An Organizing Framework for Literacy

Research-in-Progress

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ABSTRACT
Computer literacy, digital literacy, information literacy, and a host of other terms have all been used to attempt to appropriately describe particular competencies that an individual must know in the information age. However, literacy, of any type, in the information era should not be defined without including the tools that allow one to become more literate and eventually reap the benefits of improved literacy. This research attempts to put forth a unifying framework for literacy that encompasses the reality that there can be no distinction among literacies. A framework is put forth combining three significant components/antecedents that constitute literacy in the information age. This study will demonstrate how computer self-efficacy (CSE), information filtering, and access to tools (or access to Information & Communication Technology (ICT)) has a positive impact on literacy and results in the ability to engage in capital-enhancing activities.

Keywords
Computer Self Efficacy, Information Processing, IS Education literacy, computer literacy

INTRODUCTION
To be considered literate, the general consensus is that an individual possesses the ability to read and write (merriam-webster.com, 2013) Additional conceptualizations of literacy include a set of skills that include calculating along with reading and writing. Throughout history, these characterizations of individual competence have remained relatively unchanged, regardless of a person’s geographical location or culture. Over the course of the last few decades, the notion of different types of literacy has begun to emerge. Information literacy and computer literacy have entered into educational discourse as an additional layer of knowledge beyond traditional literacy. The notion of different literacies was initially a fine strategy for elucidating the changes in ever-evolving societies and the need for individuals in those societies to continue to advance. Nevertheless, this fragmented approach toward the notion of literacy does not necessarily address how individuals are to navigate an increasingly complex world. Given the amount of information generated on a daily basis coupled with the ease of access for many literacy, computer literacy, and information literacy should be considered different dimensions of the same phenomena in that these concepts can no longer be thought of in isolation. Advances in technology, along with structural changes in capitalistic societies, have necessitated a new world view of what many believe to be literate. The change in capitalism is precipitated by a transition to a new era for economies that are now based upon knowledge (Freeman 2001), as opposed to previous generations in which economies were based upon agriculture, rail, steel, and mass produced goods. Information can now be viewed as an economic good (Arrow 1997; Shapiro 1999). A small but growing body of literature has emerged that revolves around computer literacy in the information systems (IS) education area as well as other domains of literature, including sociology. As such, the computer literacy argument, though valid, continues the fragmented approach toward differing literacies. Since all of the aforementioned literacies are valid, one might consider that there should be a single set of characteristics that an individual must possess to be considered literate across all domains. Thus literacy should be defined as an individual’s ability to navigate the complexity of their environment through the manipulation of tools (i.e., IT artifacts) and information for individual or social gain.

Although there are a number of different types of literacy and a range of disciplines that touch on this type of research, IS should form the basis of inquiry for literacy. The following points will give reasons why literacy should be situated in the IS domain. Information is increasingly accessed through a wide variety of technological devices. The limitations of local resources, such as libraries, bookstores, or physical newspapers are such that individuals are confined to the providers’ supply
of information. These limitations can largely be eliminated through the use of tools capable of providing access to a wide variety of information sources. Thus, the manipulation of such tools is now a foundational element of literacy.

Individuals that have been trained to appropriately use hardware and navigate their devices’ software will have a significant advantage over individuals that do not possess devices. Furthermore, individuals that have an appropriate device but do not necessarily possess the skills to navigate the software to access desired information will also be disadvantaged. Once hardware/software competence is achieved, individuals then need to understand how to filter information to discern what is valuable and what is true. Thus, IS forms the basis of literacy in the knowledge/digital economy.

Furthermore, given the state of IS literature with regard to computer literacy and information literacy required of undergraduate business majors, the purpose of this research is to put forth an organizing framework for literacy. This research also hopes to support future inquiry into understanding the basic skills that are necessary for an individual to be considered literate. The remainder of the paper is organized as follows. Section 2 provides a review of the literature. Section 3 puts forth a framework for literacy and elucidates the theoretical underpinnings of this framework, while section 4 provides a discussion and conclusion.

LITERATURE REVIEW

The notion of digital literacy was first espoused in the popular press by Gilster (1997) from the perspective of how a practitioner would describe how to use a computer and the internet for discovering information. An emphasis throughout Gilster’s text is placed on discovering and filtering through online content to find information that is relevant to the individual user. Other practitioners such as Prensky (2001) view computer literacy as a birthright bestowed upon the millennial generation that has grown up surrounded by technology. These millennials are considered digital natives, whereas those individuals born before the digital age are considered digital immigrants that are not as fluent in the use of technology.

