Figure 1. The multiple dimensions of information literacy

3   Literature Review

3.1   Overview

This literature review provides the contexts of information literacy development followed by the description of a framework that results from this study. The first section focusses on the evolution of information literacy, definitions of informaiton literacy, information literacy models, learning theories and information literacy, mulitliteracies and new literacies, digital literacy, digital literacy and information literacy, and digital information literacy. The second section review proposes a new framework for understanding information literacy by outlining the major dimensions (see Figure 1).

3.2   Evolution of Information Literacy

The term "information literacy" was coined outside of academia by a lawyer named Zurkowski in 1974, who was interested in intellectual property and industries (Badke,

2010a; Wen & Shea, 2006). The term information literacy was first used in a proposal

submitted to the National Commission on Libraries and Information Science (NCLIS):

> "People trained in the application of information resources to their work can
> be called information literates. They have learned techniques and skills for
> utilizing the wide range of information tools as well as primary resources in
> molding information-solutions to their problems." (Zurkowski, 1974, p. 6)

Zurkowski's emphasis was on the private sector (Bowden, 2001), and his concern was

using information skills as a problem-solving approach for workplace contexts (Pinto et al.,

2010). The evolution of information literacy, however, has occurred mostly within the

public sector, mainly in the field of library sciences. Librarians and academics have set

information literacy as one of their major goals (Pinto, Cordon & Diaz, 2010). Accordingly,

this phase of the evolution of information literacy is associated and mixed with library user

education and bibliographic instruction programs, in the form of short orientations on how

to use library and information resources (Pinto et al., 2010).

Information literacy gradually began to evolve from the user-education concept of

library environment. Theoretically, the concept began to shift from teaching tools to

teaching competencies that were not limited to particular tools or contexts. In practice,

however, the transformation was very gradual because the users were still viewed as

passive information consumers (Spiranec & Zorica, 2010).

With the advent of digital technology in the 1980s, information literacy expanded

to include more than library resources, and started to be associated with technological

literacy, information and communication technology (ICT) literacy, digital literacy, and

computer literacy (Pinto et al., 2010). Information literacy at this stage was viewed as tool-

based, but with a focus on technology.

Constant advancement in information technology led to an increase in information resources and complexity of the digital information environment. It has become obvious that knowing how to use computers and access information is not sufficient for locating and extracting relevant information in such a complex environment. Therefore, the need for underlying competencies such as critical thinking and evaluation skills (Spiranec & Zorica, 2010), as well as socio-cultural support (Pinto et al., 2010) became more prominent.

The emotional or affective nature of information literacy was also taken into consideration as an essential requirement (Nahl, 2001). The studies on emotional, or affective, aspects of informaiton began with Kuhlthau (1991) and continued with several others, including Julien and Mckechie (2005), Bilal and Bachir (2007), and Lopatovska and Mokros (2008).

In recent years, Web 2.0 technology has begun to play an important role in information literacy, leading to a drastic change in the way we colloaborate, communicate, and share information. Mokhtar et al. (2009) interpret this change as an advancement in the social dimension of information literacy. Spiranec and Zorica (2010), furthermore, think Web 2.0 is significant enough to provide us with a new definition of information literacy.

Another important influence on the evolution of information literacy is educational practice. Spiranec and Zorica (2010) note the presence of a strong tie between education and information literacy. They refer to the impact of constructivism on providing new arguments for defining information literacy, which led to the promotion of being a creative and reflective user of information, particularly now that the users have access to Web 2.0

tools that can allow them to be both reflective and creative. Similarly, Farkas (2012) points out how social constructivism and connectivism can facilitate a teaching approach in accordance with current participatory technology, or Web 2.0. In a broader perspective, Bruce (2008) sees information literacy as an extension of the notion of literacy that directs us towards a future "learning society" as opposed to the current information society.

While there is a strong relation between information literacy and educational practice, information literacy is not limited to academic contexts. It goes far beyond; to lifelong learning and our identities. Bruce (2004) views information literacy as critical for lifelong learning, which empowers us both personally and economically.

To sum up, information literacy has been approached differently over time. Primarily, it has been viewed as a problem-solving approach within the context of the private sector. Then, it went through the influence of the library sector, and was mostly viewed as learning about the collection of information sources that libraries offer. It later became associated with information technology, technical skills, and databases. Information literacy has also been viewed through different lenses: information literacy as critical thinking skills, as a social practice, as affective competencies, and for lifelong learning.

3.3   Definitions of Information Literacy

 As stated above, information literacy evolved in the domain of library sciences (Saranto & Hovenga, 2004; Spiranec & Zorica, 2010), and, as a result, a number of popular definitons come from library associations. For example, according to American Library Association [ALA] (1989), information literacy is "a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use

effectively the needed information" (p.1). Information literacy has also been defined by individual scholars. Eisenberg (2008) defines it as "the set of skills and knowledge that allows us to find, evaluate, and use the information we need, as well as to filter out the information we don't need" (p. 39). Eisenberg's definition is very similar to previous ones, but his emphasis is more on filtering out irrelevant information due to advancement in information technology and complexity of the information environment. Both of the above definitions are limited in their perspectives to view information literacy merely as set of skills that can be achieved individually.

Bruce's relational model, formulated in 1997, offered a new approach to defining information literacy. Bruce highlighted the importance of the ways in which information literacy is perceived by the information users. In other words, information literacy entails being aware of various ways of experiencing information use, through pertinent practices and reflections (Bruce, 2004). Rather than offering a set of skills or processes, Bruce (1997), offers seven ways, or faces, in which one experiences information literacy: information technology, information sources, information process, information control, knowledge construction, knowledge extension, and wisdom experience. To be effectively information literate, according to Bruce (1997), one needs to experience and relate to information in these various ways. The concept of variation is significant because learning happens when we identify and act upon various ways of experiencing something (Bruce, Edwards, & Lupton, 2006). Bruce's definition relies on a learner's behaviour and perception, and, thus, is more conceptual than practical.

Tuominen, et al. (2004) view information literacy as a sociotechnical practice. They argue that information literacy is embedded in the actions of specific communities that use

adequate technologies. Tuominen et al.'s (2004) idea of sociotechnical practice is built upon concepts such as collaboration, sharing, technological artifacts, and contexts.

Despite some similarities among various definitions, there is no real consensus on how to define information literacy (Sundin, 2008). Mackey and Jacobson (2011) argue that the current definitions are not comprehensive enough. Lloyd (2005) maintains that information literacy contains various perspectives and practices, and we are not yet able to fully capture its depth and breadth. Specifically, information literacy has been defined mostly through a textual practice (where the interaction is between an individual and a text he or she reads), rather than a social practice (Lloyd, 2012).

The shift of emphasis on what is important in information literacy continues either due to our new understanding of the concept, involvement with different contexts, or the changes we face in our information environment, particularly due to the rapid advancement in information technology. Therefore, defining information literacy is similar to aiming at a moving target.

3.4 Learning Theories and Information Literacy

In this section, I review the impact of key learning theories on shifting the perspectives on information literacy. The three theories selected are constructivism, social constructivism, and Bloom's taxonomy. These theories have had profound impacts on the way we interpret information literacy today. It is within the context of these new learning theories that information literacy is moving beyond merely introducing a set of generic skills.

3.4.1   Constructivism

Many elements of constructivism are derived from the work of Jean Piaget and Lev Vygotsky (Davis & Sumara, 2002). Both theorists viewed learning as a process of constructing knowledge from one's experience. In a closer analysis, the ideas of these two theorists differ so much that they represent two main branches of constructivism: Piaget's constructivism and Vygotsky's social constructivism. The Piaget-inspired constructivist approach has become referred to as either individual constructivism, focusing on the individuality or personal aspect of one`s constructs (Williamson, 2006), or cognitive constructivism, focusing on constructs, mental models, and knowledge structure (Savolainen, 2009). Nevertheless, in this approach, the most important element is the individual`s mind and how it constructs meaning and knowledge (Savolainen, 2009). Here, learning is viewed primarily as an internal process.

Much of the literature in information literacy is dominated by constructivists who are emphasizing that individuals, as active builders of meaning, should be independent and self-sufficient (Tuominen et al., 2005). Constructivists have made significant contributions to the notion of information literacy. For one thing, they helped information literacy go beyond accounting for the external behaviours of information seekers to actually understanding the individuals' own points of views about their information seeking behaviours (Williamson, 2006; Sundin, 2008). Kuhlthau's ISP model is often referred as an example of this perspective of information literacy (Tuominen et al., 2005; Sundin, 2008). Another contribution of constructivist viewpoints to information literacy is the concept of knowledge transfer. According to Spiranec and Zorica (2010), information literacy is not a transfer of knowledge and information but a process of knowledge construction and

reflection. This helped to create a shift of focus from librarians as knowledge transferors to information users as knowledge constructors. Savolainen (2009) describes information users as active sense makers of their environment, not as parts of a passive processing system (Savolainen, 2009). Furthermore, constructivists promote the significance of Dewey`s notion of personal relevance, where learners have been found to be more engaged if what they are after is relevant to their personal goal (Jeffery et al., 2011).

3.4.2   Social Constructivism

Vygotsky-inspired constructivists view learning primarily as a social process. According to social constructivism, the mind is important in constructing meaning, but the mind cannot do so without the social contexts, interactions, and others (Savolainen, 2009). In this perspective, instead of an individual-based sense making, a social-based sense making process takes precedence and the focus shifts to communities, conversations, situations, and practices (O`Farrill, 2010).

Social constructivists` perspectives on information literacy were not as dominant as those of constructivists. There is hardly any model of information literacy that considers how individuals interact with one another (Tuominen e. al., 2004). This trend, however, started to change with the emergence of Web 2.0 technology, which transformed the landscape in which individuals select and produce information (Farkas, 2012). Within the new environment, technology is used collaboratively for constructing personal meaning (Tuominen et. al., 2004). Since collaboration and sharing information has become easier, online communities of practice have been formed, and studies began to include the community of practice in information literacy research (Abdi, Partidge, & Bruce, 2013). Information literacy also began to be associated with the notion of co-construction (Lloyd,

2010). These new ideas have influenced the way information literacy is understood in workplace environments (Lloyd, 2005, 2007, 2012). With this new understanding, information is neither viewed as merely placed within a system, nor as constructed by an isolated individual. Instead, information literacy began to be viewed as constructed by collaboration, social interaction, and dialog. However, social constructivist perspectives have not been employed in information literacy models and definitions.

3.4.3   Bloom's Taxonomy

Bloom's taxonomy, developed in the 1950s, is an organized set of educational objectives presented in a hierarchy of learning process. It organizes the educational goals into three categories: cognitive, affective, and psychomotor. It is the cognitive dimension that receives the most attention, not only in education, but also in information literacy. The learning hierarchy of the cognitive dimension of Bloom's taxonomy places knowledge at the lowest level, and increasingly gets more complex as it moves higher through the levels of comprehension, application, analysis, synthesis, and evaluation (Bloom et al., 1956).

