

eHealth Literacy_Essential Skills for Consumer Health in a Networked World

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ABSTRACT

Electronic health tools provide little value if the intended users lack the skills to effectively engage them. With nearly half the adult population in the United States and Canada having literacy levels below what is needed to fully engage in an information-rich society, the implications for using information technology to promote health and aid in health care, or for eHealth, are considerable. Engaging with eHealth requires a skill set, or *literacy*, of its own. The concept of eHealth literacy is introduced and defined as the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem. In this paper, a model of eHealth literacy is introduced, comprised of multiple literacy types, including an outline of a set of fundamental skills consumers require to derive direct benefits from eHealth. A profile of each literacy type with examples of the problems patient-clients might present is provided along with a resource list to aid health practitioners in supporting literacy improvement with their patient-clients across each domain. Facets of the model are illustrated through a set of clinical cases to demonstrate how health practitioners can address eHealth literacy issues in clinical or public health practice. Potential future applications of the model are discussed.

KEYWORDS

Internet; literacy; public health; health care; electronic health information; evaluation of electronic resources; electronics; telecommunications; consumer health information; patient education; educational status; computer network

Introduction

Access Barriers to eHealth

What if we created tools to promote health and deliver health care that were inaccessible to over half of the population they were intended for? Consumer-directed eHealth resources, from online interventions to informational websites, require the ability to read text, use information technology, and appraise the content of these tools to make health decisions. Yet, even in countries with high rates of absolute access to the Internet, such as the United States and Canada, over 40% of adults have basic (or prose) literacy levels below that which is needed to optimally participate in civil society [1,2]. A multi-country study of information technology use and literacy found that as literacy skill levels rise, the perceived usefulness of computers, diversity and intensity of Internet use, and use of computers for task-oriented purposes rise with it, even when factors such as age, income, and education levels are taken into account [3]. If eHealth is to realize its potential for improving the health of the public, the gap between what is provided and what people can access must be acknowledged and remedied.

Greater emphasis on the active and informed consumer in health and health care [4] in recent years has led to the realization that ensuring the public has both access to and adequate comprehension of health information is both a problem [5] and an achievable goal for health services [2,3]. A recent report from the US Institute of Medicine (IOM) entitled *Health Literacy: A Prescription to End Confusion* looked at the relationship between health and literacy and found that those with limited literacy skills have less knowledge of disease management and health promoting behaviors, report poorer health status, and are less likely to use preventive services than those with average or above average literacy skills [6].

Health Literacy

The IOM report focuses largely on health literacy, using the following definition (originally proposed by Ratzan and Parker [7]): “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” [7].

This definition underscores the importance of contextual factors that mediate health information and the need to consider health literacy in relation to the medium by which health resources are

presented. Within a modern health information environment, this context includes the following: interactive behavior change tools, informational websites, and telephone-assisted services, which are all being deployed globally to promote health and deliver health care (eg, [8-[11]). However, even among North American adolescents, the highest Internet-use population in the world, many teens report that they lack the skills to adequately engage online health resources effectively [12]. There is a gap between the electronic health resources available and consumers' skills for using them. By identifying and understanding this skill set we can better address the context of eHealth service delivery [13].

As we witness the impact that basic literacy has on health outcomes, questions arise about how literacy affects eHealth-related outcomes and experiences [14]. But unlike literacy in the context of paper-based resources, the concept of literacy and health in electronic environments is much less defined. Consumer eHealth requires basic reading and writing skills, working knowledge of computers, a basic understanding of science, and an appreciation of the social context that mediates how online health information is produced, transmitted, and received—or what can be called *eHealth literacy*. A definition and model of eHealth literacy is proposed below that describes the skills required to support full engagement with eHealth resources aimed at supporting population health and patient care.

eHealth Literacy Model

The Lily Model

Eng (2001) defines eHealth as “the use of emerging information and communication technology, especially the Internet, to improve or enable health and health care [15]; this is one of many published definitions currently in use [16]. Taken in the context of the IOM’s definition of health literacy stated above, the concept of eHealth literacy is proposed. Specifically, eHealth literacy is defined as the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem. Unlike other distinct forms of literacy, eHealth literacy combines facets of different literacy skills and applies them to eHealth promotion and care. At its heart are six core skills (or literacies): traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy. The relationship of these individual skills to each other is depicted in [Figure 1](#). Using the metaphor of a lily, the petals (literacies) feed the pistil (eHealth literacy), and yet the pistil overlaps the petals, tying them together.

