Connecting the Digital Dots: Literacy of the 21st Century

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EXECUTIVE SUMMARY

Prior to the 21st century, the ubiquitous term, literate, defined one’s ability to read and write. Its meaning delineated the educated from the uneducated, as being illiterate proved an unthinkable dilemma. With the advent of a new millennium and the rapidity with which technology has changed society, the concept of literacy has assumed new meanings. Experts in the field suggest that the current generation of teenagers—sometimes referred to as the E-Generation, possesses the digital competencies needed to effectively navigate the multi-dimensional and fast-paced digital environment of computers. For those baby-boomers or generations of adults who grew up in a world of books, traveling the trail of cyberspace often seems as tenuous as speaking a new language. In fact, Prensky (2001) recognizes such non-literate individuals as burdened with an accent—a non-native speaker of a foreign language, struggling to survive in a strange world.

Perhaps it is true that literacy, and numeracy for that matter, have never really been optional for fully functioning members of society, despite those social groupings which have subsisted without. However, in our current society—accelerated, media-saturated, automated, some would say, to the nth degree—the reality is that literacy is a requirement. Like water, the new literacy—much more broadly defined below than simply the ability to read and write—is a necessity of life in the 21st century.

Was it always so? History provides us with examples of societies trying to build connectivity into their communications’ infrastructures (Chandler and Cortada, 2000) two centuries ago. Using the technologies of their time, people sought methods by which they might communicate faster, easier and better. Today, we are still seeking better communication methods, only now, we have myriad more choices, we have tools and strategies and much greater knowledge about effective communication.

Digital and visual literacies are the next wave of communication specialization wherein the majority of people have technologies at the tip of their fingers to not only communicate, but to create, to manipulate, to design, to self-actualize. Children learn these skills as a part of their lives, like language which they learn without realizing they are learning it. (Andersen, 2002) Adults, who did not grow up with technology, continue to adapt from iteration to iteration. The senior population, like late adopters
of ‘new fangled gadgets’ slowly approach the new literacy like they might a foreign language that is complex and of questionable use.

Our research suggests that this is problematic. Being void of digital or visual literacy is akin to being handicapped. And the problem is accelerated further in the field of education. A common scenario today is a classroom filled with digitally-literate students, being led by linear-thinking, technologically stymied, instructors. Although funds may be plentiful for purchasing new equipment, wiring classrooms, and ordering current software, few educational organizations have developed comprehensive technology plans that specify technical learning objectives or ensure successful integration of technology needed to enhance students’ digital and visual literacy. We have found that in many cases there exists a void in professional development for faculty—training needed to gain the requisite computer skills to integrate technology into the curriculum effectively. Too often success is found in pockets within the institution, where individually motivated faculty embrace advances in technology, mastering—on their own time—the skills needed to merge the digital world with academia.

Taking precedence over systematic planning is the trial and error approach to utilizing technology in the classroom, specifically for non-technical courses such as English or fine arts. Educational institutions have given priority to computer-based courses. There appears to be an institutional modus operandi which easily justifies technology funding for some disciplines over others. To approach the use of technology differently, to enhance teaching and learning across all departments, requires change. And this change will be slow in coming without vision and practical, recognizable goals and incentives which encourage people to embrace new digital and visual literacy skills individually and collectively.

Our students are natives to cyberspace—they are digitally savvy. No longer does it suffice for a teacher to re-type overheads into PowerPoint and have students take notes. No longer is it enough for a teacher to talk about another country and hold up a four-foot by four-foot map and point to a given city. These days, new media literacy technical skills catapult traditional learning methods into orbit. As a simple example, teachers have the ability to do a PowerPoint presentation with streaming video, instant internet access and real time audio video interaction, and they can do it with relative speed and ease. The greatest challenge now is moving beyond the glitz and pizzazz of the flashy technology and teaching true literacy in this new milieu. Using many of the same skills we have used for centuries—analysis, synthesis, and evaluation—we now must look at digital literacy as another realm within which to apply elements of critical thinking.

As we researched current articles, books, reports, and papers related to digital and visual literacy, it became evident that there are many definitions applicable to the term literacy and that skills needed to be digitally and visually literate are still being
identified. However, there were common findings which aid in furthering one’s understanding and awareness of what it means to be literate in the 21st century. As suggested in our title, our world today is about connecting the digital dots; unfortunately, the dots are multi-dimensional, of varying sizes and colors, continuously changing, and linked to other unimaginable dots. But one fact remains—to successfully connect in cyberspace, one must be literate, both digitally and visually. According to a recent report from the Workforce Commission’s National Alliance of Business:

"The current and future health of America's 21st century economy depends directly on how broadly and deeply Americans reach a new level of literacy—'21st Century Literacy' " (p. 4).

Although a myriad of definitions exist related to 21st Century Literacy, our study has focused primarily on digital and visual literacy—terms that often interact, overlap, or share common meanings. Digital literacy represents a person’s ability to perform tasks effectively in a digital environment, with the term “digital” meaning information represented in numeric form and primarily for use by a computer. Literacy includes the ability to read and interpret media (text, sound, images, et. al.), to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments. According to Gilster (1997) the most critical of these is the ability to make educated judgments about what we find on-line.

Visual literacy, referred to at times as visual competencies, emerges from seeing and integrating sensory experiences. Focused on sorting and interpreting, sometimes simultaneously, visible actions and symbols, a visually literate person is able to communicate information in a variety of forms, to appreciate the masterworks of visual communication (Chauvin, 2003). Visually literate individuals have a sense of design, the creative ability to create, amend, reproduce images, digital or not, in a mutable way.