Bloom's taxonomy was later revised by Anderson, Krathwohl and Bloom (2001), who changed the noun-based cognitive categories of Bloom et al. (1956) into verbal categories such as remembering, understanding, applying, analyzing, evaluating, and creating. Placing the "creating" category at the highest level of the hierarchy, after "evaluating," was a significant change of perspective. Another significant change was categorizing "knowledge" into four types: factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge. The four types of "knowledge" are further subdivided into components. Factual knowledge, for example, is subdivided into knowledge of terminology, knowledge of specific details and elements, whereas

metacognitive knowledge is subdivided to strategic knowledge, self-knowledge and knowledge about tasks.

In information literacy, Bloom's taxonomy, or its updated version, has often been used as a basis to compare information literacy skills with learning objectives (Keene et al., 2010; Spring, 2010; Schroeder & Cahoy, 2010; Neuman, 2011; Andreae & Anderson 2013; Kessinger, 2013). Kessinger (2013), for example, uses the six steps of Bloom's taxonomy to devise a research support framework to enhance information literacy skills of undergraduate students. Spring (2010) parallels between Bloom's taxonomy and the seven pillars model of SCONUL in the UK to provide an evidence-based approach in teaching and understanding information literacy.

3.5   Multiliteracies and New Literacies

Literacy was born and evolved within the cognitive perspectives, in which reading, writing, and numeracy were the main concerns. The critical literacy of Freire (1993) and sociocultural perspectives of Street (1985) questioned the conventional mindset of literacy. Freire (1993) viewed literacy as not only "reading the word" but also "reading the world" (p. 20), which refers to offering an alternative to conventional literacy that should be based on dealing critically with the reality of the world in terms of its political structure so that the learners could participate in or strive for social change. Similarly, Street (1985) viewed literacy as contextualized and defined it as a social practice. As a result, the notion of literacy expanded to include not only a set of cognitive skills but also socio-political or socio-cultural practices.

With the rapid growth of technology, other theoretical perspectives of literacy were developed to conceptualize literacy in the new era. Multiliteracies, a term coined by the

New London Group in 1966, is one of these perspectives, and argues that individuals need

to have more than one literacy to decode information from multiple modalities such as text,

images, sounds, videos, and maps (Ng, 2012).

Another perspective is the concept of "new literacies." According to Lankshear and

Knobel (2003), "new literacies" refers to practices that are either associated with digital

technologies or with the constantly changing social contexts. Overall, the focus is on the

social practices that result from the new technologies (Ng, 2012).

Rebmann (2013) notes that there are similarities and differences between

multiliteracies and new literacies. He notes that these approaches are similar because they

are both rooted in the critical and social practice of literacy as they emphasize the structure

or contexts that shape learners and educators. These contexts might include power,

economics, or technology. The two approaches are different because multiliteracies

emphasizes multiplicity of discourses, whereas new literacies emphasizes the concept of

newness as the new contexts developed by the new technologies. Lankshear and Knobel

(2011) add that new literacies emphasizes not only the notion of newness but also the

meaning of literacy, which is under constant change due to the changing nature of

technology. Ng (2012) points out that the concept of new literacies is relatively new, and

new literacies is digital literacy characterized by new technologies.

In summary, the emergence of various movements in literacy redefined the concept

of literacy in many ways. Information literacy is composed of two components:

information and literacy. Certainly, any changes of understanding of each component will

definitely change the whole concept. Due to new changes of perspectives, literacy is being

released from the single perspective approach of conventional literacy, which was in the

cognitive realm of reading and writing. Today's literacy is multiple in essence. It is believed to be socially constructed. Technology, and the potentials it offers, has become central to literacy. Literacy, indeed, became more than one. We are now dealing with literacies incorporating all as one. Just like general literacy, information literacy was also dominated by a cognitive perspective to which information was defined within the content of a document presented to a user (Savolainen, 2009). Bringing the new and broader understanding of literacy clears the ground and paves the road for information literacy to evolve and go beyond the cognitive realm.

3.6   Digital Literacy

Digital literacy is closely related to the concepts of information literacy, computer or IT literacy, and multiple sets of new literacies. Individuals use the term imprecisely, and this leads to miscommunication and misunderstanding (Eshet-alkalai, 2004).

The term "digital literacy" was first defined in Gilster's (1997) eponymous book as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (p.1). Gilster's definition is general and conveys almost the same meaning as information literacy. His further description in the book, however, focuses more on networked computer sources and application of Internet. These details misled many readers as they assumed that digital literacy refers to the technical aspects only (Bawden, 2001). Digital literacy is not the same as literacies of the digital such as computer, or IT literacy (Bawden, 2001). Gilster (1997) emphasizes the point that digital literacy is not about keystrokes but about the ideas that we master. Mackey and Jacobson (2011) assert that digital literacy is associated with critical thinking.

Eshet-elkalai (2004) affirms that digital literacy can be information literacy, technical abilities, and even more. He categorizes digital literacy into five different types of literacy: photo-visual literacy; reproduction literacy; information literacy; branching literacy; and socio-emotional literacy. From this perspective, it is clear that digital literacy does not refer to one single type of literacy, but to multiple sets of new literacies. Photo-visual literacy refers to our ability to read visual representations of the digital environment incorporating text, sound, images, and symbols. Reproduction literacy signifies our ability to create and reproduce knowledge from the existing rich information environment. Information literacy focuses on our ability to access, find, and particularly evaluate information coming from a large number of sources. Branching literacy looks at hypermedia and the ability we need to navigate in the interactive and non-linear world of hypermedia. Finally, it is not all about technological and cognitive literacy, but about social and emotional literacy, which provide us the ability to behave appropriately in cyberspace.

Contrary to Eshet-elkalai (2004), Gilster (1997)'s book on digital literacy does not provide any list of what digital literacy should contain, but Bawden (2001) derived the following set of competencies from Gilster's (1997) anecdotal description of digital literacy:

- critical thinking skills for evaluating retrieved information
- reading comprehension skills for materials available in dynamic hypertext environment
- knowledge assembly skills for collecting information from diverse sources
- online searching skills
- problem solving skills
- communication and online publishing skills
- awareness of people online as sources of advice and assistance
- awareness of the traditional resources in connection with new media
- managing information flow with filters

3.7 Digital Literacy and Information Literacy

Digital literacy and information literacy have a complex relationship. As it has been shown by Eshet-elkalai (2004), information literacy is one type of digital literacy. However, information literacy could be broader than digital literacy because digital literacy is not the only type of literacy we need to be successful in information literacy. Besides, information literacy existed even before the concept of digital literacy, and digital technology is only one among many sources of accessing information. Therefore, the relationship between the two should be recognized and clarified.

According to Mackey and Jacobson (2011), digital literacy only applies to activities that occur within a digital environment that necessarily include technologies, whereas information literacy applies to activities that occur within an information environment that may or may not include technologies. However, in the 21st century, the information environment is predominantly filled with digital technologies, so they overlap much more than they used to before the 21st century. According to Spiranec and Zorica (2010), with the rise of Web 2.0, information literacy merges even more with digital literacy.

To resolve the complexity of the issue, we should determine the focal point of reference. In information literacy, the learners are expected to get engaged in and work with information, so the focus lies on how digital technologies help them to do so. With the emergence of Web 2.0, the focus also remains on information artifacts in various formats (Spiranec & Zorica, 2010). Therefore, when the focal point is information literacy, digital literacy is a component or subpart—one among several possibilities dealing with information (Figure 2). However, when the goal is teaching or learning digital literacy, information literacy becomes a subpart among other literacies (Figure 3).

Figure 2. The relationship between information literacy and digital literacy: the focus is on information literacy.
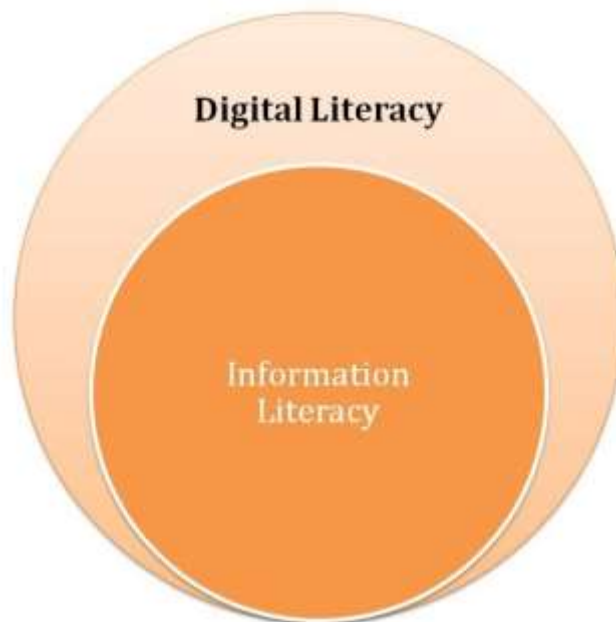

Figure 3. The relationship between information literacy and digital literacy: the focus is on digital literacy

3.8   Digital Information Literacy

By now, it should be obvious that digital literacy is only one way of working with information. As discussed in Eshet-elkalai (2004), digital literacy includes several other literacies, which extend beyond the traditional and functional literacy of the non-digital age. The requirement of a new set of skills led to the emergence of a new term: *Digital Information Literacy*.

The term 'digital information literacy', according to Bawden (2001), was first used by Dupuis to refer to evaluation and use of digital information, and by Wilson to refer to evaluating Internet resources as opposed to printed material. Jeffery et al. (2011) define digital information literacy as a form of literacy that focuses on electronic information:

> Digital information literacy involves recognising the need for, and being able to access and evaluate electronic information. The digitally literate can confidently use, manage, create, quote, and share sources of digital information in an effective way that demonstrates an understanding and acknowledgement of the cultural, ethical, economic, legal, and social aspects of information. (p. 385)

According to Jeffery et al. (2011), the progress of digital information literacy has been very slow due to various obstacles, such as internal barriers of the learners, including emotional aspects like self-efficacy, confidence, overconfidence, anxiety, and attitude; cognitive aspects such as critical thinking skills; and external barriers, including information overload, socio-economic issues, digital divide, etc.

3.9   Information Literacy Models

3.9.1   Overview

Several key researchers have developed information literacy models (Eisenberg & Berkowitz, 1990; Kuhlthau, 1991; Neuman, 2011). This review will examine the models that have been used and referred to the most in educational contexts: Eisenberg & Berkowitz' (1990) "Big Six Model," Kuhlthau's (1991) "Information Search Model" (ISP), and Neuman's (2011) "I-LEARN model."

3.9.2   The Big Six Model

A widely recognized model of information literacy, particularly in K-12 education, is the Big Six Skills model developed by Eisenberg and Berkowitz (1990). The Big Six model offers a systematic framework for using information to solve problems, and consists of six stages: task definition, information seeking strategies, location and access, information use, synthesis, and evaluation. Table 1 summarizes the components of each stage of this model.