Within the lily model, the six literacies are organized into two central types: *analytic* (traditional, media, information) and *context-specific* (computer, scientific, health). The analytic component involves skills that are applicable to a broad range of information sources irrespective of the topic or context ([Figure 2](#)), while the context-specific component ([Figure 3](#)) relies on more situation-specific skills. For example, analytic skills can be applied as much to shopping or researching a term paper as they can to health. Context-specific skills are just as important; however, their application is more likely to be contextualized within a specific problem domain or circumstance. Thus, computer literacy is dependent upon what type of computer is used, its operating system, as well as its intended application. Scientific literacy is applied to problems

where research-related information is presented, just as health literacy is contextualized to health issues as opposed to shopping for a new television set. Yet, both analytic and context-specific skills are required to fully engage with electronic health resources.

eHealth literacy is influenced by a person's presenting health issue, educational background, health status at the time of the eHealth encounter, motivation for seeking the information, and the technologies used. Like other literacies, eHealth literacy is not static; rather, it is a process-oriented skill that evolves over time as new technologies are introduced and the personal, social, and environmental contexts change. Like other literacy types, eHealth literacy is a discursive practice that endeavors to uncover the ways in which meaning is produced and inherently organizes ways of thinking and acting [17,18]. It aims to empower individuals and enable them to fully participate in health decisions informed by eHealth resources.