Weaved within the definitions of each term are a host of other sub-classifications including information literacy, lateral literacy and reproduction literacy. Each term defines, specifically, skills inherent in a digitally or visually literate individual. In fact, we found that the variations in terminology, including at times, redundancies, represents the newness of this phenomenon and the lack of extensive, or at least longitudinal research related to digital literacy and, most importantly, its impact on the learner, explains such occurrences. However, a common understanding has emerged—a leitmotif that characterizes a unique environment, and literacy, in any form, advances a person’s ability to effectively and creatively use and communicate information.
TERMINOLOGY

Digital Literacy
Digital literacy refers to the assortment of cognitive-thinking strategies that consumers of digital information utilize. Digital literacy is usually regarded as a measure of the ability of users to perform tasks in digital environments. But digital literacy is much more than just the physical use of software. It includes the ability to “read” instructions from graphic interfaces (‘photo-visual literacy’), to use the computer’s digital reproduction capability (‘copy & paste’) in order to form genuine-creative products (‘reproduction literacy’), the flexibility of thinking that enables learners to construct knowledge from hypertextual, non-linear navigation through knowledge domains (‘lateral literacy’), and the ability to critically evaluate and assess the quality of digital information (‘information literacy’). These literacies determine, to a great extent, the quality of learners’ work in digital environments. This paper proposes a terminology framework for digital literacy. Discussion of every digital literacy type is accompanied by results from a study that examined the ability of learners, from different age groups, to effectively utilize these literacies in educational contexts. (Eshet, 2004)

Digital literacy is the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers... (Not) only must you acquire the skill of finding things, you must also acquire the ability to use those things in your life. Acquiring digital literacy for Internet use involves mastering a set of core competencies.

New Media Literacy
New Media literacy is the ability to apply critical thinking and viewing skills to what we see, hear and read (http://www1.medialiteracy.com/home.jsp). It is the ability to access, analyze, evaluate and create information in a variety of media formats including print and non-print. (http://www.gailehaley.com/considine/media-literacy.htm)

Information Literacy
Information literacy can be defined as “the ability to locate, evaluate and use information.” What is 21st Century Information Literacy? Retrieved 12-23-04 from http://21cif.imsa.edu/inform/program/whatisinfofluency.html

... the ability of information consumers to make educated, smart, information assessments requires a special kind of literacy, termed Information Literacy. This literacy acts as a filter: it identifies false, irrelevant, or biased information, and avoids its penetration into the learner’s cognition. ... Without a good command of information
literacy, how can one decide which of the endless pieces of contradicting information found on the Web to believe? (Eshet, 2004, p. 5)

**Lateral Literacy: Hypermedia and thinking**
Lateral literacy and the world of hypermedia represent a lateral environment which is described as a non-linear way to assess and use information—unlike the linear skills needed to read and analyze a book. Thinking laterally allows users to perform multi-level tasks and to synthesize disparate pieces of information for greater understanding or knowledge. (Eshet, 2004)

**Photo-Visual Literacy**
Visual communication in an interactive environment is constructed of multi-layered and ambiguous symbols systems that are both syntactically and semiotically dense. In visual communication, the syntactic elements are those visual characters that are used, while the semantic elements relates to the correlation, compliance and connection between the visual symbols that serve to deposit meaning into visual metaphors used to communicate. (Bamford, 2001)

**Reproduction Literacy**
With the advent of computers, a new skill set has emerged which enables people to reproduce or edit digital texts or visuals. This leads to new interpretations of originality, creativity and invention of artwork or other endeavors. Similar to lateral literacy, the reproduction of digital information requires a digitally-literate user; therefore, the term is synonymous with digital literacy. (Eshet, 2004)

**Today’s Literacy**
The authors of *Digital Transformation*, a recent report published by the Educational Testing Service's Center for Global Assessment, define today's literacy as the ability to use "digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society" (International ICT Literacy Panel, 2002, p. 2). In other words, although reading, writing, listening, and speaking are paramount, today's students must be able to decipher meaning and express ideas through a range of media. (enGuage, North Central Regional Educational Laboratory).

(http://www.ncrel.org/engauge/skills/basiclit.htm)

**Visual Literacy**
Refers to a group of vision-competencies a human being can develop by seeing and at the same time having and integrating other sensory experiences. The development of these competencies is fundamental to normal human learning. When developed, they enable a visually literate person to discriminate and interpret the visible actions, objects, symbols, natural or man-made, that he encounters in his environment. Through the creative use of these competencies, he is able to communicate with others. Through the appreciative use of these competencies, he is able to comprehend

Visual literacy is the ability to access, analyze, evaluate, and communicate information in any variety of form that engages the cognitive processing of a visual image. (Chauvin, 2003)
NATIONAL ORGANIZATIONS

Introduction

The following section introduces the reader to a variety of national organizations focused on providing information, training, research, workshops and conferences related to digital and visual literacy. In most cases, information was extracted directly from the organization’s web site.

ComputerPrep

ComputerPrep is an organization dedicated to providing information technology curriculum and training through instructor-led, computer-based, web-based formats. As a Microsoft Certified Partner, ComputerPrep is the world’s first standards-based training and certificate program, offering certifications in digital literacy. Referred to as a “Classroom-in-a-box, ComputerPrep also provides teachers with everything needed to implement the company’s integrated courseware.

Education Development Center, Inc.
http://main.edc.org/

The Education Development Center (EDC), in operation for more than four decades, develops programs and products in collaboration with partners around the globe, advancing learning and healthy development for all individuals in nearly every facet of society including: early child development, K-12 education, health promotion, workforce preparation, etc. As a non-profit organization, EDC addresses critical challenges around the world in education, health, technology, including literacy, and human rights.

EDC publishes a diverse array of products including videos, software, and large-scale curricula, such as Teenage Health Teaching Modules, Mathscape, Connected Geometry, Insights, just to name a few.

