Digital Literacy
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Introduction

Common wisdom, which has held strong since computers first entered the home, the workplace and the classroom, states that the ability to use computing technology (sometimes more broadly defined as “Information and Communication Technology” or “ICT”) is not just an important skill but a primary “literacy,” on par with reading, writing and mathematics in terms of its importance to life, productivity and learning.

Despite this, agreement on which specific skills need to be mastered to obtain this type of technical ability has remained elusive, as has a common term to describe the set of capabilities that make up a skill set understood to constitute a life-critical “literacy.”

Part of the problem of defining technology literacy is the speed at which the technology itself is evolving. Certainly the move from bulky, underpowered and largely standalone computers sitting atop (or below) the desktop to powerful interconnected devices that weigh just ounces implies a technology changing so rapidly as to defy a static definition. And terms such as “Information and Computing Technology” elevates the importance of how these devices are used (as information processing and communication tools), implying that this literacy is not just about an understanding of hardware and software but also includes important intellectual abilities involving locating information, evaluating its quality and using it appropriately.

A decentralized education environment, especially in the US (where standards are developed at the state level and implemented by thousands of school districts), has created a myriad of technology education standards for both students and teachers (only a percentage of which are ever implemented in the context of classroom curricula or assessments). And a marketplace in which technology, textbook and educational-product vendors vie to distinguish their offerings by building them around their own unique definitions of technology literacy further fragments an understanding of how such a term as technical literacy can be defined, taught, assessed and made part of every student’s educational experience.

The term “Digital Literacy” has emerged from the more than twenty years of discussion in this area as a defining framework under which both a definition and associated standards (both teachable and measurable) can be built. More importantly, during the last decade a global consensus has emerged that helps break down this definition into three categories that have remained stable over time (Foundational Knowledge, Contemporary Skills and Critical Thinking Ability – all defined later in this document), giving educators and employers something they can use to inform the teaching and evaluation of students and employees to ensure they are in possession of this critical life skill.

Before showing how this three-part framework for Digital Literacy has come to be defined, however, it is important to understand how this concept has evolved.
Evolution of the Digital Literacy Construct

Computer Literacy

The first iteration of this construct; “Computer Literacy,” entered the vocabulary in the early 1980s as computers were leaving the sealed, air-conditioned “white rooms” of corporate and government IT organizations and entering homes, schools and workplaces in the form of desktop microcomputers.

The choice of the term “literacy,” even in this early period of computing technology intersecting with people’s personal lives, recognized that the ability to understand and use this new tool was not just one life skill among many to be mastered, but was rather a multi-faceted set of abilities as critical to everyday life as the ability to read and write.

In the years since “computer literacy” entered popular consciousness, other disciplines have attempted to elevate the necessity of their own subjects by creating additional “literacies,” such as “scientific literacy” and “historical literacy.” Similarly, educators and government agencies use the terms “financial literacy” and “health literacy” to highlight the importance of these life skills.

While one cannot argue with the importance of all of these areas of knowledge and study, it should be noted that “computer literacy” entered the popular vocabulary spontaneously, indicating an understanding from a very early stage that the computer represented not just a tool, but a revolution, and that mastery of this device would soon be a cornerstone of what it meant to be a functional student, worker and citizen.
Information Literacy

Once the computers on people’s desktops became connected with one another, first through inter-company or inter-school networks, and eventually into a wider world via the desktop modem, it became clear that the real power of the new technology was as a tool for communication and collaboration.

While productivity tools such as word processors and spreadsheets did not lose their importance during this era (indeed, they became more powerful and ubiquitous than ever), the documents word processors were used to create and edit, and the numbers spreadsheets were used to “crunch” increasingly came from multiple sources and were shared and communicated via networks and electronic mail.

Before the advent of the Internet, digital information sources were the preserve of large institutions (such as investment firms who paid high fees for access to historic and real-time financial information) and, critically, academic and public libraries. It was no accident, then, that the library field developed the next evolution of the technology literacy construct in the form of “Information Literacy.”

This term first appeared in 1974, decades before the computer revolution, in a paper written by Paul G. Zurkowski for the National Commission on Libraries and Information Science, but took on new importance as the library field reinvented itself as the focal point for information access from traditional print (book, journal and reference text) and online sources and librarians reinvented themselves as information specialists.

During the 1980s and 90s, previously expensive or inaccessible information sources became increasingly available for free at public and school libraries, often in the form of dedicated desktop computers accessing research databases on CD ROM. Today, these same databases (and many more) are available online, but the research field of Information Literacy created during the CD era has endured as the cornerstone of understanding how information available from a wide variety of sources is accessed, organized, understood and used.

Information Literacy (and the term “Digital Literacy”) entered public discourse in 1997 when Paul Gilster (notably a former literature and history professor and commercial aviator, not a technologist) published the book Digital Literacy which popularized Information Literacy concepts just as the Internet was becoming the focal point for information gathering for millions of similar non-technologists around the world.

Gilster recognized that the tools which define Information Literacy (notably, the ability to examine online information sources with a critical eye and mind) was more important than ever in an era when information creation was no longer the preserve of professional database publishers and librarians were no longer the advisors (and gatekeepers) for seekers of knowledge.
Issues such as relevance, timeliness and bias, important for any type of research, became paramount once the Internet opened the creation of new information sources to the world (without the formal quality-control mechanisms associated with professional research or journalism). While a major step forward in the information and technology revolution, the exponential increase in online information meant that the most important link in the chain of research and understanding was no longer the computer and browser, but the mind of the user with its ability to evaluate the quality of information through application of critical thinking skills.