Table 1. The Big Six Model

Stages	Details
1. Task Definition	• Define the problem • Identify information requirement
2. Information Seeking Strategies	• Determine range sources • Prioritize sources
3. Location & Access	• Locate sources • Find information
4. Information Use	• Engage (read, view) • Extract information
5. Synthesis	• Organize and Present
6. Evaluation	• Judge the product • Judge the Process

Eisenberg (2008) discusses the importance of context when implementing the Big Six model. He emphasizes three essential contexts for successful learning and teaching of

information literacy: the information process, technology, and real needs. According to

Eisenberg (2008), the information process gives students a structure so that they know

where they are in their problem-solving journey. The technology within the context

presents students with focus and flexibility so that students know how technology

develops their specific information skills. Finally, real needs make information literacy

relevant and transferable to students. More specifically, Eisenberg (2008) focuses on

integration, conveying that neither technology nor information skills should be taught in

isolation. It is only through integrating technology skills within the information problem

solving process tied with real-life needs that effective information skills can be developed.

The Big Six model is not context sensitive, thus, it is applicable in various settings.

      Some scholars find the Big Six model too restrictive regarding recent changes and

issues in technology and information. Mokhtar et al. (2009) propose three additional

elements to Eisenberg and Berkowitz' (1990) Big Six model: collaborative information

seeking behaviour, attitudes and perceptions, and ethics and social responsibility. They

argue that with the emergence of Web 2.0 and social networking services, the

characteristics of the information seeking process have changed to be interactive and

collaborative. Individuals do not seek their answers from systems at an individual level

only. They will also seek the opinions of the others using social networking sites. Mokhtar

et al. (2009) emphasize motivation, self-efficacy, and respect for various opinions as

essential elements for becoming information literate. Mokhtar et al. (2009) also consider

ethics and social responsibility as helpful components so that individuals become more

than just information literate, but responsible users of information as well.

3.9.3   The Information Search Process (ISP) Model

The Information Search Process (ISP) model (Kuhlthau, 1991), like the Big Six model, divides the process of information searching into six steps: initiation, or recognizing an information need; selection, or identifying a general topic; exploration of the required information on a general topic; formulation of a specific focus; collection, or gathering of relevant information; and information search closure. Kuhlthau (1991) states that her model incorporates three realms: the physical (actual actions taken), the affective (feelings experienced), and the cognitive (thoughts concerning both process and content). Table 2 summarizes Kuhlthau's six stages.

Kuhlthau's (1991) focus on the affective component of information literacy is unique. Cahoy (2013) calls her an affective information literacy researcher who highlighted underdeveloped affective skills as barriers in a students' information seeking process (Cahoy, 2013). In examining the affective aspects of the model, Kuhlthau (1991), HeinstrÖm and Todd (2008) tracked nine feelings through their data collection: confidence, disappointment, relief, frustration, confusion, optimism, uncertainty, satisfaction, and anxiety. Therefore, Kuhlthau's (1991) model adds affective dimension to our understanding of information literacy.

3.9.4   The I-LEARN Model

The I-LEARN model, proposed by Neuman (2011), is similar to the Big Six (Eisenberg & Berkowitz , 1990) and ISP (Kuhlthau, 1991) models in that it provides a set of skills or processes to describe information literacy. However, Neuman (2011) emphasizes the concept of learning. Neuman (2011) reminds us that the central reason why we need information in the first place is learning and argues that other models,

influenced by library science, concentrate more on the information seeking process than on information learning. According to Neuman (2011), from the library setting perspective, what matters more is how to access various resources and how to evaluate them based on our identified need. What is missing in this context is the actual use of information that is left to the learners to figure out.

The letters of the term I-LEARN signify the six stages of Identify, Locate, Evaluate, Apply, Reflect, and kNow. Each stage contains three elements, which contextualizes the use of the model in practice:

Identify (Activate, Scan, Formulate): identify an information problem by activating a sense of curiosity, scanning the environment, and formulating a question or problem

Locate (Focus, Find, Extract): locate the needed information through focusing on what is to be learned, finding the candidate information needed, and extracting the most relevant information

Evaluate (Authority, Relevance, Timeliness): evaluate that information through questioning its authority, relevance, and timeliness.

Apply (Generate, Organize, Communicate): apply that information through generating new understanding, organizing that information-based understanding and communicating that new understanding in a usable way

Reflect (Analyze, Revise, Refine): reflect both on the process and product of learning through analyzing, revising and refining

kNow (Internalize, Personalize, Activate): know what is learned through internalizing it, personalizing it, and activating it in the future (Neuman, 2011)

3.9.5   The 5Ps Model

For the purpose of this review, I have coined new terms for five key processes of information literacy. These five processes, called the 5Ps, represent five core stages of information literacy: planning, picking, processing, producing, and presenting. The 5Ps refers to a sequence of stages that are non-linear because a shift may happen from one process to any other process at any time depending on the context. The goal of the 5Ps model is twofold. Firstly, it provides an easy-to-remember acronym in describing the major stages individuals go through in order to seek and use information effectively. Secondly, it combines different models and relevant discourses of information literacy. The 5Ps model is needed to provide both a basis for showing the disposition of information literacy directions in the 21st century and comparison between models of information literacy.

The first P stands for information "Planning." One of the earliest steps in information literacy is planning ahead. Information seekers plan what information they need to find and assess their progress on that basis (Gorrell et al., 2008). To plan ahead, learners need to understand what the topic or problem at hand is about, and predict the possible solutions. However, understanding and planning don't stop at this earlier stage. Our goals and plans keep changing as we strive for answers or solutions and do not find them. This may occur because our understanding may change or the issues may change. The fact that the sequence of steps may keep repeating emphasizes the non-linear nature of the 5Ps model.

The second P stands for "Picking". We can pick, or select, information individually via text (print/digital), physical senses (observing/ hearing) or while collaborating with other individuals in a particular context. Wilder (2005) noted that one of the flaws of the current concept of information literacy is that it leads individuals to seek or search relevant information, whereas the real difficulty today is in finding high quality and relevant information. Similarly, an important part of information literacy, according to Beeson (2006), is to be able to judge the found information in a search with regard to the searcher's plans and goals with acceptable speed and accuracy. In addition, while having effective searching and seeking information skills is a major part of being information literate, information literacy does not always require us to search. However, it always requires us to pick, or select. For example, we pick information around us, in our immediate environment, due to our area of awareness, not due to our searching skills. Similarly, new technology tools such as RSS web feed get the information directly to our computer so that we pick the one that is relevant to our needs. Information picking, or selecting, is a more descriptive, comprehensive, and adequate term in the 21st century than information seeking or searching. Finally, since the advances in information retrieval research and practice have made searching and accessing information easier than ever, the term "pick" significantly sets the ground for the requirement of higher-order skills such as evaluating the validity and relevance of information we pick (e.g., information processing).

The third P stands for "Processing". Both cognitive constructivism and information processing approaches view information use as processes occurring in our minds to interpret activities (Savolainen, 2008). Processing of information through thinking critically and evaluating effectively is what we need to adapt to the 21st century rich

information landscape. From the perspective of constructivism, the emphasis is in constructing one's own meaning (Savolainen, 2008). Therefore, rather than waiting to receive the information from outside, we need to actively process and make sense of the information we pick. Information processing is an indispensable element of decision making, which is often a significant reason why we search for information in the first place.

The fourth P stands for "Producing". An important characteristic of new information literacy is the notion of a user's ability to generate content with Web 2.0 (Bawden, 2007; Spiranec & Zorica, 2010; Mills, 2010; Mackey & Jacobson, 2011; Ng, 2012). Here, the term "producing" refers to the user-generated characteristic of information literacy in the 21st century. Web 2.0 technologies provide us with new sets of possibilities that change the way information literacy was perceived (Spiranec & Zorica, 2010). These possibilities, such as blogs, wikis, and social networking sites, encourage and facilitate the production of new interpretations, new texts, and new audio, visual, or other media formats (Eshet, 2012). User-generated information could happen individually or in collaboration with others due to the affordances of participatory technologies. Wikipedia is but one example of how Web 2.0 tools have altered the way that information is produced (Dunaway, 2011).

The fifth P stands for "Presenting". Presenting illustrates the ease with which information can be shared and presented today. Mackey and Jacobson (2011) argue that producing and sharing information are two significant features of Web 2.0 environments. In previous centuries, the most frequent forms of presenting or sharing information were written documents (Mackey & Jacobson, 2011). In other words, relatively few individuals were able to publish and present their work. This picture has changed in the 21st century.

Web 2.0 has made it possible to easily share or present information with a global network in many forms such as video, blogs, tweets, wiki, and social networking posts (Mackey & Jacobson, 2011). Presenting information, thus, matters significantly at a time where information flows to the digital and global network in almost no time. Ease of presenting and sharing information is a great advantage, but it leads to the issue of information abundance, which again underlines the importance of planning, picking, processing, and producing information.

3.9.6   The 5Ps Model and the New Directions of Information Literacy

One of the purposes of developing the 5Ps model is to depict the directions of information literacy. Figure 4 illustrates these directions by aligning the 5Ps model with Bloom's revised taxonomy (Anderson et al., 2001). Figure 4 also highlights the iterative nature of the 5Ps model.
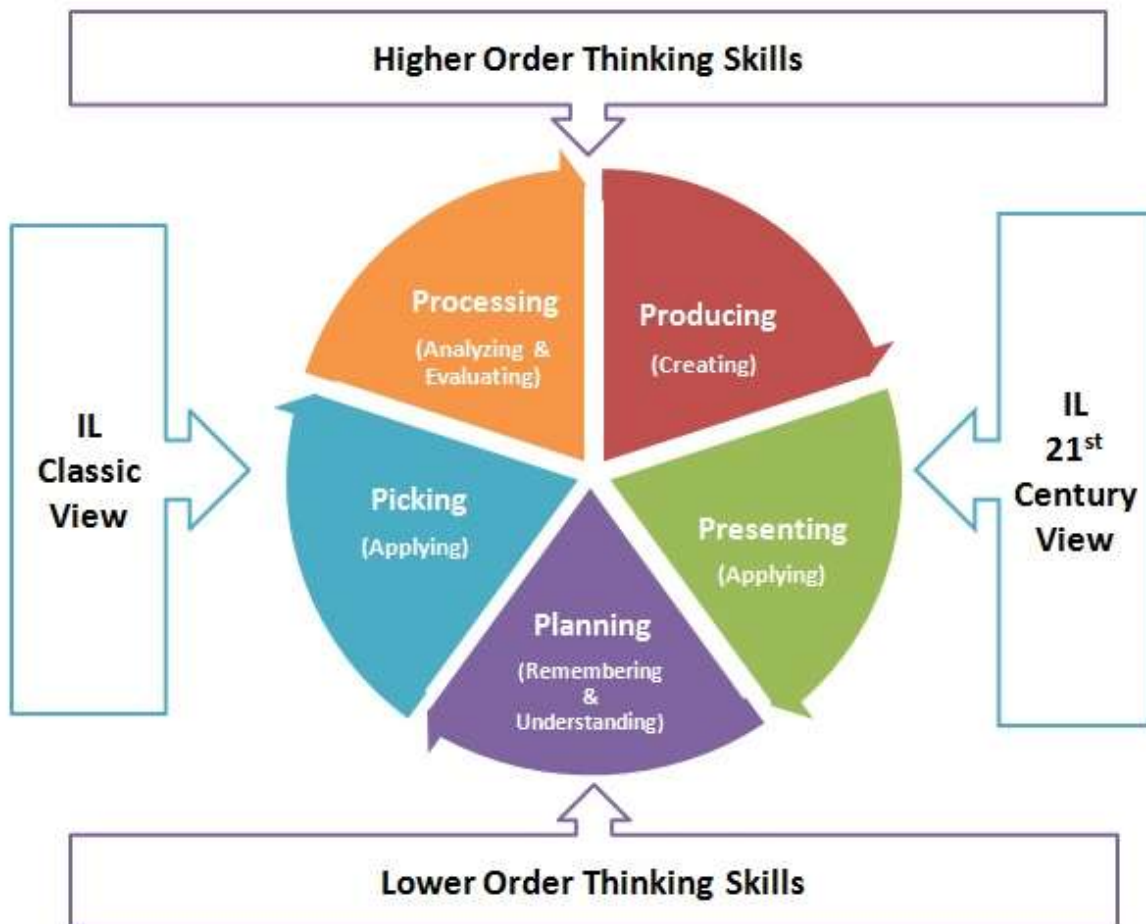
Figure 4. The 5Ps Model and the Directions of Information Literacy