Global Digital Literacy Council
http://www.gdlcouncil.org/index.html

The Global Digital Literacy Council serves as the preeminent advisory body and as an authoritative voice on issues driving the development and implementation of global digital literacy standards and systems.
Objectives:

Represent key geographic and industry stakeholders in the identification of issues, definition of best practices, and research and development of programs related to Global Digital Literacy.

Publicly present and position Global Digital Literacy issues.

Review and update the Digital Literacy Standards based on input from subject matter experts worldwide.

Information and Communication Technologies Literacy

http://www.ictliteracy.info/

This Web site is the "public face" of a fast growing international movement focused on promoting Information and Communication Technologies (ICT) Digital Literacy. Building an international consensus is critical for advancing meaningful educational initiatives, training high skilled workforce, and understanding issues related to economic development. This website provides a rich, centralized portal for the repository of ICT Literacy resources, highlights innovative efforts and partnerships promoting ICT Literacy, and facilitates the interaction between researchers, business, government and educational segments.

Institute for Multimedia Literacy: Annenberg Center for Communication, University of Southern California

The USC Annenberg Center’s Institute for Multimedia Literacy conducts and supports pioneering research and development efforts designed to embrace the transformative potential of today’s literacy — an expanded, multimedia literacy in which the ability to read and write in images, sound, interactivity, and movement is held to as high a standard as learning the reading and writing of text. To this end, that the Institute’s scholarly projects and academic programs examine and articulate the social, cultural, and practical implications of what it now means to be literate in the twenty-first century. All of the Institute’s activities revolve around four major goals.

I. Understanding and articulating multimedia literacy

*The Institute is engaged in ongoing projects designed to understand and articulate the languages, the linguistics, and the epistemologies that make up twenty-first-century literacy.*

II. Examining what it means to be a multimedia scholar
Exploring expanding literacy within traditional academic practices, the Institute studies the implications and transformative potentials for pedagogy, scholarship, and publication.

III. Studying the impact and implications of multimedia literacy and scholarship

*The Institute’s research efforts include an expansive study of the widespread impact and social and cultural implications of these expanding notions of literacy.*

IV. Designing programs to promote multimedia literacy and scholarship

*The Institute is dedicated to assessing and sharing its dynamic practices for building programs that promote a basic knowledge of multimedia literacy across a wide range of audiences and explore very complex issues of discipline-based multimedia scholarship.*

Some central elements to the Institute’s approach are:

- Collaborative practices that are frequently cross-disciplinary,
- An emphasis on authoring and critical thinking with a grounding in historical perspective, and social-cultural contexts,
- A focus on process over product,
- Articulating the relationship between form and content,
- Active and self-reflexive research,
- Conceptual, but not technical, fluency.

To date, the Institute has worked with more than 100 faculty and researchers, 3,000 undergraduate and graduate students, and dozens of experts and leaders in the field from around the country.
(Source: http://www.iml.annenberg.edu/html/home.htm)

**International Society for Technology in Education**


International Society for Technology in Education (ISTE) is a non-profit organization consisting of worldwide leaders in the field of educational technology. The organization is focused on providing leadership and services needed to enhance teaching and learning initiatives, specifically the effective use of technology.

ISTE is home to:

- National Education Technology Standards
- Center for Applied Research in Education Technology
- National Educational Computing Conference
ISTE offers innovative educational technology books and programs; professional development workshops, forums, and symposia; and research, evaluation, and dissemination of findings regarding educational technology on an international level.

**International Visual Literacy Association**

http://www.ivla.org

The International Visual Literacy Association (IVLA), formed in 1968, provides an electronic forum for the exchange of information related to visual literacy. Specifically, topics of discussion focus on education, instruction and training in modes of visual communication relevant to researchers, educators and artists.

IVLA produces several national publications, including Journal of Visual Literacy, Selected Readings, and Symposium Readings. Additionally, the organization sponsors an annual conference.

**VisioN 2010**

http://www.si.umich.edu/V2010/projhist.html

Vision 2010 is a project devoted to imagining the effects of digital information technologies on scholarly communication during the coming decade. Digital information technologies are transforming academia, and we are just beginning to appreciate the depths of these changes. It is not merely that the university is being automated, that students are word-processing their theses, or that some journals are now available online. These are simply issues of efficiency. Something more profound is happening: these technologies are potentially changing the nature of knowledge and learning themselves.

Given that scholarly communication may be changing in revolutionary ways, the Vision 2010 goal is essentially this: we want to promote a level of discussion and study that befits an incipient revolution. Much of the information technology management done at universities today is of the fire-fighting sort: we have this problem, how can we solve it? Vision 2010's primary mission is to help universities create their futures rather than reacting to them. As stated in the project's original mission statement, the primary emphasis will be "What do we want to see created?" and not "How are we going to change?" The term "visionary" has been cheapened, but we haul it out here because it fits—we need visionary thinking about the digital revolution or we shall find ourselves its victims rather than its victors.
Vision 2010 Participants

The project was initially funded by the Carnegie Foundation, overseen by the Commission on Preservation and Access, and managed by the University of Michigan's School of Information. Vision 2010 is administered by a small steering committee of individuals from the Commission on Preservation and Access and the University of Michigan. Taken as a whole, the Vision 2010 participant list thus far includes many of those who will have primary responsibility for shepherding higher education through the coming decade.