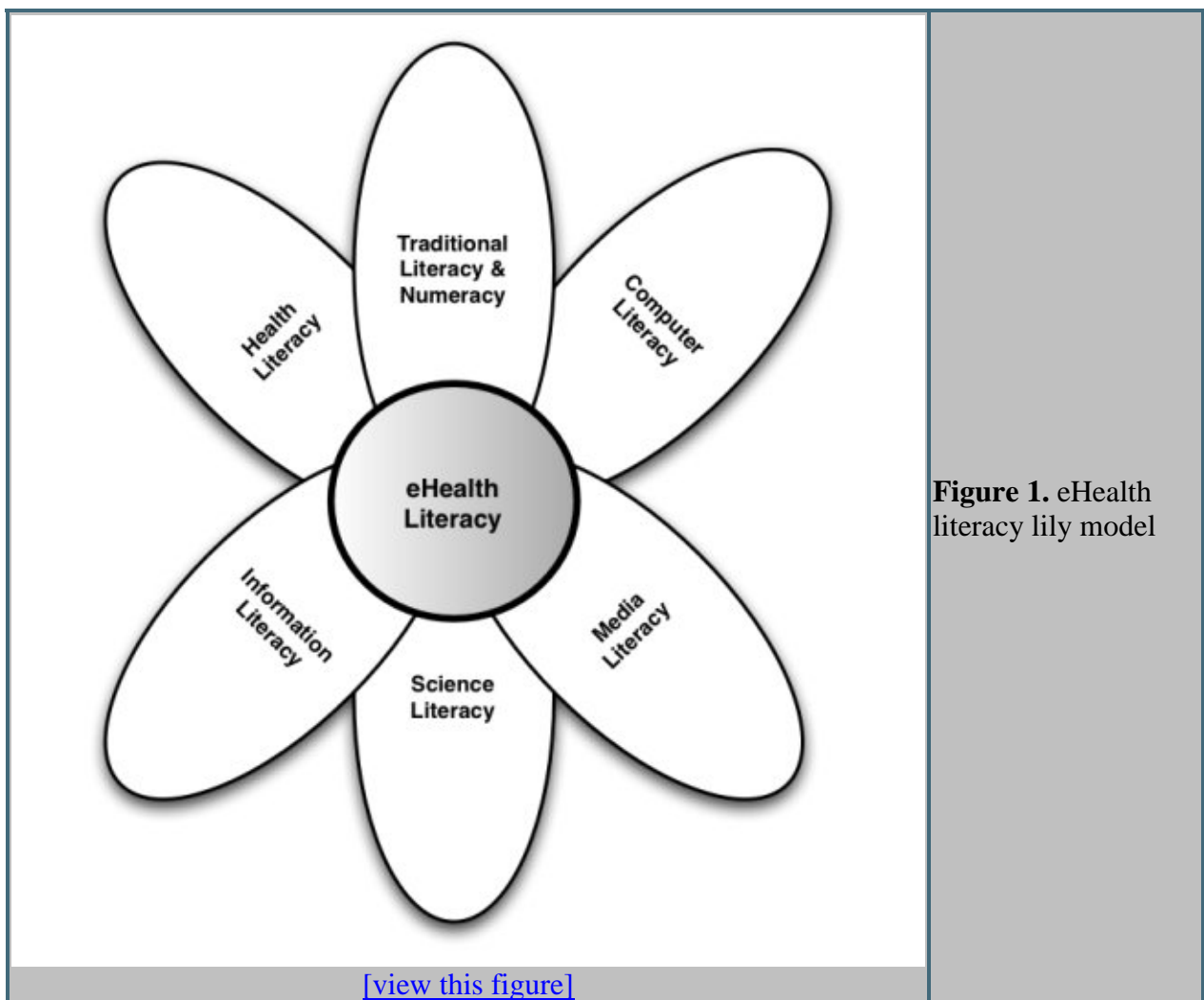
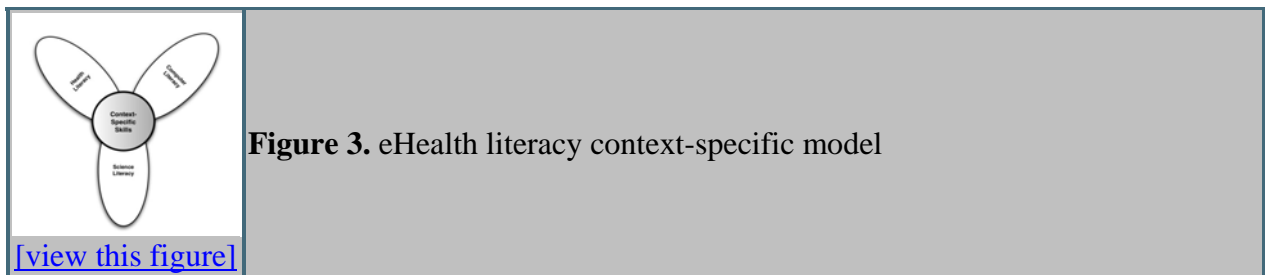
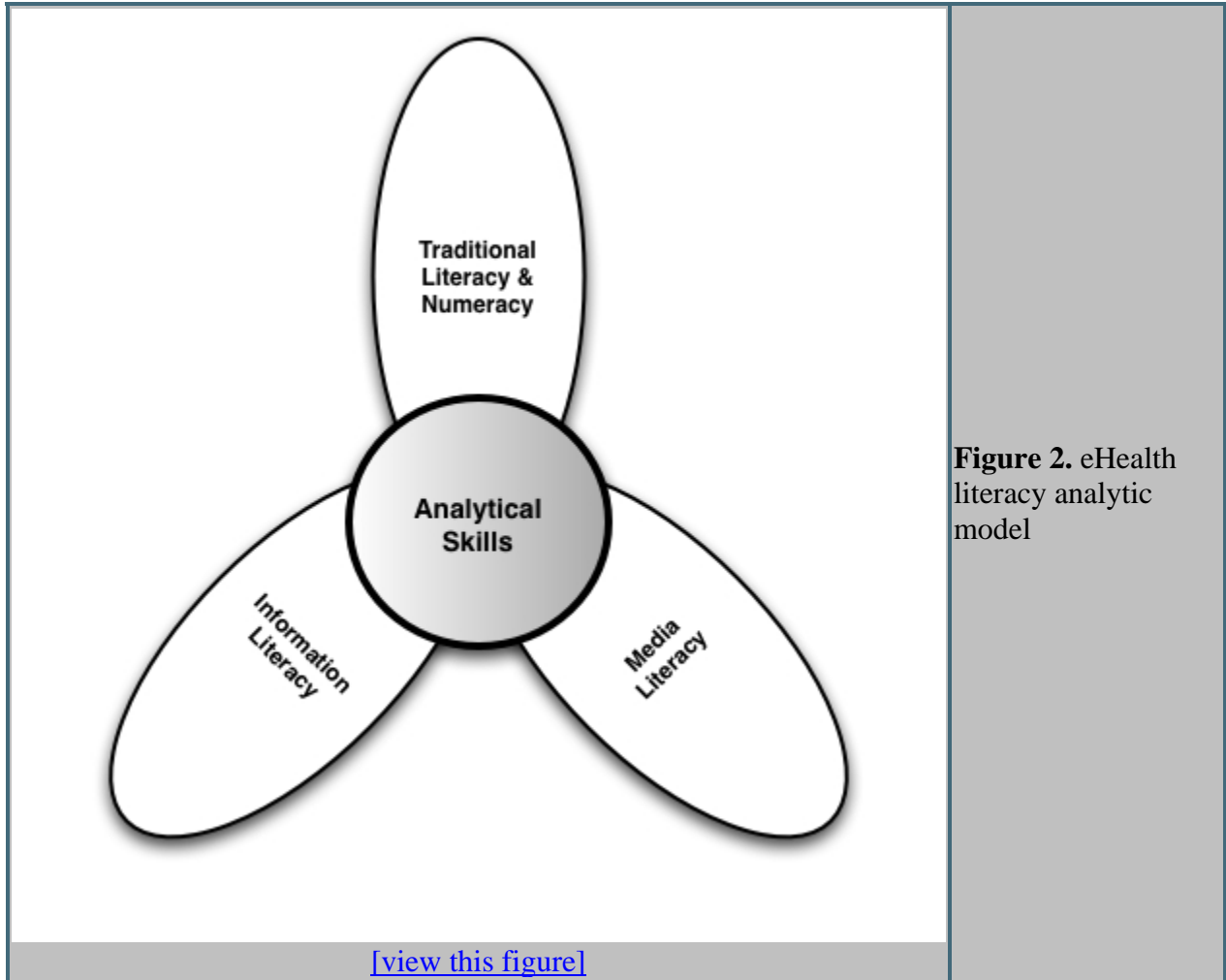