As shown in Figure 4, information literacy in the 21st century is shifting from the classic, or library perspective, which predominantly focuses on information seeking or receiving, to the 21st century view, which emphasizes producing and presenting information. Figure 4 also illustrates a move from lower-order thinking skills to higher-order thinking skills. Processing information, which is built on analytical and evaluative skills, as well as producing information, which is based on creative thinking, requires higher-level thinking skills than planning, picking, and presenting.

According to Jones (2007), today, more than ever, the emphasis is on the higher-order skills such as analyzing, evaluating, and creating. Similarly, Mackey and Jacobson (2011) coin the term "metaliteracy" to mark a similar shift in the 21st century. They emphasize a shift from lower-order thinking skills to higher-order thinking skills of information literacy so that learners will be able to engage with multiple modes, forms, media, and literacies of today. At the same time, they emphasize the shift from a primarily skills-based approach to learning to collaborative production and sharing of information.

3.9.7   Integrating the 5P Model with Previous Information Literacy Models

Table 2 displays the side by side coordination among the three key models (Big Six, ISP, and ILEARN) using the 5Ps as a point of comparison. The comparison among models reveals further details about information literacy.

Table 2. Comparison between the Models of Information Literacy

5Ps	Big 6 Information Problem Solving Model (Eisenberg & Berkowitz , 1990)	Information Seeking Model (Kuhlthau , 1991)	ILEARN Model (Neuman , 2011)
Planning	1. Task Definition • Define the problem • Identify Information Requirements	1. Initiation	1. Identify • Activate • Scan • Formulate
Picking	2. Information seeking strategies • Determine range of sources • Prioritize sources 3. Location & access • Locate Sources • Find information 4. Use of information • Engage (read, view, etc.)	2. Selection 3. Exploration (investigate information on the general topic) 4. Formulation of focus 5. Collecting (gather information on the focused topic)	2. Locate • Focus • Find • Extract
Processing	6. Evaluation • Judge the product • Judge the process	7. Assessment (of process and outcome)	3. Evaluate • Authority • Relevance • Timelines
Producing	5. Synthesis • Organize		4. Apply • Generate • Organize 5. Reflect • Analyze • Revise • Refine 6. Know • Internalize • Personalize • Activate
Presenting	5. Synthesis Present	6. Presentation	4. Apply • Communicate

First, to a large degree, information literacy has been dominated by an information seeking approach. The emphasis is mostly on picking and processing information rather than on producing and presenting it. The information seeking approach reflects the conventional context of library practice which has influenced most models to some extent. The goal is achieved if information is transferred to the users or consumers. Neuman's (2011) I-Learn model, in particular, highlights the shift from picking information to

producing information through terms such as knowledge creation, personalization, and

communication.

Secondly, the models differ from each other based on their initial perspectives. The

Big Six model is focused on a task, inquiry, or problem (task and problem definition). In a

problem-based perspective of information literacy, individuals are viewed as problem

solvers who are trying to construct new meaning out of the complex and chaotic

information environment (Tuominen et al., 2004). The ISP model, on the other hand, is

focused on behaviours: initiation, selection, and exploration. The ISP model reflects the

common experiences of information seekers (Kuhlthau, 1991). Finally, the I-Learn model

uses action verbs and learning objectives such as identify, locate, and evaluate. Using

action verbs in the I-LEARN model adapts it to the new shift. With the new perspective of

information literacy, the attention is drawn to the role of the user as an active information

constructer as opposed to a passive information receiver (Savolainen, 2009).

4   A Multidimensional Framework for Information Literacy

4.1   Overview

The purpose of this section is to present a framework for an understanding of information literacy in the 21st century. Lloyd (2005) maintains that developing various ways of exploring information literacy enables us not only to broaden our understanding of the concept but also to construct a framework for addressing current educational, community, and workplace concerns. Based on a comprehensive review of the literature from 2004 to 2013, a new framework for understanding the concept of information literacy is proposed based on five dimensions: cognitive, technological, affective, social, and metacognitive (Figure 5). A detailed explanation of each dimension follows.
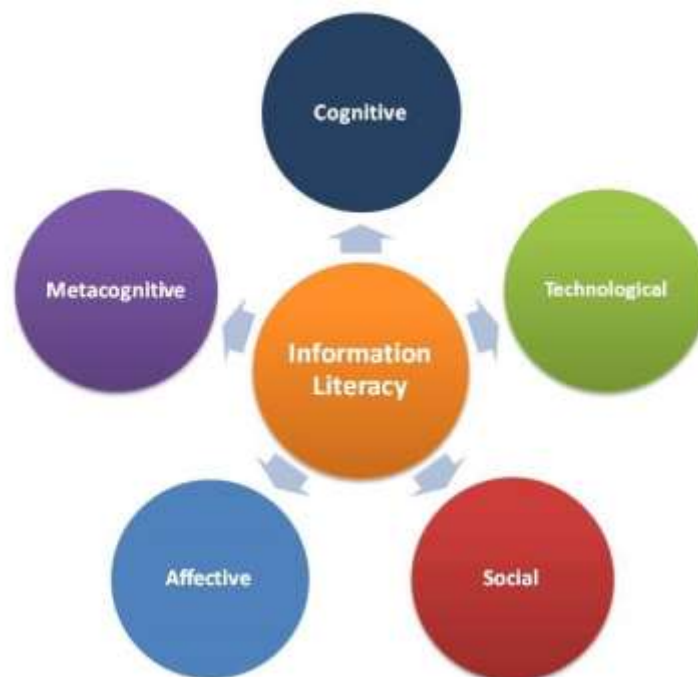
Figure 5. The Multidimensional Framework of Information Literacy

4.2   The Cognitive Dimension of Information Literacy

The first dimension of information literacy is the cognitive dimension. In education and information literacy, the cognitive dimension enters when there is a need to make a distinction between various types of learning activities and objectives: cognitive, affective, and psychomotor (Bloom et al, 1956); cognitive, affective, physical (Kuhlthau (1991); cognitive, technological, and ethical (Calvani et al., 2008); and individualistic or cognitive process versus social practice viewpoint (Savolainen, 2009; Lloyd, 2007, 2012; O'Farrill, 2010).

According to Schroeder and Cahoy (2010), information literacy used to be viewed merely on its cognitive dimension. Calvani et al. (2008) define the cognitive dimension as "being able to read, select, interpret and evaluate data and information taking into account their pertinence and reliability" (p. 187). The cognitive dimension, however, incorporates tacit and complex mental processes that cannot be captured in a single definition. Secker (2008) views information literacy not as skills, but as interconnected high-level abilities that reside within us.

From the literature review, eleven themes, or key elements, emerged for the cognitive dimensions. These include being aware of information, perceiving, exploring, understanding information forms, comprehending, problem solving, critical thinking, evaluating, analysing, creating, and presenting (Figure 6). Each of these will be discussed in turn.
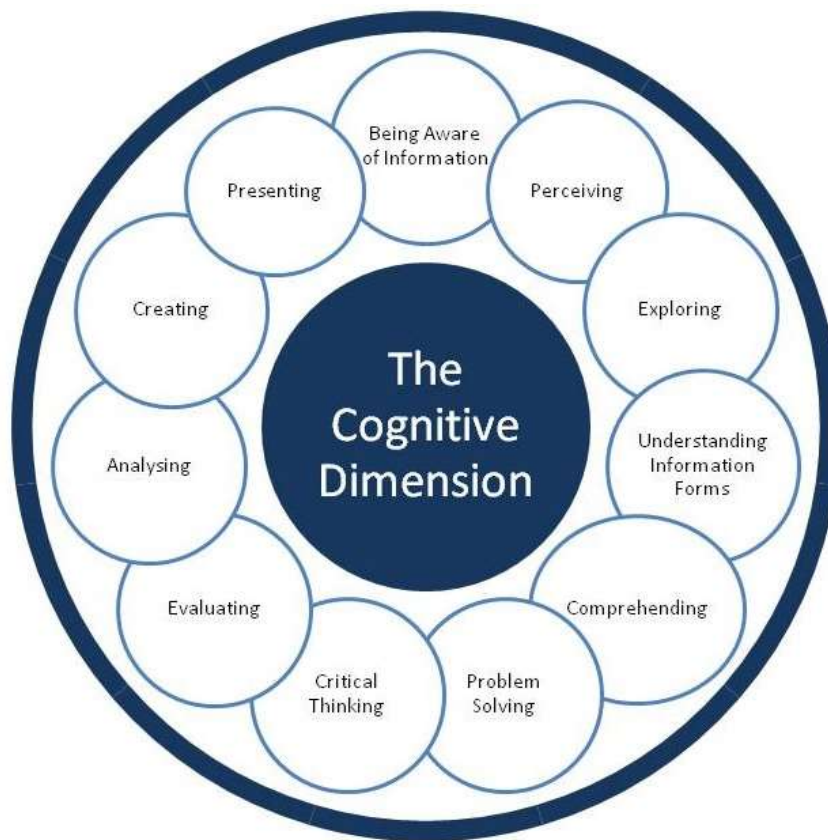
Figure 6. The Cognitive Dimension of Information Literacy

4.2.1   Being Aware of Information

A first element of the cognitive dimension is being aware of information. Awareness

of information refers not only to the awareness of the need for information, but also to the

awareness associated with the existence of information and information sources.