Additional Organizations:

Australian Center for the Moving Image
http://www.acmi.net.au/

The George Lucas Educational Foundation
http://www.glef.org/

Institute for Multimedia Literacy
http://www.iml.annenberg.edu/html/home.htm

Just Think: Youth Media
http://www.justthink.org/

Visual Understanding in Education
http://www.vue.org/
CONFERENCES

Syracuse University’s Center for Digital Literacy
Syracuse, NY
April 2005

Pennsylvania Convention Center
Philadelphia, PA
June 2005

Coronado Resort
Orlando, Florida
October 2005
SELECTED ARTICLES, BOOKS, REPORTS AND PRESENTATIONS

Introduction

The following annotative bibliography introduces the concepts of digital and visual literacy and their varying forms and definitions. Considerable effort has been made to identify current and relevant information commensurate with the landscape of digital and visual literacy. We have endeavored to provide succinct summaries for each citation and to ensure that information is germane to education. In some cases definitions overlap—in others, the reader will be directed to a particular section of the document.

Although a wealth of information has been found related to this topic, much of the research is in the early stages. We have found that many articles focus on defining terminology, with explanations being provided by the authors as to why research has been limited. We suspect that not unlike achieving accountability standards, measuring digital or visual literacy is a difficult task.

Further, while we have intentionally focused on works written in the past five years to ensure currency and relevance, we have included several sources pre-dating 2000 because of their historical perspective, their unique views, and in some cases, their uncanny predictive content.
1. ARTICLES/PAPERS

Amy, L. E. (1999). “Speed bumps on the on-ramp to the information highway: Going online at average U.” The Internet and Higher Education.

According to Amy, technology is coming slowly to some academic areas, such as English, where networking of writing labs is seen often as a luxury rather than a necessity. To ensure equity in support and delivery of instructional technologies, faculty need to lead the way in developing intellectual infrastructures. “In the age of digital culture, “literacy”—the uncontested province of the English classroom—increasingly requires a knowledge of information technology” (p. 292). This article provides a strategy for faculty-driven development of an interim technology plan. It includes a list of six steps for developing interim technology plans, and presents a case study of some the failures and successes of developing such a plan for the English department at Cleveland State University. These initiatives, according to the author, are a necessary “front-line approach . . . a “critical mass” of faculty, teaching strategies, interest, and momentum necessary to revolutionize education for the 21st century” (p. 302).


Making a reasonable argument for art education within a literacy context, Bamford examines adolescents’ interpretation of visual communication. The results of her study provide insight related to how adolescents “interpret multi-layered, seriated, and framed visuals from a personal, socio-cultural, and structural perspective.” Images play a major role in understanding our world. People need to be able to adequately interpret these images. According to Bamford, “In interactive media, it is the spaces between the text that are as important to read as the text itself.” Since today’s adolescents represent the first generation to have grown up amid interactive media, this study is timely and critical to assessing the visual literacy skills needed for future generations.


The concepts of ‘information literacy’ and ‘digital literacy’ are summarized in a review of literature and subsequently analyzed. The article progresses from a definition of ‘literacy’ into definitions of new literacies that are needed to deal with our ever-increasingly complex world. Definitions include computer literacy, library literacy, network literacy, internet literacy, and hyper literacy. The article leads to a discussion of general concepts “such as information literacy and digital literacy, which are based
on knowledge, perceptions and attitudes, though reliant on the simpler skills-based literacies.” (p. 1)


In the article, *Visual or media literacy?* Chauvin differentiates between media and visual literacy, providing a number of current definitions from scholars in the field of media and visual literacy. Duncan (1989), Bowen (1996), and Thoman (1995) define media literacy as “education that aims to increase students’ understanding and enjoyment of how the media works, how they produce meaning, how they are organized, and how they construct reality (Chauvin, 2003, p. 121). Conversely, Fransecky & Debes (1972) define visual literacy as “a group of vision competencies which can be developed by seeing and at the same time having and integrating other sensory experiences” (Chauvin, 2003, p. 122).

Chauvin considers visual literacy as a viable skill, and the more encompassing term, offers the following definition: Visual literacy is the ability to access, analyze, evaluate, and communicate information in any variety of form that engages the cognitive processing of a visual image. (p. 125)


The focus of Eshet’s article is to provide a terminology framework of digital literacy—or to disaggregate the meaning so that each described characteristic results in a cumulative definition of the term. According to Eshet, the four components of digital literacy are:

- Photo-visual literacy
- Reproduction literacy
- Lateral literacy
- Information literacy

(Definitions of each term is provided in the terminology section of this report.)

Additionally, the author presents the results of a study that examined the extent to which learners effectively utilize digital literacy in educational contexts. Some of the findings suggest that younger (14-15 year old) participants were the best users of photo-visual information and showed the highest level of lateral literacy; older participants demonstrated a higher level of reproduction and information literacies.

In this article, Finn argues that with the mandate of No Child Left Behind, there is an increased urgency related to technical skills or digital literacy. According to the author, “It will become increasingly necessary to be digitally literate to function in a digital, Internet-connected economy” (para. 3).

Finn introduces the reader to several national organizations focused on developing standards and professional competencies needed to ensure literacy. Some of these include Global Digital Literacy Council and Interactive Society for Technology in Education. (A summary of both organizations is included in this report.)


Assessment of computer literacy needs from the perspective of potential workforce development is an important part of an educational program involving adult learners. About 22 percent of adults currently entering the labor market possess the technology skills that are required for 60% of new jobs. This paper describes the training provided to tutors and trainers of adult learning centers in Hampton Roads Virginia. Results showed that the trainees, prior to the training, had limited access to computer technology and needed training in incorporating computer technology in the curriculum. After the training, trainees have shown increased levels of comfort with various software, including Word Processing programs, such as MS Word, Power Point, Netscape, Hyperstudio and MS Frontpage. Training the trainers can be more effective in reaching a larger population for creating opportunities to access global information for the workforce. (The previous description is quoted verbatim from the abstract.)


