nasa.gov/niac/guide/>

5. PBS (Public Broadcasting Service) links to educational programs, materials for classroom use, and PBS member stations.

URL: <http://www.pbs.org>

6. Uncle Bob's Kids Page, collection of links to educational and entertaining sites for kids.

URL: <http://gagme.wwa.com/~boba/kids.html>

7. Goals 2000, A reform initiative started by the Department of Education.

URL: <http://www.ed.gov/pubs/goals/progrpt/index.html>

8. Department of Education teacher's guide for government projects, grants, and misc. programs.

URL: <http://www.ed.gov/pubs/TeachersGuide/>

9. Regional Educational Laboratories. Organizations country-wide that provides research and resources on education.

URL: <http://www.nwrel.org/national/regional-labs.html>

10. On-line Internet Institute. A collaborative project between Internet-using educators, proponents of systemic reform, content area experts, and teachers desiring professional growth.

URL: <http://www.oii.org>

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