

Information Literacy and Information Technology Literacy: New Components in the Curriculum for a Digital Culture

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February 21, 1998

Introduction

This brief position paper is in response to a call for input to a study of information technology literacy being conducted by the Computer Science and Telecommunications Board of the National Research Council. While the call for input asked particular questions of particular sectors, such as librarians, computer scientists, employers or educators, my training and career have spanned many of these roles, and my comments address the issue generally, rather than from the particular perspective of one single sector. The views expressed here are purely my own.

Information Literacy and Information Technology Literacy

To me, information technology literacy deals with an understanding of the technology infrastructure that underpins much of today's life; an understanding of the tools technology provides and their interaction with this infrastructure; and an understanding of the legal, social, economic and public policy issues that shape the development of the infrastructure and the applications and use of the technologies.

Information literacy, on the other hand, deals with content and communication: it encompasses authoring, information finding and organization, the research process, and information analysis, assessment and evaluation. The content in question here can take many forms: text, images, video, computer simulations, multi-media interactive works. Content can also serve many purposes: news, art,

entertainment, education, research and scholarship, advertising, politics, commerce, and documents and records that structure activities of everyday business and personal life. Information literacy as I view it subsumes but goes far beyond traditional the textual literacy that has been considered part of a basic education (the ability to read, write, and critically analyze various forms of primarily textual literary works or personal and business documents).

Both forms of literacy are essential for individuals to function and succeed in today's society; they are distinct but inter-related. In an increasingly technological society, the means of authoring, information finding and organization and research, and even information use are increasingly mediated by information technology. And information technology shapes the channels of publication, access and dissemination of information; the influence, and the intrinsic nature of digital documents, raise new issues in the activities and practices of analysis, assessment, evaluation and criticism. And much of today's information technology and supporting infrastructure is intended to enable communication, information finding, information access and information delivery. Teaching of the two sets of literacy skills thus need to be closely coordinated.

Information Technology Literacy

There are two general perspectives on information technology literacy. The first emphasizes skills in the use of tools: word processing, spreadsheets, basic operation of computers (for example, managing computer files and launching programs); and now use of basic internet tools such as web browsers and electronic mail systems. Sometimes, this is also expanded to include a superficial knowledge of a programming language. The second perspective (which will be discussed in more detail shortly) focuses on understanding how technologies, systems, and infrastructure work -- first at a more superficial descriptive level, and later, for those who are interested, at an much more detailed analytic or engineering level.

While immediately applicable skill-oriented training is very useful for the short-term goal of gaining employment, it is extremely limited and I would argue that students graduating from the educational system with only these skills are poorly prepared for life in an information and information technology intensive culture -- indeed they have in a real sense been cheated. While it certainly true that facility with current information technology tools is very useful and necessary, and also

helps people to gain understanding and insight into the underlying principles, skills with tools date very quickly given today's technology lifecycles. Forty years ago, teaching students how to type (that is, to operate a typewriter) would have served many people well for decades; today, while touch-typing is certainly still a very useful manual skill, knowledge of an early 1980s word processing system offers only a modest start at understanding current authoring technologies and how to use them (including issues such as layout, presentation, capture, editing and integration of graphical or video material, typography, etc.) In the area of skills, I believe that the objectives need to be include fluency with current tools, experience in the process of learning new tools, a grasp of the design principles and practices guiding the use of tools (including some introduction to aesthetic issues), and perhaps most importantly a level of confidence in learning and operating software. This includes some experience with trouble-shooting, problem solving and debugging at least of software tools; exposure to programming proper is also valuable in understanding the limitations and realities of computers.

The use of software tools to communicate information is a particularly important area for both technology and information literacy. A simple example is the graphic display of quantitative information; here students might both learn tools and study the work of scholars such as Tufte. A newer area, which has been illuminated by the recent work of Sherry Turkle, deals with the construction, analysis and use of simulations; it's important that students not only use simulations as learning tools, but understand how to construct them and to analyze their underlying assumptions.

In my view, the other key component of information technology literacy is an understanding of the principles of how the technological world works -- and I believe it is a mistake to scope this too narrowly to information technology (i.e. computers); it needs to encompass a rather broad view of the technology infrastructures that support our society, including computing, telecommunications, broadcasting, publishing, electrical power distribution, transportation and financial infrastructure and related areas. And this understanding needs to encompass not only the technological principles, but also some appreciation of history, economics, social and public policy issues. Most of this material seems to be poorly covered in present curricula at all levels: elementary school, high school, and college. It is touched on peripherally in history, science, and social studies, but not covered systematically. Certainly there are elective courses at various levels that teach one how to be either a "technician" or an

"engineer/designer" in various of these areas; but very few opportunities -- much less an expectation -- within the standard curriculum for an "educated layperson" to learn the principles of how these infrastructure components work, how they have evolved, and what the key issues are. While this body of knowledge will certainly date, it will have a much longer valid lifespan than more skill-oriented information literacy; it is also more complex and takes much longer to convey and absorb than a specific information technology skill.

The key question that must be addressed is the extent to which this base of understanding is "useful" knowledge for most people: if one is not going to be a technician, engineer, designer of some component of the technology infrastructure; if one is not going to be involved in business or public service related to a technology infrastructure component, why is it valuable to understand how these systems work? What difference does this knowledge make? Why aren't at least an initial portfolio of information technology "skills" -- granting the need for continued updating of these skills throughout one's adult life -- a sufficient goal for the educational process?

I would argue that this type of understanding will be increasingly critical for people to succeed in all walks of life, to function as informed citizens, and to continue to learn and grow in an evolving technological society. Technology is now pervasively reshaping commerce, communications, and society; in business, science and government, for example, recognizing the effects and opportunities -- and sometimes threats -- created by these transformations is becoming increasingly central. Information technology literacy limited to a set of largely rote skills will limit not only career opportunities but also one's ability to function intelligently in society.

Information Literacy

The focus of this study is information technology literacy rather than information literacy; thus, my brief concluding comments here are confined to a few specific areas of information literacy that are strongly influenced by information technology and the networked information environment.

The body of knowledge related to text -- authoring and critical and analytic reading (including the assessment of purpose, bias, accuracy and quality) -- needs to be extended to the full range of visual (image and video) and multimedia communication genres. This includes an

appreciation of interactive media, and also a recognition of the fluid nature of many digital forms, plus an understanding of the computer's growing ability to edit or even fabricate what have traditionally been viewed as factual records of events (such as images).

As computer-based searching has become increasingly central to information finding and research, an understanding of how searching systems work, and of the interplay between indexing techniques, descriptive practices and organizational systems (cataloging, abstracting, indexing, rating), searching, and information accessibility, visibility and impact is becoming essential. One important point here is the limitations of both digital information resources (much material will not be available in digital form for the foreseeable future) and also of various searching techniques.

People also need an understanding of how information resources and how they are mapped into technological and economic structures, and how these resources interrelate. In essence, they need to form a conceptual map of information space. For example, they need to be guided in developing mental models of the relationships among documents on the Internet, proprietary databases, library collections and the like. As part of this map, they need to develop a sense of what information sources are likely to be most appropriate for their various information needs.

Finally, there are a range of issues related to information policies and practices that are an essential part of information literacy. These include: legal, social, economic, and ethical issues surrounding the ownership and use of intellectual property; privacy questions in the collection and use of information; information authenticity, provenance and integrity; records management, documentation and archiving issues in personal, business, government, and broader cultural contexts; and the management and construction of the social, cultural and intellectual record of discourse.