According to Hobbs, there are seven ‘great debates’ which surround “media literacy” the outcomes of which are essential to its evolution in education. The way in which these questions are addressed, says Hobbs, will fundamentally affect the future of the media literacy movement. The seven debates are:

1. Does media literacy protect kids?
2. Does media literacy require student media production activities?
3. Should media literacy have a popular culture bias?
4. Should media literacy have a stronger ideological agenda?
5. Can media literacy ever reach large numbers of students in K - 12 American schools?
6. Should media literacy initiatives be supported financially by media organizations?
7. Is media literacy best understood as simply a means to an end?

Hobbs provides a brief summary of the yes-side and the no-side of each question and urges readers to decide which side of each debate they support. Then, she encourages people to speak up about their choices.


The author addresses the decline in vocabulary among ninth graders and cites Gitlin—who suggests this may be attributable to the diminishing role of reading and the fleeting attention span of dominant media. Isaacson observes “No one antidote will reverse such trends, but college speech instructors can promote improvement through assignments in presentational speaking courses.” He introduces the project, The “Art of Speech” as one solution that promotes a richer use of language. Students enrolled in public speaking courses choose a provocative artifact to develop a theme for a persuasive speech. Based on the training in message design, expressive speeches emerge. According to Isaacson, “The integration of art and speech provides an antidote to a communication environment increasingly composed of sound bites and transient images.”


Jelfs and Colbourn, members of the Assisting Small-group Teaching through Electronic Resources (ASTER) project team, focused their study on students’ perceptions of using communication and information technology for a virtual seminar series in Psychology. Specifically, the authors were interested in how student learning approaches within the group affected their adoption or rejection of electronic media.

According to Jelfs and Colbourn,

Our findings indicate only weak correlations between deep, strategic and surface approaches to learning and perception of C&IT at an overall level. However, individual measures of the deep, strategic and surface approaches to learning indicate potentially interesting relationships, and we offer suggestions on how these may assist in the design of computer-mediated learning.

This article provides an overview of the growing importance of digitization, the Internet, and the World Wide Web, and how each of these media change the way we think about information and visual literacy. To enhance understanding and awareness of literacy needs, the authors present the need, rationale, prospects, and challenges of the proposed Joel A. and Irene A. Benedict Visual Literacy Collection (BVLC) available in full-text for research and teaching. As cited by Ma and Semali, “The dream of the virtual library comes forward now not because it promises an exciting future, but because it promises a future that will be just like the past, only better and faster” (James, J. O’Donnell, Avatars of the Word).


The technological advances, specifically digital technology has prompted swift and radical change in the world we know. With such change, today’s students “think and process information fundamentally differently from their predecessors” (p. 1). The author has created a new term, Digital Natives, to describe the high-tech, digitally-proficient youth of today. In this article, the author recognizes that today’s students are native speakers of a digital language. For the rest of the world, those not born in the e-generation, and therefore not digitally-literate, Prensky has created the term, Digital Immigrants. Because technology is not the natural language of this cohort, they are less adept at utilizing it.

According to Prensky, “. . . the single biggest problem facing education today is that our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language” (p. 2)


In this article, Tyner considers the relationship between knowledge and power, calling into question the “notion that information is a finite commodity and that those who disseminate information are more powerful than those who receive it.” (p.1) She also points out that access to media does not provide either power or knowledge if those accessing cannot make sense of the information they have. As such, she makes the argument that it is essential for people to develop media literacy – the ability to access, analyze and evaluate information – especially given the underlying theme that literacy is the cornerstone of democracy. Tyner suggests that media literacy “is a logical and necessary brand of literacy that has the potential to enhance social justice by teaching
active citizenship skills. Media literacy education has the potential to realign an equitable relationship between knowledge and power and to revitalize the central, democratic goals of community access in the age of digital communication.” (p.2)


This article introduces the reader to key questions related to digital literacy, including assessing the skills needed to ensure competency. The study, an EU-funded project, looks at challenges within school practices and the new digital tools needed today.

The author frames the study and article on a common understanding of digital literacy. According to Ulicsak, digital literacy refers to proficiencies needed to utilize digital technology. A useful aspect of the author’s research is a list of activities which require at least a modicum of digital literacy. These include:

- **modeling** - the creation of digital analogues of systems for analysis and experimentation
- **knowledge management** - conducting research, combining knowledge to create new knowledge, navigating through information structures
- **multimodality and hypertext** - new ways of creating communicative documents combining different modes and media and new ways of reading them
- **electronic communication** - not just e-mail but a whole panoply of ways in which inter-human communication is developing and how entry into communities of learners may be dependent on electronic communication
- **game play** - the ways in which playing digital games exemplifies ways of thinking and working in a digital domain, and is potentially a summation of the above activities. (para. 3)


Based on a broad, thorough review of literature, Williams suggests that there are 11 theses that can inform the question of computer literacy and information technology fluency. For each of the theses, the author provides

- a discussion which includes literacy scholarship that discusses the theses
- an indication of whether the National Research Council (NRC) report of 1999 includes the relevant aspects learned about literacy, and
- ways in which to include this knowledge in our theoretical understanding of computer literacy.

The theses are:

1. Literacy is a technical skill.
2. Literacy is conceptual.
3. Literacy is historical.
4. Literacy is social.
5. Literacy is intertwined with power.
6. There is a literacy divide between school and home.
7. Bridging different literacies is desirable.
8. The crisis in literacy theory can be resolved.
9. Literacy problems suggest that democracy is threatened.
10. Literacy theory is cultural hegemony.
11. The digital format integrates literate forms of communications with non-literate forms.

2. BOOKS:


Banister’s book is a sensible, forward-looking explanation of how digital technology is leading us deeper and deeper into a new age of “networked media,” facilitating unprecedented communication, creativity and productivity in our workplaces, as well as our homes and our daily lives.