Awareness plays an essential role in the initial stages of an information seeking process.

Before anything, individuals should become aware of their lack of information (Fainburg, 2009). Information need occurs once one recognizes that his or her knowledge is not sufficient to satisfy a need (Norbert & Lwoga, 2013). An awareness of information need is necessary but is not sufficient to lead to information seeking behavior. Individuals should also be aware that the information they need exists and is accessible. They should be aware of available sources of information (Abdi, Partidge, & Bruce, 2013), collaborative information (Shah, Marchionini, & Kelly 2010), the purpose of information providers (McKinney, Jones, & Turkington, 2010), and the functions and processes of service providers (O'Farrill, 2010).

4.2.2   Perceiving

A second noteworthy element of the cognitive dimension of information literacy is the individual's perception. Studies show that there is a relationship between individuals' perceptions of the usefulness, quality, and accessibility of information, and their engagement in the information seeking activities (Marton & Choo, 2012). Individuals often examine the benefits of an informer's reputation, respect, and authority, and they continue their activity of receiving or sharing knowledge based on their perceived cost and benefit exchange (Cyr & Choo, 2010). Individuals' perceptions have also been examined in health information literacy. According to Marton and Choo (2012), an individual's threat perception of a health issue such as the susceptibility, seriousness, and consequences of an illness plays an important role on his or her information seeking behavior.

4.2.3   Exploring

A third element of the cognitive dimension is exploring. The ability to explore effectively through the current flood of digital information is such a key element that Hockly (2012) calls it "searchliteracy". The actual search, however, occurs through a phase of quick scanning (Lazonder & Rouet, 2007) or going through available sources in order to gain a better understanding of the topic (Nichols, 2009). It is not enough to go through oceans of information. Rather, one needs not only to understand the sources, to use search techniques such as Boolean logic, truncation searching, and RSS feeds effectively, but also to come up with search strategies that help explore the best needed information (Spring, 2010). Contrary to what is often believed, the main focus for forming a research question or thesis statement does not occur at the beginning of a project, but somewhere in the middle of the exploration process from the information detected (Kuhlthau, 2013).

4.2.4   Understanding Information Forms

A fourth element of the cognitive dimension is understanding information forms. In today's digital environment, information is presented in diverse ways. It is important for learners to understand how information is organized and disseminated (Whitworth, 2011) and how it is delivered in various forms, formats, media, and modes (Wen & Shih, 2006; Mackey & Jacobson, 2011). Teaching information literacy also involves introducing learners to the various forms of information, and helping them understand what type of information is needed in any specific context (Badke, 2010b). Accessing, analyzing, and evaluating messages in various forms are the common elements between information literacy and media literacy (Mackey & Jacobson, 2011). Bawden (2001) notes that many authors prefer to see media literacy as a component of information literacy. Now that the

notion of information is extended to include media literacy, the knowledge and skills of media literacy can play an important role in understanding the delivery of information through various forms of media.

4.2.5   Comprehending

A fifth cognitive element for information literacy is an individual's level of proficiency in reading and comprehending (Lazonder & Rouet, 2007; Loertscher, 2008). Comprehension, according to Wiley et al. (2009), is a process of constructing mental models out of important concepts and their relationship within a text. The clearer the relationship presented in a text, the easier it is to read and remember. Kessinger (2013), using Bloom's revised taxonomy (Anderson et al., 2001) to devise a research support framework for undergraduate students, listing verbs such as describing, explaining, identifying, matching, and summarizing as indicative of comprehension in information seeking process (Kessinger, 2013).

4.2.6   Problem Solving

A sixth element of the cognitive dimension of information literacy is problem solving. This concept is rooted in the origin of information literacy and reflected in Zurkowski's (1974) statement that information literate individuals use tools and resources "in molding information-solutions to their problems" (p. 6). Although the focus of information literacy, later, shifted to tools and generic skills, viewing information literacy as a problem solving process has become appealing again with the new trends in education such as problem-based, project-based and competence-based approaches to learning (Brand-Gruwel, Wopereis, & Vermetten, 2005). For an inquiry-based information literacy,

McKinney et al., (2010) suggest integrating information literacy into subject curriculum in order to make use of the problem solving process. Clermont (2005) proposes four levels of difficulties for problem solving. Level one refers to very elementary, concrete, and limited problems, where one looks for well-defined information in a particular context. Level 2 requires some rudimentary reasoning to access, evaluate, and store the information, yet within concrete situations. Level 3 deals with information coming from multiple and potentially conflicting sources, and Level 4, the highest level of competency, requires learners not only to access, evaluate, and store information from multiple sources, but also to be able to explain how and why they reached such conclusions.

4.2.7   Critical Thinking

A seventh element of the cognitive dimension is critical thinking. Gibson (1995) considers evaluation, analysis, and synthesis as micro-skills of critical thinking. In Bloom's (1956) original taxonomy, one moves from knowledge, the lowest level of the learning hierarchy, to evaluation, the highest level. Effective use of information will not happen without the use of critical thinking (Weiler, 2005; Andreae & Anderson, 2013). Learners approach information literacy with different levels of critical thinking skills. Weiler (2005), referring to William Perry's research (Perry, 1970), maintains that critical thinking is developmental and it begins when we move beyond dualistic thinking. According to the studies of Perry (1970), intellectual development has several developmental stages: dualism (believing in a world of right or wrong), multiplicity (accepting diversity), and contextual relativism (seeing the world as relativistic and relevant to specific contexts). While not all students may get to the same level of critical thinking ability, it is necessary for information literacy instructors to help them make meaningful choices in their research

(Andreae & Anderson, 2013). Therefore, information literacy programs should shift focus from the current limited approach, where there is only one right answer, to a new approach in which students are encouraged to see the multiple and complex layers of the information universe (Spiranec & Zorica, 2010).

4.2.8   Evaluating

An eighth element of the cognitive dimension of information literacy is evaluation. In the context of new technology and information overload, it is increasingly important to be able to evaluate information. Students should be able to assess the biases, hidden meanings, and agendas of communicators (Stiller & LeBlanc, 2006; Eshet, 2012). They should also be able to evaluate a wide range of factors, including the relevance of retrieved information to their own needs (Lazonder & Rouet, 2007; Calvani et al., 2008; Secker, 2008; Keene et al., 2010), reliability, such as author affiliation (Calvani et al., 2008; Kessinger, 2013), authority and authenticity (Eshet, 2012), timeliness or currency (Keene et al., 2010), credibility, through a track record of sources (Farkas, 2012), and evaluating user feedback such as comments, star ratings, and user-generated information such as Wikipedia (Mackey & Jacobson, 2011). According to Farkas (2012), scholarly information is produced anywhere, through any media, and it is important to teach our students the evaluation skills they need.

4.2.9   Analyzing

A ninth element of the cognitive dimension of information literacy is analysis. The term analysis is among the most prevalent elements of information literacy; however, there is often little focus on what needs to be analyzed. Major areas explored in this literature

include analysis of problems to identify key components and information needs (Keene et al., 2010), analysis of the structure and grounds of an argument (Secker, 2008), identification and analysis of the contexts in which information is generated (Spiranec & Zorica, 2010), and analysis of the messages in diverse forms (Mackey & Jacobson, 2011).

4.2.10   Creating

A tenth element of the cognitive dimension of information literacy is creating. The shift in information literacy from information retrieval to information creation is expressed in different terms: user-generated information (Jacobson & Mackey, 2013), knowledge creation (Paterson & Gamtso, 2012), recreating in innovative methods (Hockly, 2012), reproducing content in multiple media formats (Bawden, 2007; Mackey & Jacobson, 2011), reproducing existing texts, visuals, and audio pieces using digital reproduction technologies (Eshet, 2012), and information creation (Huvila, 2011).

Now, in the Web 2.0 environment, synthesizing has become more challenging than before as information seekers need to be able to synthesize ideas coming in more disparate information formats and from far more sources (Mackey & Jacobson, 2011). At the same time, Web 2.0 provides a useful environment for students to practice synthesizing ideas (Magnuson, 2012). In Kessinger's (2013) research support framework, some of the verbs that describe synthesis include compose, formulate, integrate, estimate, solve, develop, and create.

4.2.11   Presenting

Finally, an eleventh element of the cognitive dimension of information literacy is presenting. In the most rudimentary form of the digital information literacy scenario, a

student needs to be able to present his/her writing in a digital environment (Nazari & Webber, 2012). According to Lenning and Ebbers (1999), the results can be presented in various types of interaction: physical, virtual (synchronous), and through correspondence (asynchronous). Web 2.0, as an information delivery medium (Spiranec & Zorica, 2010), encourages students to explore various channels (Dunaway, 2011), and simplifies presenting information. Web 2.0, according to Bawden and Robinson (2009), has the potential to promote a shallow novelty since individuals post and present information very quickly by linking or re-packaging, without spending enough time to produce deep and thoughtful new materials.

4.2.12   Summary

The cognitive dimension of information literacy refers to certain inherent intellectual abilities. The eleven themes that comprise the cognitive dimension include being aware of information needs and sources, perceiving the benefit and quality of information, exploring large information sources rapidly and reliably, understanding the delivery of information through various forms and media, comprehending information from a wide range of digital and textual sources, problem solving, critical thinking, evaluating, analysing, creating, and presenting. Although the review of major relevant discussions and research further revealed that information literacy, to a large extent, requires a mastery of cognitive skills, information literacy also requires technology to access appropriate online research sources.

4.3   The Technological Dimension of Information Literacy

The second dimension of information literacy is the technological dimension. According to Tuominen et al., (2004), thinking about literacies without considering the technologies that shape them does not make any sense. The information literacy we know today has been embodied by technology. Digital technology is now the primary source of information. Technology has simplified not only accessing and presenting information, but also collaborating with others, and creating information.

Calvani et al. (2008) define "technological dimension" as "being able to explore and face problems and new technological contexts in a flexible way" (p. 187). According to Ng (2012), the technical dimension refers to the operational skills we need to use information and communication technology, and the operational skills are developed through understanding the structure, features and capabilities of technology.

In this literature review, the technological dimension refers not only to digital tools, systems, or machines that enable us to effectively pick, process, produce, and present information, but also to the understanding of the affordances that technologies offer for our interaction with information. In terms of tools, the technological dimension includes a wide range of hardware and software tools from desktop, mobile, and digital recording devices, to Web 2.0 and all other information resources on the Internet and digital environment.

In this section, the major themes, or key elements, that emerged from the analysis of the literature associated with digital technology will be examined and reviewed. These include technology affordances and Web 2.0 (Figure 7).