Figure 1. eHealth literacy lily model



The six components of the eHealth literacy model are briefly outlined below.

Traditional Literacy

This concept is most familiar to the public and encompasses basic (or prose) literacy skills such as the ability to read text, understand written passages, and speak and write a language coherently[19]. Technologies such as the World Wide Web are still text dominant, despite the potential use of sound and visual images on websites. Basic reading and writing skills are

essential in order to make meaning from text-laden resources. A related issue is language itself. Over 65% of the World Wide Web's content is in English[20], meaning that English-speakers are more likely to find an eHealth resource that is understandable and meets their needs.

Information Literacy

The American Library Association suggests that an information literate person knows “how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them” [21]. Like other literacies, this definition must be considered within the context of the social processes involved in information production, not just its application [19]. An information literate person knows what potential resources to consult to find information on a specific topic, can develop appropriate search strategies, and can filter results to extract relevant knowledge. If one views the Web as a library, with search tools (eg, Google) and a catalogue of over eight billion resources, the need for Web users to know how to develop and execute search strategies as well as comprehend how this knowledge is organized becomes imperative.

Media Literacy

The wide proliferation of available media sources has spawned an entire field of research in the area of media literacy and media studies. Media literacy is a means of critically thinking about media content and is defined as a process to “develop metacognitive reflective strategies by means of study” [22] about media content and context. Media literacy is a skill that enables people to place information in a social and political context and to consider issues such as the marketplace, audience relations, and how media forms in themselves shape the message that gets conveyed. This skill is generally viewed as a combination of cognitive processes and critical thinking skills applied to media and the messages that media deliver [23].

Health Literacy

As discussed earlier, health literacy pertains to the skills required to interact with the health system and engage in appropriate self-care. The American Medical Association considers a health literate person as having “a constellation of skills, including the ability to perform basic reading and numerical tasks required to function in the health care environment. Patients with adequate health literacy can read, understand, and act on health care information” [24]. Consumers need to understand relevant health terms and place health information into the appropriate context in order to make appropriate health decisions. Without such skills, a person may have difficulty following directions or engaging appropriate self-care activities as needed.

Computer Literacy

Computer literacy is the ability to use computers to solve problems[25]. Given the relative ubiquity of computers in our society, it is often assumed that people know how to use them. Yet, computer literacy is nearly impossible without quality access to computers and current information technology. For example, it is not helpful to learn PC-based commands on a Mac, to learn Windows 98 if one requires Windows XP, or be trained on a laptop when a personal digital

assistant (PDA) is required for a task. Computer literacy includes the ability to adapt to new technologies and software and includes both absolute and relative access to eHealth resources. To illustrate this, Skinner and colleagues found that while nearly every Canadian teenager has access to the Internet, far fewer have the quality of access or the ability to fully utilize it for health [26,27].

Scientific Literacy

This is broadly conceived as an understanding of the nature, aims, methods, application, limitations, and politics of creating knowledge in a systematic manner [28]. The latter-mentioned political and sociological aspects of science are in response to earlier conceptions of science as a value-free enterprise, a position that has been vigorously challenged [28-30]. For those who do not have the educational experience of exposure to scientific thought, understanding science-based online health information may present a formidable challenge. Science literacy places health research findings in appropriate context, allowing consumers to understand how science is done, the largely incremental process of discovery, and the limitations—and opportunities—that research can present.