The Internet boom and bust, according to Banister, was the most obvious example of the radial shift that has changed the nature of media. Unabated in their proliferation, cable, CD/DVD, satellite, wireless and many other formats are systematically fuelling the paradigmatic change in how every uses media. Banister provides examples of how media has evolved – from the telegraph to wireless digital – into a key component of every company’s business. He also presents vanguard ideas for how our conception of “programming” in this age of networked media has to evolve for us to realize its full potential.

Word of Mouse is essential reading for professionals and consumers who want to learn more about what these evolutions portend, in the workplace and in the home. The book have been included in this bibliography not only for its content, but also for its author. Jim Baniser is a veteran media industry executive who has worked with Time Warner, the Walt Disney Company, Steven Spielberg’s Survivors of the Shoah project and the BBC. He is currently mixing television, games, and networked media with his company XLabes MediaWorks.

This Handbook is a useful tool for educators looking for information about and guidance on how to deal with the new media world. Specifically, it has been developed to assist educators with their own visual literacy skills levels, especially as they become more sophisticated and reflective users of media both in their classrooms and on their own. The book provides evaluation criteria for a variety of media products. And, the authors present insight into how new media can be used across a spectrum of academic disciplines - language arts, history, science, and art. There is a resource section with information on specific products and web sites, along with useful exercises at the end of each chapter.


This book is a comprehensive, scholarly and sobering essay-by-essay collection which chronicles the variety of methods by which media systems have transformed U.S. society since the colonial period. From the earliest days, North Americans have invested in the infrastructure to make connectivity possible and this book explores what the deployment of these technologies say about American society. The book includes contributions from experts in a variety of fields which complements the fully integrated and cross-referenced approach by the editors.

The book has been included in the bibliography because of its approach and historical timeline. For example, the book includes an historical perspective on the information age, a section on the early American origins of the information age, commentary on the process of recasting the information infrastructure for the industrial age, use of information and technology in business and much more.


In this book, the authors assert that it is not what students watch, but how they watch it that is so important to the understanding of why students need to develop critical cognitive and viewing skills in order to function literately in our media drenched society. By reviewing several topical events (i.e., the Clinton/Lewinsky scandal; media representation of tobacco and the tobacco industry) and their implications (i.e., social violence, reinforcement of stereotypes, political cynicism and adolescent sexuality), the authors highlight ways students can become wiser consumers of information by learning how to analyze, synthesize and use information carefully and intelligently in their decision-making processes.

In *Changing minds: Computers, language and literacy,* the author is interested in exploring whether education can be transformed and learning, specifically science education, enhanced by the computer. The author argues that computers are more than basic tools—they represent the foundation for a new literacy that will change how people perceive, analyze and learn. The computer produces “two-way literacies,” where each user invents as well as applies new skills. Based on more than twenty years researching the role of computers in education, diSessa suggests “computers can make us smarter, if not wiser, and can revolutionize education” (ix). Simply put, computers change the way we think, and as evidenced by the author’s work with science education, the way we learn. Although diSessa recognizes that the evolution of a new literacy enhances teaching and learning, there is little scientific verification documenting the extent to which learning has been altered or enhanced. It worthy to note that many of the ideas presented and focused on science education are applicable to other disciplines and to education in general.


A diverse collection of National Telemedia Council sponsored essays on the future of media literacy, this book provides 16 articles by “leading voices in media education around the world.” Developed by the editors as an environmental scan of media literacy internationally, the book is a compilation of cutting edge thinkers – leaders and visionaries – who are at the leading edge of media education globally. The collection is a summary of media literacy issues, research and classroom practices in countries including Canada, Japan, Australia, New Zealand, Argentina, Hong Kong, Spain and England as well as the United States. And, because of its international flavor, the book is valuable in providing a variety of perspectives on how countries are handling issues such as integrating new technologies, teacher training in the new millennium and the media’s impact on democracy.


This well-organized, useful and extensively referenced resource book has been characterized as the “definitive work on information literacy”. The book traces the notion of information literacy from its origins to present day, providing historical, current and future research perspectives, theoretical foundations and the economic and political significance of information literacy.

The author of several books on mass media and contemporary culture, Todd Gitlin writes that we live in “the age of disposable feelings”. He follows with, “Each hot, breaking, unsurpassed, amazing, overwhelming event fades, superseded by sequels; each ‘crime of the century’ dissolves into the next, only to be recycled in the form of TV collages, magazine and move if of the week ‘specials’ instant books, branded sound bites and video clips, chat groups and instant polls, each cross-referenced to previous spectacles, each assigned meanings by choruses of pundits and focus groups, each instantly labeled unique, unforgettable.”

In this book, Gitlin reframes the media-saturated, ever-increasing pace of our world, presenting a society of non-stop stimulus and relentless sensation. And, rather than flagging a ‘new information age’ or suggesting people actively engage, he suggests that the media tsunami fosters disposable emotions and casual commitments which threaten the very principles of democracy. The book highlights the torrent of manufactured images and sounds as a defining characteristic of western society, commenting on the barrage as reflective of the culmination of this society’s hopes and dreams.


Gilster, the author of six books about the Internet, including the bestselling "Internet Navigator, has written a Primer which presents information on skills that Web users need to help them discriminate between good and bad information and data on the Internet. This book is a valuable resource, particularly for adult newcomers to the information highway as it provides (novice) internet users with core competencies and basic critical thinking skills that they need in order to function in the highly interactive environment. The Primer was developed for use on-line and in educational institutions.


Kenny’s book is a resource for developing and refining students’ language, media comprehension, and creative skills. At the same time, the book introduces the basics of TV and media production through portfolio projects which culminate in an end-of-term video competition. The author has combined elements of TV production, media literacy, mass communications and theory in the book to provide plentiful activities and resources for teachers who are interested in developing media-savvy consumers and producers.