Gilster provided a set of tools for evaluating the quality of online information sources, skills more relevant today than they were in 1997 when his book was first published. But Gilster’s work, like the work of librarians working in the Information Literacy field, had a major flaw, presupposing as it did a base level of computer competence that was not necessarily reflected in the common user.

After all, one cannot access online information sources if you cannot use a desktop or laptop computer, connect to the Internet and open a Web browser. And analyzing numerical information found online requires not just computer and spreadsheet skills, but also an understanding of underlying mathematical concepts.

While both Gilster and the library field defined a crucial component of technology literacy, this component needed to be integrated with more traditional computer literacy subjects to create the comprehensive framework for technology education that would eventually re-define the term “Digital Literacy.”

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2 Gilster, Paul, Digital Literacy, John Wiley and Sons, 1999
In 1999, the Computer Science and Telecommunications Board of the National Research Council (NRC) published their groundbreaking work *Being Fluent in Information Technology*. This slim volume proposed a holistic model (called *FITness*) to the subject of technology literacy built around three broad “strands”:

- **Foundational Knowledge** - An understanding of the underlying concepts of technology (i.e., the fundamental underlying principles of computers, networks and the Internet)
- **Contemporary Skills** – The ability to use current hardware and software to perform useful functions
- **Critical Thinking Ability** - A set of higher-order thinking and reasoning skills required for understanding and solving problems as they arise in modern technological systems

Like “computer literacy,” *FITness* acknowledges the importance of being able to use today’s technology, yet it also stresses that certain underlying knowledge (such as the nature of the microprocessor and memory) while not necessarily eternal, are foundational for an understanding of what one is doing with today’s hardware and software. *FITness* also stressed the importance of critical thinking skills, as highlighted in the field of Information Literacy, but also saw those skills as a component of an integrated whole, part of a “three-legged stool” that stressed the need for all three components (Foundational Concepts, Contemporary Skill and Critical Thinking Ability) in order to become a truly technology literate individual.

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Computer Literacy

Like many terms, the phrase “Digital Literacy” soon broke free of its origins and is today used to describe the emerging consensus definition first popularized by the NRC’s *Fitness* study, which can be summarized in the diagram to the right.

This consensus model for Digital Literacy made up of multiple integrated knowledge, skills and abilities was reinforced by the 2003 *Framework for ICT Literacy* developed by the International ICT Literacy Panel and the *OECD PISA ICT Literacy Feasibility Study of 2003* (an attempt to benchmark the world’s computer literacy skills by assessing students on a country-by-country basis). This framework can also be seen within the important National Educational Technology Standards (NETS) for students, teachers and school administrators created by the International Society for Technology and Education (ISTE) in conjunction with the US Department of Education (K-12 guidelines that have informed higher education standards, notably in the area of teacher training).

If you look at these US state standards, or national technology standards in countries such as the UK, Japan, Australia, and South Africa, they all reflect a common understanding that Digital Literacy requires mastery of these three inter-related areas: Foundational Knowledge, Contemporary Skills and Critical Thinking Ability. Absent Foundational Knowledge, even the most skilled computer operator may be ready to use today’s technology, but may lack the basic understanding to use what comes tomorrow. And absent Critical Thinking Ability, the most adept Web surfer lacks the tools needed to determine which information they find is valuable and which is worthless.

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4 http://www.ets.org/Media/Tests/Information_and_Communication_Technology_Literacy/ictreport.pdf
6 http://www.iste.org/AM/Template.cfm?Section=NETS
7 http://www.iste.org
8 http://www.e-skills.com/
With a definition in place of Digital Literacy that has emerged from decades of research and conversation (a definition embraced by Cengage Learning, its authors and product teams), educators can now evaluate their teaching and assessment programs to determine how well they are preparing their students to face the challenges in an ever-increasingly technology-rich world.

Many educators will likely recognize where their current curricula fit into the three-part Digital Literacy model. Most obviously, computer concepts courses (which stress subjects such as hardware, software, networks and online communication), focus heavily on what the Digital Literacy definition categorizes as Foundational Knowledge, while courses on using desktop application suites such as Microsoft Office are the preserve of Contemporary Skills. Educators can also begin to see where their courses might fall short of this comprehensive framework, especially as Contemporary Skills begins to expand into software categories beyond desktop productivity applications and Critical Thinking Ability struggles to find a home in an already crowded Intro to Computing curriculum.

How the current curricula is evolving (or may be evolving) in ways that bring it into line with this Digital Literacy model and the role of the most neglected third of the Digital Literacy “pie” (Critical Thinking Ability) will be discussed in Parts II and III of this series of white papers.

About the Author

Jon Haber is co-author of National Educational Technology Standards for Students (NETS*S): Resources for Assessment, published by the International Society for Technology in Education (ISTE). He has worked in the fields of technology-based assessment and education for over twenty years and was the developer of the Internet and Computing Core Certification (IC3) standard, a global standard and certification on broad-based Digital Literacy skills. He is currently Executive Editor for Digital Strategy at Course Technology, a Cengage Learning company.