On the other hand, there are other practitioners’ viewpoints that suggest digital natives are shallow users of technology that do not possess a deep understanding of the inner workings of the technology they use (Waters 2011).

With regard to the IS literature, the topic of literacy has been narrowly defined within the IS education area. Areas of inquiry have clustered around particular themes of what students need to know. Researchers have examined specific types of students, such as general business majors, as well as overall student populations. For example, Hignite et al. (2009) used standardized tests from the educational testing service (ETS) to gauge undergraduate students’ (regardless of major) understanding of computers and IS. Others, such as Karsten and Schmidt (2008), specifically examined the computer self-efficacy (CSE) of business majors. They found that computer experience does not necessarily translate into CSE. Furthermore, females have lower CSE than males, and counter to the researchers’ initial expectations students at a higher class level had lower CSE scores than students at a lower class level. The most interesting aspect of the study is that Karsten and Schmidt repeated this study in both 1996 and 2006; they found that students in 2006 had lower CSE in 2006 than in 1996. In another study of a large body (n=1,973) of incoming university freshman, Kennedy et al. (2008) found that there is a large variation in access to and use of computer hardware and software. Although there is an assumed uniformed upbringing (of students) with regard to access and use of technology, Kennedy et al.(2008) found there is great variation in the understanding of technology among the assumed digital natives.

Other perspectives of what a student knows or should know come directly from professors. This research is primarily in the form of compiled lists or suggestions from their own experiences of what they believe the work place will require of their graduates. Ives et al. (2002) focus on higher-level (i.e., strategic) key IS concepts, while Nelson et al. (2011) survey faculty both inside and outside the business school to determine a set of specific Management Information Systems (MIS) skills students need to know as well as general information literacy skills. The MIS skills revolve around application development, maintenance, security, and database administration. Information literacy skills revolve around information research, retrieval, and validation. All of the faculty members surveyed in the study were in favor of information literacy skills as well as teaching applications, whereas only business school faculty believed the MIS skills to be valuable.

Finally, other literature attempts to define a typology that includes computer and information literacy. Easton et al. (2006) posit that computer literacy has no standard definition and that there are different types of computer literacy. The authors suggest computer literacy is comprised of computer competency (one’s ability to use a computer); technology literacy (a conceptual understanding of computer science); information literacy (a recognition when information is needed, as well as how it is obtained, located, and evaluated); computer fluency (computer literacy with higher-level thinking); and information and communications technology literacy (“the ability to use digital technology, communications tools and/or networks to access, manage, integrate, evaluate and communicate information ethically and legally in order to function in a knowledge society”)(Easton 2006)). Still others, such as Shapiro and Hughes (1996), create a typology of computer literacy that includes tools (hardware/software); resource literacy (access to information); social structural literacy (understanding the production
and social significance of information); research literacy (use of IT tools for research); publishing literacy (ability to communicate and publish information); emerging technologies literacy (understanding new developments in IT); and critical literacy (ability to evaluate the benefits of new technologies).

In sum, the previous literature is comprised of a variety of typologies that attempt to categorize the variety of literacies as they relate to information, hardware, and software. The literature also attempts to determine what students need to know from a faculty perspective. Finally, the literature begins to examine students in order to gain an understanding of how comfortable they are with ICTs and how they can effectively employ ICTs to their advantage in their coursework and individual lives.

However, the literature is at best fragmented with regard to how an individual might be literate in general, given the fact that societies have entered the information age. Going forward, the aim of this research stream should be to present a holistic view of literacy. Given the structural changes in societies due to widespread adoption and use of ICTs, literacy should be viewed as a combination of effective adoption and use of ICTs and hardware and software, as well as the ability to effectively filter information and validate it for personal use. A single view of literacy is necessary in so much that an individual must be able to effectively utilize a variety of devices and associated software to obtain information quickly and efficiently. An individual must then filter that information in order to achieve whatever particular purpose he or she might be attempting to attain.