This book provides valuable insights into technology and computer technology, presenting readers with useful ways by which to cross the digital divide. Monroe is particularly interested in creating a ‘critical pedagogy for the electronic age’. Among the topics in this book are issues related to non-white, poor communities on ‘the other side’ of the digital divide. Instructional technology and multiculturalism are addressed and useful insights are provided for educators at all levels working in all types of schools. The book has case studies, practical classroom approaches to teaching and writing, analysis and critique related to adolescent minority groups, and a refreshing view of the public policy debate on access to technology in high-poverty schools.


Known as the First Citizen of the Internet, Rheingold chronicles his experiences with virtual communities, beginning with his home community and expanding outward. He reveals a compelling understanding of the online community as he tours cyberspace, exploring one area of the new society that has been created as a result of the advent of computers. While the book includes an historical review of the information superhighway and questions who its future users will be, it also provides a thorough look at the online community, including commentary on what people do and say online, making the point that online communities are as much a ‘mixed bag’ as any physical community. The book includes a bibliography.

Selber, Stuart A. (2004). Multiliteracies for a Digital Age

Multiliteracies for a Digital Age is not only a review of an immense body of research, but is also a critique and a synthesis of the information provided. Selber, who uses a post-critical approach in this work, “emphasizes the social scene for computer-based writing, offering a contextual view of technology that challenges the predominant instrumental views. This is breakthrough work, showing how technology theory should matter to literacy scholars and teachers.” Jim Porter, Michigan State University (http://www.siu.edu/~siupress/titles/s04_titles/selber_digital.htm)


Within the context of the impact on schools, this engaging book by a former learning technologist with the U.S. Education Department, studies the progression from a ‘book and library’ world to a digital world of electronic text, television, and the Internet. Withrow forecasts his vision of the digital society in 2010, redefines literacy in this
new society and considers what the digital world means for schools. He also questions whether educators can provide an educational model for learners to have anytime/anyplace access to learning. The author includes topics ranging from how students may learn in a digital world to national and international digital libraries whose focus is high quality curriculum, to a discussion about the development of federal law which might provide a digital resource for schools both nationally and internationally.

3. REPORTS

Thinking Critically about Media: Schools and Families in Partnership (2002). Cable in the Classroom (CIC)

Cable in the Classroom is an educational foundation with a deep commitment to good teaching and learning. Media literacy has been a topic of interest to the organization for quite some time and as such, CIC invited six well-known voices in the field of media and digital literacy to present their perspectives and recommendations on these topics. Below are brief summaries of two articles printed in the report.

Andersen, N. (2002). New Media and New Media Literacy: The horizon has become the landscape – new media are here. p. 30–35.

“Because many 21st century homes are equipped with more robust technology than most schools, there is often a significant disconnect between students' thinking and classroom demands. Students emerging from home electronic environments have experienced multimedia immersion, participating on many cognitive levels and in many media languages simultaneously. The dominant design of many classroom curricula, however, is to isolate a few senses and concentrate on them in depth, while ignoring others” (p. 30). Andersen discusses the characteristics of new technologies in an effort to help readers understand what skills and abilities ‘Information Age children’ need in order to function effectively as productive and happy citizens.


According to Considine, “If they are to fully harness the power and potential of exciting new technologies and multimedia, our students must be offered the critical criteria and information skills necessary for them to become intelligent, competent consumers and creators of media messages” (p. 23). In his article, the author discusses the importance of teaching students critical media literacy skills and presents a series of recommendations on how to go about doing so.

This report is a guide for people interested in helping graduates function successfully in today’s digital world. As indicated in the report, children are native to digital and media literacy having been exposed to the digital world en masse for nearly a decade while adults are much less ‘naturally’ literate. The report addresses the issue of how we, as adults – the least experienced in this new milieu – can help children use their ‘native intelligence’ effectively and responsibly. The 21st Century Workforce Commission’s (2000) National Alliance of Business summarized the economic implications of doing so in its statement: "The current and future health of America's 21st century economy depends directly on how broadly and deeply Americans reach a new level of literacy—'21st Century Literacy' " (p. 4).

4. PRESENTATIONS


As part of a children’s literature class, the authors seek to determine how to improve student teachers’ visual and verbal literacy skills. The important role that visual literacy plays in teaching and learning within a diverse environment is explored, as is the need for teachers to have a variety of skills related to art and visual tasks. “Many students want to know why the assignment is important. The importance of visualizing from different perspectives is not intuitive to them. This information is literally explained to the pre-service teachers, but those that continue to have difficult time creating the thumbnails from different perspectives question the need and purpose of the exercise” (Whitener-Lepanto & Harroff, 2002, p. 7).

5. INTERNET SOURCES

Media Literacy Online Project
http://interact.uoregon.edu/MediaLit/mlr/readings/contents/newmedia.html

The following represents a comprehensive list of articles published by the Media Literacy Review, part of the Media Literacy Online Project – College of Education, University of Oregon.

Access in a Digital Age. By Kathleen Tyner. Digital technologies, in particular, call into question the popular notion that information is a finite commodity and that those who disseminate information are more powerful than those who receive it.
The Appalshop School Initiative: A Report on an Experiment in Classroom Research. By Kathleen Tyner. There's too much concern with systems and too little concern with what kids could do with a computer. It does not have to be an elaborate, top-down system. You can give people equipment and they can do imaginative things.


I'm a Computer Game Addict! By Bill Walsh. Personal observations about becoming addicted to computer game.

Computer Scoring of Essays a Bad Idea. By Bill Walsh. I actually felt a chill run down my spine when I saw the headline on the front page of the education newspaper I was reading: "Pennsylvania tests essay-grading software." The sub-head was even scarier: "Officials mull using artificial-intelligence system to score state exams."