Figure 7. The Technological Dimension of Information Literacy

4.3.1   Technology Affordances

One theme of the technological dimension refers to the understanding of the

affordances that technologies offer for information literacy. Technological proficiency is

more than just knowing how to use a computer. Technological proficiency is the knowledge

and ability to use technology flexibly and creatively for particular purposes (Eisenberg,

2008). The new understanding of technological proficiency led some researchers to

explore the potentials or affordances of technology for specific purposes. Shand, Winstead,

and Kottler (2012) organize digital tools into five categories: communication, collaboration,

presentation, organization, and critical thinking. According to Shand et al. (2012), to be

successful learners in the 21st century, students need a new set of proficiencies, such as the

ability to collect, evaluate, organize, and use information from digital sources, and success

in these areas only happens through structured learning activities, facilitated by technology

tools. Table 6 summarizes Shand et al.'s (2012) effort to organize tools for specific

purposes:

Table 6. Categorization of Technology Tools for Various Purposes (Shand et al., 2012)

Purpose	Digital Tools
Communication	• Web-based logs such as Wordpress • Online surveys such as SurveyMonkey • Audience-response systems such as Quizdom
Collaboration	• Wikis such as Wikispaces, and PBWiki • Real-time document suites such as Google Docs
Presentation	• Presentation software such as PowerPoint and Keynote • Web based tools such as Prezi, Empressr, Sliderocket • Interactive white boards such as Smart Board • Video-sharing sites such as Youtube, and Flickr
Organization	• Graphic organizers such as charts, and tables in Microsoft Office, iWork, and Gliffy
Critical Thinking/Problem Solving	• Concept mapping • Virtual comic strip and storyboard programs like Comic Life, Comiqs, or Pixton • Flashcard builders such as Flashcard machine and Quizlet

Shand et al. (2012) provides an illustrative example of how exploring technology's

potentials with specific purposes in mind can help develop both content materials and

targeted learning activities. Although Shand et al. (2012) do not integrate their category

into information literacy per se, the set of purposes by which they organize the digital tools

are compatible with the themes of information literacy which have emerged in this review.

Eisenberg (2008), however, integrates the use of digital tools specifically into information

literacy. Table 7 summarizes how some digital tools fit within Eisenberg's (2008) Big Six

model.

Table 7. Technological Capabilities and the Big Six Model (Eisenberg, 2008)

Stage	Description	Technology
1	Task definition	e-mail, group discussions (listservs, online forums), brainstorming software, chat, videoconferencing, groupware
2	Information seeking strategies	online catalogs, info retrieval, networked electronic resources, Intranet), Web resources, digital reference services, online discussion groups, blogs, wikis
3	Location & Access	online catalogs, electronic indexes, search engines, browsers
4	Use of information	upload/download, word processing, copy-paste, outliners, spreadsheets, databases (for analysis of data), statistical packages
5	Synthesis	word processing, desktop publishing, graphics, spreadsheets, database management, presentation software, down/up load, e-journals, blogs, wikis, web-authoring
6	Evaluation	e-mail, group discussions (listservs, online forums), brainstorming software, chat, videoconferencing, groupware

Looking at digital tools from the perspectives of the potentials they offer allows us to move from isolated computer skills to integrated information and technology skills, where isolated digital tools become powerful information tools (Eisenberg, 2008).

In reality, it is difficult to specify a tool for one specific purpose both because technology is under constant change and because technology is context-dependent. The use of presentation software such as PowerPoint, for example, used to be easily categorized under presentation. With the emergence of cloud computing, such as Microsoft Cloud and Google Docs, learners are able to use these tools for collaborative purposes. Heinrichs and Lim (2010) consider presentation tools having potentials for generating thoughts and

synthesizing ideas. Nevertheless, the purpose, or purposes, technological tools serve are

related to the potentials they provide, and the potentials they provide sometimes reshape

our understanding. Web 2.0, for example, is now reshaping and redefining the way we

understand information literacy.

4.3.2   Web 2.0

Another theme of the technological dimension refers to the tremendous impact of

Web 2.0 on the information environment, and our understanding of information literacy as

a result. Information literacy associated with Web 2.0 includes online tools such as blogs,

wikis, media sharing, and social networks, as opposed to search engines, websites, and e-

learning platforms of Web 1.0 (Spiranec & Zorica, 2010). Bawden and Robinson (2009) also

include RSS feeds, podcasts, sites for sharing photographs and videos, social bookmarking,

and virtual worlds such as Second Life in the Web 2.0 list. Before the emergence of Web

2.0, digital tools associated with information literacy were search engines, online

databases, and network browsers. Web 2.0 tools have facilitated new potentials that the

conventional and static Web 1.0 could not (Mills, 2010). Web 2.0 has had such an impact on

the information landscape that Spiranec and Zorica (2010) propose "information literacy

2.0", which involves employing Web 2.0 in information literacy practices.

Web 2.0 provides opportunities for new practices in information literacy. For one

thing, sharing information has never been as easy as it is now. A number of Web 2.0 tools,

such as Facebook, Second Life, and LinkedIn, Flicker, YouTube, and social bookmarking

have made it possible for individuals to share information and collaborate online (Huvila,

2011; Jeffery et al., 2011). Secondly, massive amounts of information are being created in

the digital environment every day. The opportunities provided by wikis and blogs for

communication, information creation, and authority are now more familiar to students than library databases (Farkas, 2012). Wikipedia is another example of information creation and authority. Learners often use Wikipedia as a starting point for finding information, but they can also use it to understand how information is created and how to value information (Godwin 2009). In a comparison between the accuracy of content in the Wikipedia and Encyclopedia Britannica, Giles (2005) concluded that Wikipedia had more up-to-date science and technology articles than Britannica. Giles (2005) also showed that the number of factual errors in Wikipedia is almost the same number of Britannica.

Thirdly, Web 2.0 has also been considered as having the potential to encourage a reflective and critical thinking environment. When peers provide comments for each other on a blog, it creates a community involved in reflective practices (Farkas, 2012). Similarly, Wikipedia has the potential to provide an opportunity for critical thinking with regard to how information is created and controlled (Jacobs, 2010). In conclusion, Web 2.0 led to the emergence of new concepts, widening of the information environment, and a reexamination of the practical applications of information literacy (Spiranec & Zorica, 2010).

Web 2.0 technology, according to Hicks and Graber (2010), not only led to the emergence of new concepts of information such as content creation, collaboration, and conversation, but also shifted the role of users from being passive consumers to being active creators. Ultimately, Web 2.0 tools have great potential for providing an engaging learning environment in which students become active learners of information literacy (Dunaway, 2011; Farkas, 2012).

4.3.3   Summary

Technological proficiency is not just learning how to use a particular digital tool, but recognizing how it contributes to accomplishing a task and fulfilling a purpose in information literacy (Eisenberg, 2008). Knowledge gained from examining the affordances that technology provide for communication, collaboration, critical thinking, and other purposes helps make information literacy meaningful in the new information landscape. Web 1.0 technology provided more opportunities for information seeking practice than information using. With Web 2.0, the focus has shifted to information use, making it easier to employ information to collaborate, communicate, share, create, publish, and disseminate it. By positioning individuals as active producers of knowledge rather than passive consumers, Web 2.0 questions the current definition of information literacy (Dunaway, 2011). The potential of Web 2.0 for making it easier for individuals to collaborate and share information has led Mokhtar et al. (2009) to view the emergence of Web 2.0 as an advancement into the social dimension of information literacy. According to Mackey and Jacobson (2011), the current institutional frameworks for understanding information literacy lag behind the impact of Web 2.0.

4.4   The Social Dimension of Information Literacy

The third dimension of information literacy is the social dimension. Traditionally, information literacy has been viewed as an isolated activity, but information literacy is not limited to an interaction between an individual's conscious mind and the media he/she seeks to examine (Shah, Marchionini, & Kelly, 2010). Information literacy is a social and situated practice (Lloyd, 2007, 2012). When individuals are interacting with text, they are

not working in isolation, because the authors of information are part of the context and social nature of the information (Harris, 2008). Information is not neutral—it is indicative of social values and political structure (Nahl, 2001).

Similarly, the process of information seeking, evaluating, and using happens within community contexts associated with underlying meanings and values (Harris, 2008). An individual's cognitive process, such as critical thinking, is not sufficient for using information to learn. One needs to also get engaged in a process of dialogue and clarification with other involved members (O'Farrill, 2010). From a social perspective, information literacy is a negotiated practice (Lloyd, 2012), where individuals navigate through various communities, considering multiple perspectives (Spiranec & Zorica, 2010), cultural knowledge (Trace, 2007), and contexts (Harris, 2008).

In this review, the social dimension of information literacy refers to the interaction of an individual with others and with his or her social context to select, process, produce, and present information. It includes social interaction (collaboration, communication, sharing, and community), responsibilities (ethics and privacy), and context (Figure 8).
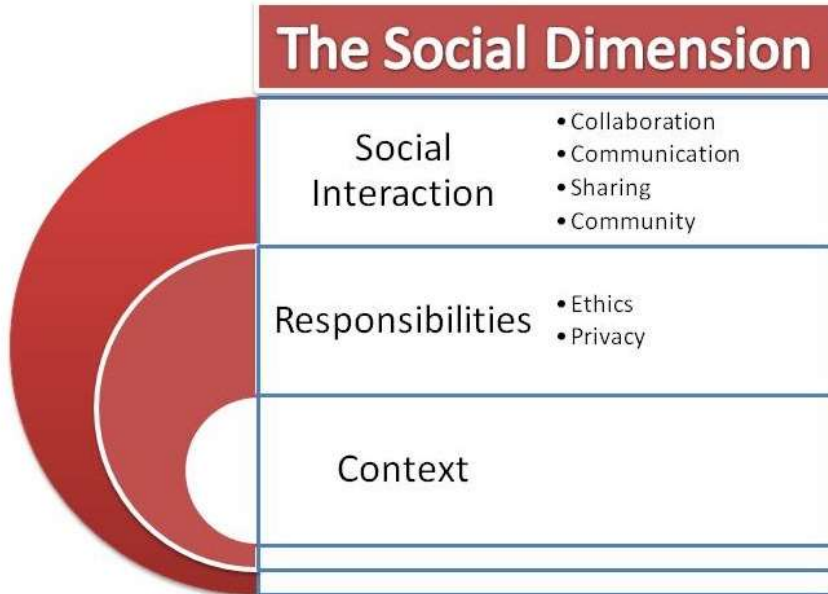
Figure 8. The Social Dimension of Information Literacy

4.4.1   Social Interaction

4.4.1.1   Collaboration

Collaboration is an essential skill in defining information literacy. It should be addressed as a major element of educational and organizational learning, both in theory and practice of how to seek, process and use information (Tuominen, et al 2004; Heinrichs & Lim, 2010; O'Farrill 2010). Most information literacy models and standards miss the significance of the collaborative element as they are based on an assumption that information literacy is an individual process (Mokhtar, et al., 2009; Farkas 2012). Collaboration, as a necessary activity of a community, happens regardless of what type of media we are using, digital, oral, or written (Harris, 2008), and the potential of new technology provides opportunities that can be used to enhance one's collaborative skills, competencies, and knowledge (Calvani et al., 2008; Secker, 2008; Jeffery et al., 2011;

Whitworth, 2011). Mackey and Jacobson (2011), using the potentials of the new

participatory technology, propose a shift of emphasis from viewing information literacy as

a discrete set of skills to collaborative construction of information. Kauhanen-Simanainen

(2005) views collaborative literacy at various levels such as local, national, and global, due

to the fact that one cannot manage alone in the current digital environment.