THEORETICAL UNDERPINNINGS

Prior literature has elucidated the need for studying computer literacy. Nevertheless, among previous studies, Karsten and Roth’s study (1998) is one of the few that specifically tests the CSE of students. Thus, the prior research on computer literacy has a limited grounding in the previous IS literature. Although an aim of this research is to examine literacy holistically, this topic must be grounded, at least in part, in the prior CSE literature. This begins with a measure of self-efficacy toward computer use, where self-efficacy can be a predictor of behavior (Bandura 1986). Furthermore, specific to computer use, Compeau and Higgins (1995) expand the notion of self-efficacy with regard to computers by defining CSE as an “individual judgment of one’s capability to use a computer.”

The other component of literacy, information filtering and use, can be viewed through the lens of information-processing theory. Although utilized in the IS literature, this theory is not specifically an IS theory. First espoused by Miller (1956), the theory recognizes the limits of an individual’s ability to receive, process, and retain information. Information-processing theory is especially applicable in the information age due to the ever-increasing amounts of information individuals must filter through to attempt to understand the world they now live in. An individual’s information filter can be defined as an individual’s mechanism to process information. In other words, processing is a type of selective attention (Cowan 1988) applied to the information received. Figure 1 below depicts a research framework for literacy that does not divorce information processing from computer efficacy.
Literacy for the information age is undergirded by a combination of an individual’s ability to acquire hardware and software tools/devices, possessing the behavioral traits that lend themselves to an affinity for computer use, and the capability to properly manipulate ICTs. Furthermore, the individual must also possess the skills necessary to process information resulting from the use of ICTs. Finally, a literate individual possesses the capability to engage in capital-enhancing activities (Howard 2001). A capital-enhancing activity is an individual endeavor (i.e., use of the internet and information) that ultimately increases one’s own personal welfare or social status. Examples include using the internet for answering a student’s homework problems; researching a topic for a personal hobby; gathering information for a job interview; or investigating one’s own health or personal financial alternatives. Capital-enhancing uses of the internet are the opposite of using the internet for purely recreational purposes. Examples of recreational use include watching videos or playing games. Given the nature of literacy for the information age, the following research questions and propositions are put forth. Prior research suggests that higher levels of education lead to use of the web for more capital-enhancing activities (Hargittai & Hinnant, 2008)

**What factors comprise literacy? How does literacy impact individual behavior?**

**Proposition 1**

As information is increasingly digitized, individuals must grasp how to manipulate a variety of devices as well as software/applications to effectively retrieve information in a format that allows ease of manipulation. Thus the following proposition is put forth:

*Greater access to tools (hardware, software, applications) will have a positive impact on individual literacy levels.*

**Proposition 2**

Computer self-efficacy is a necessary antecedent to individual literacy. Performance with a variety of computer hardware and software applications rests upon an individual’s ability to be persistent, put forth effort, and display a certain level of commitment to computer-related tasks (Marakas 1998). Thus the following proposition is put forth:

*Higher levels of CSE will lead to higher levels of individual literacy.*

**Proposition 3**

The individual’s ability to filter information is based upon the amount of information that can be effectively processed. Thus the following proposition is put forth:

*Higher levels of information filtering should lead to higher levels of literacy.*

**Proposition 4**

Individuals that are considered literate possess the ability to efficiently and effectively use hardware and software tools to enhance both their professional and personal lives. They clearly recognize the power of information and the ability to search and manipulate it to their advantage. Advancing professionally or benefitting from greater leisure through technology can both be viewed as capital-enhancing activities. Thus the following proposition is put forth:

*Higher levels of individual literacy lead to more time engaged in capital-enhancing activities.*

**DISCUSSION**

**Implications**

This research will unify the IS literature with regard to literacy and merge other disciplinary areas of research, such as information retrieval/library science, to fully understand how multiple literacies go hand in hand. Outcomes of this research will bring clarity to what literacy is and how to properly measure it. Managers might use the results of this research to determine which employees possess the requisite level of literacy to perform sufficiently in the workplace.

**Future Research Direction**

To fully understand what possible factors comprise literacy, the initial research method will be qualitative in nature. Focus groups and diaries will be employed to develop an understanding of what individuals actually do to navigate their daily activities. The second phase of the research will be to derive measurable constructs from the qualitative study and use established measures of CSE and other literacy measures to create a scale that measures the degree of an individual’s overall literacy.
Conclusion

This research is an attempt to begin examining the phenomena of literacy in the information age. Each literacy domain has previously been framed in its own silo without intersection. Although adequate for the industrial age, the different varieties of literacy, including computers, information, and basic reading and writing, are not sufficient for the digital age in which these literacies must be simultaneously present if an individual is to successfully navigate an increasingly complex world.

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