Cost-effective Networking of Schools and homes. By W. Curtiss Priest, Ph.D. Interim review for a study being conducted by EPIE Institute and CITS. Funded by: The John D. and Catherine T. MacArthur Foundation.

The Effects of Electronic Media On A Developing Brain By Robert Sylwester. One of the first studies on the effects of media on brain maturation.

Equity and the Public Hand : Presentation to the Harvard Computer Society. By W. Curtiss Priest, Ph.D. In the information age, knowledge is wealth. Unlike material wealth, information and knowledge-based wealth can be shared and no one ends up with less

Examining the Emperor's New Clothes:The Use of Existing Video in Multimedia Packages. By Linda Polin. Years of educational research have focused on understanding the relationship between text and reader, and using that understanding to perfect instructional materials and written tests. Now we see educational materials moving into a new format-- not just video, but interactive video.

Global Struggle for Communication. By Robert W. McChesney. Since the first systems of mass media and telecommunications emerged, their control and structure have been political issues. It has been well understood that the control over the means of communication is an integral aspect of political and economic power. Perhaps the most striking feature of our current age is the increase in prominence -- for economics, politics, and culture -- of technologically advanced systems of communication and information, that are often global in scope.

How the Web Destroys the Quality of Students' Research Papers. By David Rothenberg. This article explores the influence access to the World Wide Web has on student research for University academic papers.

Informing Ourselves to Death. By Neil Postman. A speech given at a meeting of the German Informatics Society (Gesellschaft fuer Informatik) on October 11, 1990 in Stuttgart, sponsored by IBM-Germany.
**Literacy For The Information Age.** By Renee Hobbs. Our students are growing up in a world saturated with media messages, messages that fill the bulk of their leisure time and provide them with information about who to vote for and what buying decisions to make. Yet students receive little to no training in the skills of analyzing or evaluating these messages, many of which make use of language, moving images, music, sound effects, special visual effects and other techniques which powerfully affect our emotional responses.

**Measuring Global Trends with Mom.** By Bill Walsh. I have a confession to make. Sometimes, as I try to figure out global trends in technology and media, I look very close to home. As a matter of fact, I sometimes I look at my mother.

**Media Academy Takes the Lead.** John C. Fremont High School is a large, urban school in Oakland, California which boasts the only media academy in California public schools. Strategies talked with journalism educator, Steve O'Donoghue and broadcasting teacher, Sandy Collins about their program. Source: Strategies for Media Literacy.

**Misusing Computer Technology** By Bill Walsh. "Just because I own and see the usefulness of a computer doesn't mean that I think computers can do everything. The misuse of media technology is perhaps as big and as real a danger as is its under-utilization."

**Reconceiving Multimedia for School Teachers.** By Chris Berry. Multimedia does not have to be high-tech and expensive, nor does it require special skills. More positively, multimedia does have direct, simple and practical applications for media studies classes that can help to solve longstanding problems in our field.

**A Slice of Life In My Virtual Community.** By Howard Rheingold. An exploration of the evolution of virtual communities that are emerging from an intersection of humanity and technology.

**Taking Back the Citadel: Managing Nintendo Use at Home.** By Kathleen Tyner. Some tips for parents who fear that their children will be sucked off into the Nintendo universe never to return in human form.

**Telecom Act of 1996.** By Wally Bowen. I've been tracking the coverage of the telecom bill for more than two years, and the salient feature that has emerged in that time is that this legislative process has been covered strictly as a business story, especially by agenda-setting media such as the New York Times.

**Two New Sites on the World Wide Web.** By Bill Walsh. "As it gets easier and easier to develop Web sites (it's now so easy, even an English teacher can do it!), we're going to see more and more organizations and individuals turn to the Internet to get their message across."

**VR In The Schools. Volume 1, No. 1** Dr. Veronica S. Pantelidis and Dr. Larry Auld, Co-directors, editors. A quarterly publication of the Virtual Reality and Education Laboratory (VREL), is distributed in both print and electronic versions.
**VR In The Schools. Volume 1, No. 2** Dr. Veronica S. Pantelidis and Dr. Larry Auld, Co-directors, editors. A quarterly publication of the Virtual Reality and Education Laboratory (VREL), is distributed in both print and electronic versions.

**Why Censoring Cyberspace Is Futile**, By Howard Rheingold. It is only a matter of time before law enforcement authorities use cases like this to crack down on the free-wheeling, everything-is-permitted culture of cyberspace.
CONCLUSION

Competency begins with understanding. Each media represents a unique environment, presenting the view of our world from varying perspectives. McLuham’s idiom “the medium is the message,” seems prophetic in the high-tech reality in which we live. The idea that the world we shape, in turn, shapes us is a constant and veritable fact. Newspapers, television, and computers, all human inventions, help formulate our beliefs, perspectives, and even competencies. And from each media we create new realities. Cultural theorist, Baudrillard used the term “hyperreality” to describe the simulation of something which never really existed. An example is a magazine photo of a model, the picture having been touched-up, or enhanced by a computer—the creation of a new reality. Hollywood’s ultimate depiction of hyperreality was The Matrix, a movie about a world that does not really exist, or exists only in our minds.

Ironically, while some see the profusion of realities as threatening to us, our children and even democracy, the new media is nothing if not simply another way of viewing our world, of interacting with one another, of opening ourselves to learning in realms of possibility we never conceived of before. As such, in the scheme of our development as higher order thinkers, multiple realities are far less important to our survival than our ability to understand what we see, to interpret what we experience, to analyze what we are exposed to, and to evaluate what we conclude against criteria that supports critical thinking. In the end, it would seem far better to have the skills and competencies to comprehend and discriminate within a common language than to be left out, unable to understand.
REFERENCES


Andersen, N. (2002). New Media and New Media Literacy: The horizon has become the landscape – new media are here. Report produced by Cable in the Classroom. p. 30-35.