4.4.1.2   Communication

Another central element of the social dimension of information literacy is

communication. Since Web 2.0 could easily allow students to create and share information,

it has become especially useful for highlighting the importance of communication in

information literacy (Magnuson, 2012). Sundin (2008) identified four approaches to

information literacy: the source approach, the behavioural approach, the process approach,

and the communication approach. The communication approach emphasizes the social

aspects of seeking, processing, and using information, and places an increasing interest in

communication and interaction between members of a community (Sundin, 2008).

Spiranec and Zorica (2010) claim that due to the new information landscape, we are now

entering the communication phase of information literacy, as described in Sundin's (2008)

research.

4.4.1.3   Sharing

Sharing is another key element of the social dimension of information literacy.

Sharing information has never been as easy as it is now in the history of mankind. Video,

social networking posts or comments, Second Life, blogs, wikis, rating and review sites,

Twitter, and YouTube are among the possible forms and methods that information is

shared with people worldwide. The ease with which information can reach a global

audience brings new responsibilities such as understanding the most appropriate ways of

sharing information, democratic participation, and issues related to rights and authorship

(Jacobson & Mackey, 2013). Sharing information in the digital and virtual worlds has made

a shift from traditional authority to a new phenomenon of shared knowledge and expertise

(Mills, 2010). Ease of sharing is changing the way information literacy is perceived.

Information literacy has begun to be viewed as collaborative production and sharing of

information (Mackey & Jacobson, 2011).

4.4.1.4   Community

Community plays a significant role in the social dimension of information literacy.

As a social practice, information literacy is viewed not only within an individual's domain

but also within the domain of a community (Lloyd, 2013). The viewpoint that information

literacy needs community focuses on the interconnection between members and how they

process information (Harris, 2008). When individuals produce and process information in

communities, there is usually a consensus on how to interpret information as a community

(Elmborg, 2006).

Harris (2008) refers to two types of communities for information literacy:

communities of practice and learning communities. In a study on workplace information

literacy, O'Farrill (2010) identifies the importance of community practice from a socio-

constructivist perspective. For example, frontline staff members of the workplace used

dialog, a social sense-making process, not individual-based skills, to validate and

determine whether the information they found was applicable or not. By the same token,

learning communities provide necessary contexts for information literacy practice (Soules et al., 2013).

Web 2.0 technology facilitated the creation and proliferation of learning communities (Spiranec & Zorica, 2010). The concept of community within information literacy helps learners look for the best practice and helps them think like information literate professionals such as architects, engineers, or journalists (Bruce et al., 2006). Despite the importance of community, there are hardly any standards and models of information literacy that mention the concept of community (Harris, 2008).

4.4.2   Social Responsibilities

4.4.2.1   Ethics

From a social dimension viewpoint, information literacy is not mainly about how to use information effectively. It is also about how to use information ethically. Using information ethically and legally is getting more complex in the digital landscape of today due to the flow of micro-content such as blog posts and tweets (Farkas, 2012). Ethics are essential to make sure that students understand the complexity of the information environment and are able to practice ethical and responsible use of information (Mokhtar et al., 2009). It is quite easy for students to copy, paste, and adapt some digital information without realizing copyright restrictions and the notion of intellectual property that exist on the Net (Stiller & LeBlanc, 2006). An ethically information literate individual should show respect on the Net (Calvani et al., 2008), observe netiquette, and use appropriate language (Ng, 2012), deal with intellectual property issues (Mackey & Jacobson 2011), and choose an appropriate medium and style (Whitworth, 2011).

4.4.2.2   Privacy

Privacy also plays an important role in the social dimension of information literacy. To be information literate, one needs to have skills that go beyond selecting and using information. It has become so easy to share information related to one's privacy and identity online, but difficult to protect and safeguard it. According to Leung and Lee (2012), adolescents who are more tool- and social-structure literate are less at risk of privacy violation. In addition, in collaborative social setting, the notion of personal privacy changes as individuals are willing to disclose so much personal information online (Jacobson & Mackey 2013). The scope of what is understood as information competency should be expanded to include issues related to privacy on the Net, information security, and online safety (Mackey & Jacobson 2011; Jacobson & Mackey 2013).

4.4.3   Context

Part of the social dimension of information literacy is an understanding the context and situations within which an information activity occurs (Harris, 2008). In other words, information literacy is about engaging with information through discourse practices that are specific to a context (Lloyd, 2005). For example, Nazari and Webber (2012) identify three types of contexts in order to conceptualize information literacy in the practices specific to online distance learning: the physical context of the learning environment; disciplinary context of the problem-solving process within the nature of a subject area; and educational context, which includes curriculum, design, pedagogy and assessment. Spiranec and Zorica (2010) introduce a wider perspective which includes any social, political, and economic ideology playing as the background behind information. Similarly,

Dunaway (2011) implies that information is always affected by social, political, and economic contexts.

4.4.4   Summary

An understanding of information literacy will be limited if the social dimension, or elements, are not taken into consideration (Lloyd, 2007, 2012; Harris, 2008). Based on the themes explored in this review, the social dimension of information literacy includes the interaction or relationship among people, their social responsibilities, and the context in which interaction occurs. The social interaction for processing and using information involves collaboration, communication, sharing, and community. Social responsibility pertains to ethics and privacy. Individuals are now able to easily access enormous amounts of information. They need to learn how to behave ethically and responsibly with information retrieval and sharing. Finally, information happens within a context, and the meaning of information may change as the context changes. Therefore, opportunities should be provided so that learners practice information literacy within appropriate contexts, but since learners' behaviours are emotionally driven as well, the affective dimension of information literacy also matters and comes into play.

4.5 The Affective Dimension

The fourth dimension of information literacy is the affective dimension. Emotions such as uncertainty, confusion, and anxiety are crucial in our information seeking behaviours (Kuhlthau, 1991). Without inclusion of the affective dimension into our perspective towards information literacy, we are denying the natural presence of our feelings and the emotional challenges we face while we are interacting with information.

For example, negative emotions such as uncertainty prior to the search (Bilal & Bachir, 2007) leads to frustration and difficulties in finding the answer. On the other hand, by acknowledging the impacts of affective factors, we are paving the way for learning how to develop our affective competence. Cahoy (2013) asserts that affective competence; the ability to manage the emotions that we encounter while seeking and producing information, is essential. As Nahl (2005) points out, individuals with low or high cognitive skills benefit from higher affective coping skills, but those with high cognitive skills and low affective skills may experience stress and difficulty in completing a search task.

Studies have also shown that affect has an impact on search strategies, drive to continue a search, and attitude towards system and performance (Lopatovska & Arapakis, 2010). In a study of affective motivation, Nahl (2005) found a positive correlation between self-efficacy, optimism, and motivation for accomplishing an online information search task. Information literacy may be more effective if learners' affective factors, behaviours, motivations, and preferences are taken into consideration (Shenton & Fitzgibbons, 2009).

The affective domain is defined as "a person's attitude, emotions, interests, motivation, self-efficacy, and values" (Chroeder & Cahoy, 2008, p. 129). Nahl (2004) identifies several affective components used in the study of information science including self-efficacy, optimism, uncertainty, time pressure, and motivation. The affective domain, according to (Nahl, 2001), is closely related to the choices we make throughout our search activities. For example, the motivation to find an article on a topic of our interest keeps us being persistent in our search process.

In this review, the affective dimension refers to the emotional abilities that one needs to cope with, including emotional challenges that arise in the process of seeking,

collaborating, producing, and sharing information. The major themes that emerged from

the analysis of the literature associated with the affective dimension include attitude,

anxiety, interests, motivation, uncertainty, and self-efficacy (Figure 9). Each will be

discussed in turn.

Figure 9. The Affective Dimension of Information Literacy

4.5.1   Attitude

A first element of the affective dimension is attitude. Having positive attitudes

towards information literacy, information learning, and information technology are

essential traits that one requires in order to interact with information effectively (Wen &

Shin, 2006; Mokhtar et al., 2009). In a study on assessing students' attitudes towards

information literacy, Scales and Lindsay (2005) conclude that those who displayed a

broader view of information, such as connecting information literacy to human development and lifelong learning, do better in the long run than those who saw it as a particular school project and developed expertise in more mechanical aspects of information literacy. Therefore, it is important to develop learning activities that help information seekers form desirable attitudes that make them critical and effective information seekers (Farkas, 2012). The newer versions of information literacy standards began to include the notion of attitude as an important element of information literacy. For example, the American Association of School Librarians (AASL) broadens its scope to stress the building of attitude, or dispositions, in the 2008 version of its information literacy model (Leortscher, 2008).

Bruce et al. (2006) noted a connection between participants' perspectives of teaching and learning and their attitude towards information literacy, and this is illustrated by the way in which information literacy is taught in educational environments.

4.5.2   Anxiety

A second element of the affective dimension is anxiety. Rosenthal (2008) found anxiety and/or stress as a major obstacle in developing digital information literacy. Information anxiety may be caused by information overload, insufficient information, poorly organized information, or inability to work with an information environment or system (Bawden & Robisnson, 2009). Anxiety suppresses and reduces the learning capacity by directing cognitive resources towards fears (Tobias, 1985, as cited in Jeffery et al., 2011). Since students often carry some level of anxiety around their research activity, strategies should be developed to reduce their level of anxiety (Cahoy, 2013).

4.5.3   Interests

A third element of the affective dimension is interest. The idea that students should develop skills for exploring their own interests, whether personal or academic, is becoming pivotal in education (Shenton & Fitzgibbons, 2009). Mayer and Bowles-Terry (2012) found a connection between student engagement with information and student interests. Zanin-Yost (2012) also found that students do significantly better when their area of research is relevant to their areas of interests, such as future careers. A study about the connection between researchers' feelings and Web contents revealed that researchers' feelings are provoked by personal interest. Similarly, by introducing a personal relevance frame, Bruce et al.'s (2006) framework for information literacy emphasizes the significance of making information relevant to an individual's interests and contexts.

4.5.4   Motivation

A fourth element of the affective dimension is motivation. Knowing what motivates information seekers is definitely a crucial element. Therefore, information literacy will be more effective if it takes learners' motivations into account (Bruce et al., 2006; Mokhtar et al., 2009; Shenton & Fitzgibbons, 2009; Schroeder & Cahoy, 2010; Korobili, Malliari & Zapounidou, 2011). Studies show that low motivation narrows the scope of the search in certain contexts (Ford et al., 2001). According to Heinstrom (2006), who explored the relationship between intrinsic-extrinsic orientation and information literacy, intrinsically motivated information seekers display a true intention for learning, whereas extrinsically motivated students search for information so as to meet requirements. Motivation is an important factor for a researcher to maintain—the searching ends as soon as the motivation ends (Nahl, 2004).