The Six Literacy Types

Taken together, these six literacy types combine to form the foundational skills required to fully optimize consumers' experiences with eHealth. A profile of each literacy type with examples of the problems patient-clients might present is summarized in Table 1. Also included is a list of resources, many of them Web-based, that can be consulted to help health practitioners support patient-clients in improving their literacy skills across each domain. Although it would not be unexpected to find that older adults and those from nonindustrialized countries report greater difficulties in certain domains, particularly those that are context-specific, it is the authors' experience that few assumptions about which groups or individuals are likely to encounter difficulties can be made. As work with highly Internet-connected populations (like North American adolescents) shows, many of whom we would expect to be skilled users, there is a lack of skills, opportunity, and environments to use eHealth to its fullest potential [12,26,27].



Category	Percentage
Basic Computer Skills	85%
Advanced Computer Skills	75%
Health Information Literacy	65%
Scientific Literacy	55%
Media Literacy	45%
Consumer Health Literacy	35%
Health Communication Skills	25%
Health Decision Making Skills	15%
Health Self-Management Skills	10%
Health Advocacy Skills	5%

Table 1. Profile of literacy skills as related to health care practice

[\[view this table\]](#)

These six skill types illustrate the challenges that eHealth presents to those with low literacy in any one area. Although one need not have mastery in all these areas to benefit from eHealth resources, it can be argued that without moderate skills *across* these literacies, effective eHealth engagement will be unlikely. Using a specific health-related issue (smoking prevention and cessation) as an example, Table 2 illustrates how these literacy issues may present within the context of primary care while suggesting possible intervention strategies. Unlike other areas of health care, there is no “best practice” solution to addressing problems of literacy that fits into a

single session or neatly packaged brief intervention. Rather, improving literacy is a process that requires coordinated remediation and education, involving partnerships among patient-clients, practitioners, educators, and community health organizations over time. It is as much a process as it is an outcome.



Case Scenario	Scenario Description	Scenario Description
1	Scenario 1: A patient with low literacy skills is unable to understand the instructions for their medication.	Scenario 1: A patient with low literacy skills is unable to understand the instructions for their medication.
2	Scenario 2: A patient with low literacy skills is unable to understand the instructions for their medication.	Scenario 2: A patient with low literacy skills is unable to understand the instructions for their medication.
3	Scenario 3: A patient with low literacy skills is unable to understand the instructions for their medication.	Scenario 3: A patient with low literacy skills is unable to understand the instructions for their medication.
4	Scenario 4: A patient with low literacy skills is unable to understand the instructions for their medication.	Scenario 4: A patient with low literacy skills is unable to understand the instructions for their medication.
5	Scenario 5: A patient with low literacy skills is unable to understand the instructions for their medication.	Scenario 5: A patient with low literacy skills is unable to understand the instructions for their medication.
6	Scenario 6: A patient with low literacy skills is unable to understand the instructions for their medication.	Scenario 6: A patient with low literacy skills is unable to understand the instructions for their medication.

Table 2. Case scenarios: tobacco use and the six literacy types

[\[view this table\]](#)

Discussion

Literacy is as much a process as an outcome and requires constant attention and upgrading. The key is to reach a level of fluency at which one can achieve working knowledge of the particular language (or skill), enough to function at a level conducive to achieving health goals.

Knowledge, information, and media forms are context-specific, and context dictates what skills and skill levels are required to access health resources. For example, technical jargon may be appropriate in academic discourse provided it allows for a more precise explanation of certain concepts. However, when directed at nontechnical consumers or those outside of a particular research or practice culture, technical language may need to undergo a translation process in order to convey a message properly^[45]. Whereas a scientist may be interested in acetylsalicylic acid, a patient requiring pain relief knows this substance only as Aspirin or ASA.

As the World Wide Web and other technology-based applications become a regular part of the public health and health care environment, viewing these tools in light of the skills required for people to engage them becomes essential if the power of information technology is to be leveraged to promote health and deliver health care effectively. The eHealth literacy model presented here is the first step in understanding what these skills are and how they relate to the use of information technology as a tool for health. The next step is to apply this model to everyday conditions of eHealth use—patient care, preventive medicine and health promotion, population-level health communication campaigns, and aiding health professionals in their work—and evaluate its applicability to consumer health informatics in general. Using this model, evaluation tools can be created and systems designed to ensure that there is a fit between eHealth technologies and the skills of intended users. By considering these fundamental skills, we open opportunities to create more relevant, user-friendly, and effective health resources to promote eHealth for all.

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Conflicts of Interest

None declared.

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