4.5.5   Uncertainty

A fifth element of the affective dimension is uncertainty. Kuhlthau's (1991) findings brought attention to the notion of uncertainty and its association with feelings of confusion and anxiety in information search processes (Arapakis et al., 2008). According to Kuhlthau (2013), uncertainty is a starting point of learning, without which curiosity and exploration are extinguished. Tolerance of uncertainty leads to persistence, interest in topics, and a sense of discovery (Kuhlthau, 2013). Uncertainty gets negative when it is intense (Nahl, 2004). Studies show that complex tasks raise the level of uncertainty and consequently the levels of stress, self-doubt, and negative feelings (Kim, 2008). To minimize the negative feelings caused by uncertainty, instructors can provide affective support (Bilal & Bachir, 2007) and cognitive support by helping students generate ideas via brainstorming (Fainburg, 2009).

4.5.6   Self-efficacy

Finally, a sixth element of the affective dimension is self-efficacy. It is not sufficient to develop a high level of cognitive skill to be competent in seeking and using information. One also needs to gain a high level of self-efficacy to feel confident in the use of these skills. Self-efficacy, according to Bandura (1997), is a belief in one's ability to organize and execute the actions required to achieve a goal. Self-efficacy reflects individuals' perceptions about their abilities based on their previous experiences, which affect their future actions (Jeffery et al., 2011). In other words, individuals try to take action in the areas that they feel confident about and avoid those that they do not.

There have been many discussions about the relationship between self-efficacy and information literacy (Nahl, 2005, 2004; Lopatovska & Arapakis, 2010; Mokhtar et al., 2009;

Schroeder & Cahoy, 2010; Jeffery et al., 2010; Cahoy & Schroeder, 2013); however, there

has been limited research to articulate the nature of the connection. Nahl and Meer (1997)

found a positive relationship between students' self-efficacy and their search performance.

Self-efficacy and optimism also provide advantages to those who are faced with the

negative impacts of uncertainty (Nahl, 2005). Kurbanoglu, Akkoyunlu, and Umay (2006)

developed a 28-item scale to measure self-efficacy for information literacy. Identifying

students' level of self-efficacy is important because a high level of self-efficacy might help

counteract the more negative emotions of information search behaviour (Nahl, 2004).

4.5.7   Summary

An information literate individual needs to be aware of the affective dimension of

information literacy. The affective dimension of information literacy refers to the

knowledge and skills learners need to effectively deal with the emotional aspects of

information seeking and using processes. The six themes that emerged in this review

include attitude towards information literacy and technology; information anxiety;

personal or academic interests; motivation; uncertainty; and self-efficacy, or the belief in

one's ability to successfully complete the search project. Accordingly, information literacy

instructors need to take their learners' emotional motives and responses into

consideration and provide opportunities so that their students can develop affective

competency. The learners themselves also need to self-monitor and self-direct their

behaviours. The next section discusses how a metacognitive approach will help learners

make not only their own affective choices, but also cognitive, technological, and social

choices.

4.6   The Metacognitive Dimension of Information Literacy

The fifth dimension of information literacy is the metacognitive dimension. Exploring ways to enable students to learn how to use their knowledge and strategies more consciously and efficiently in information rich environments has led to the inclusion of the metacognitive dimension to the understanding of information literacy. The term metacognition was coined by John Flavell in 1971, who described it as thinking about one's own thinking (Lazonder & Rouet, 2007). Flavell developed the concept further in 1979 when he divided metacognitive knowledge into three categories: knowledge of person (oneself or others), knowledge of task (success criteria), and knowledge of strategy for achieving a goal (Gorrell et al., 2008). Eisenberg (2008) acknowledges the importance of metacognition by viewing the Big Six model as a representation of metacognition for presenting students with awareness about their own mental processes. In today's information age, it is important to be aware of what we do with information, how we do it, and why we do it in order to be conscious and in control; otherwise, the information system controls us.

Lazonder and Rouet (2007) define metacognition as the ability to plan, monitor, and evaluate one's own behaviour. According to Bowler (2010) there is a consensus in the literature on at least two aspects of metacognition: control process and metacognitive knowledge. Control process refers to the use of strategies to control metacognitive knowledge, an action of self-monitoring or self-regulating. Metacognitive knowledge refers to knowledge, not use—knowing that certain strategies or tasks work better.

In this review, the metacognitive dimension provides an intersection between various dimensions. It refers to knowledge and the ability one needs to regulate one's own

cognitive, affective, social, and technological dimensions of information literacy. The major

themes that emerged from the analysis of the literature associated with the metacognitive

dimension will be examined and reviewed, and they include self-knowledge, strategizing,
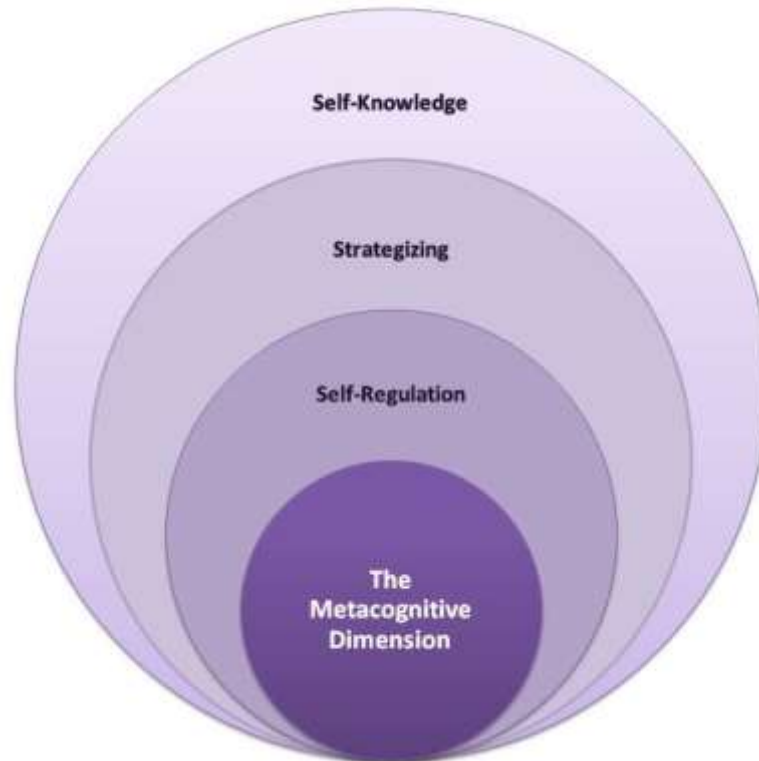
and self-regulation (Figure 10).

Figure 10. The Metacognitive Dimension of Information Literacy

4.6.1   Self-Knowledge

One of the central components of metacognition is self-knowledge, which refers to

the awareness of one's own thought processes, strengths, weaknesses, and drives (Bowler,

2010). According to Catts (2012), metacognition is the highest level of competency in

which individuals are able to explain why and how they have reached their conclusions in

terms of locating, evaluating, storing, and applying information. Shenton (2013) proposes

introducing metacognitive skills to youngsters so that they will be able to reflect on their

own information seeking behaviour, and assess the quality of alternative approaches. According to Gorrell et al., (2008), incorporating reflection and self-assessment suggests a metacognitive act. The idea of metacognitive acts, self-knowledge, and self-awareness are evident in the work of others who may not have mentioned the term metacognition. Cahoy and Schroeder (2013) refer to studies that fostered self-awareness by asking students to reflect on their search skills and research process. In Stiller and LeBlanc's (2006) introduction of cyber-literacy, students developed self-awareness by keeping an online journal to record their activities, goals, tools, and changes in the courses of their creative process. Metacognition is also about learning how to learn. Being aware of one's own learning is as important as what one is learning. Kuhlthau (2013) implies the notion of metacognition while stating that learning how to learn in an information-rich environment is pivotal for information literacy.

4.6.2   Strategizing

Another important aspect of metacognition is the ability to strategize. To successfully complete a search task, we need to employ strategies in various stages of information literacy to overcome our skill deficiencies and to achieve our goals. Strategic knowledge is the procedural knowledge that we use at the time we are unsuccessful (Bowler, 2010). Wiley et al., (2009), while stressing the role of metacognition in comprehension, report that successful readers are able to employ a range of strategies in response to their lack of success in comprehending information. Stadtler and Bromme (2007) studied the role of metacognitive strategies in successfully dealing with multiple documents on the Web. They assigned four experimental groups with four different types of metacognitive strategies, such as evaluation prompts, monitoring prompts, both kinds of

prompts, or no prompts at all. Their results indicated the significance of metacognitive strategies in successfully dealing with multiple documents and forming source knowledge on the Web as those receiving prompts outperformed the no-prompts group. Similarly, Shenton and Hay-Gibbson (2012) propose pro-formas, or reflection forms, which play the role of prompts, to enable youngsters to reflect on their behaviours while seeking information.

4.6.3   Self-Regulation

Another central component of metacognition is self-regulation. Information literate individuals need to stay focused and adjust actions in the course of an information search process. Self-regulation refers to individuals' ability to take control of their metacognition via monitoring, evaluation, and planning (Gorrell et al., 2008). An example within information literacy could be Branch's (2001) study on Web searching when individuals plan a search, monitor their progress, and evaluate their results in terms of relevance, reliability, and authority (Lazonder & Rouet, 2007). Self-regulation is a broad concept and might overlap with other concepts of metacognition (Gorrell et al., 2008), but it is important to include it in this review as it signifies monitoring of not only self-knowledge but also the use of strategies in the process of taking control of one's own learning, behaviour, or actions. Monitoring can take the form of self-assessment of progress (Madden et al., 2008). For example, self-assessment help individuals become conscious of their progress in finding reliable and relevant information. Similarly, it helps them in learning transfer, while individuals monitor the transferring of what they have learned in one task into new tasks (Gorrell et al., 2008).

4.6.4   Summary

The metacognitive dimension offers the knowledge and ability one needs to monitor and regulate cognitive, affective, social, and technological dimensions of information literacy. While the other dimensions are all essential in a successful information literacy learning journey of the 21st century, metacognitive knowledge and skills are needed to assist learners to take control of their own learning and become self-directed lifelong learners. The themes emerging from the metacognitive dimension include self-knowledge (an awareness of one's own cognitive and affective processes), strategizing (for overcoming one's failures and difficulties in various dimensions of an information research project), and self-regulation (for evaluating and correcting oneself in order to stay focused until the goal is achieved). Information literacy educators can support learners' metacognitive abilities by providing them with strategy training, modeling, prompts, and a collaborative environment (Lazonder & Rouet, 2007).