

E-LITERACY SCHEMA FOR E-LEARNING PROGRAMMES

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ABSTRACT

The advent of the Internet-based applications into the academic settings engendered a wide range of dynamic virtual paradigms such as e-learning, e-research, and digital libraries. The networked information and e-learning processes however have brought about information overload and search anxiety to the end-users. Such phenomena created urgent needs for developing effective e-literacy scenarios to extenuate such a discomfort phenomena. Knowledge map (K-map) and Information literacy (IL) are among instrumental approaches being used to adapt to such inevitable changes in information dissemination and learning landscape. This work presents an e-literacy schema to facilitate scholarly use of the Web, and to expedite task-based information searching within an academic computing environment (ACE); especially, via course management software (CMS) platform such as Blackboard™. The IL programmes at United Arab Emirates University (UAEU) revealed that the students and some instructors suffering from a serious gap in Web literacy and online search skills. This status has triggered off an initiative to develop a k-map pathway to maintain e-literacy process, which is a blend of several techniques of knowledge representations as the Eisenberg and Berkowitz's Big6™ model, Ellis's model, and Association of College and Research Libraries (ACRL) standards into an applicable e-literacy schema. E-literacy schema would be providing an effective approach to subject analysis and then to facilitate easy-to-find relevant information while searching in a networked learning environment. E-literacy schema integrated with Blackboard-enhanced online engineering courses at UAEU (in 2005) purposely to assist the students in developing online search skills to retrieve relevant academic information, as well as further use this information to create intellectual works in a knowledge base. The engineering students who were involved in the test of the schema showed an obvious improvement in their information retrieval skills, along with abilities in evaluating return relevance. In conclusion, the integration of e-literacy schema with CMS-enhanced learning is unique, and it is convenient for IL instructors involved in e-learning processes.

Keywords: E-learning; Knowledge map; E-literacy; Information seeking behavior; Search strategies

INTRODUCTION

Information literacy (IL) is conceivably the foundation for learning in the emerging knowledge-oriented societies whose hallmark is their consciousness of importance of information to the total development processes (Lloyd & Williamson 2008). The idea of e-literacy has sprung up with the ongoing developments in information and communication technology (ICT). The term of e-literacy has grown and taken varying meanings parallel with the complexity and the technologies incorporated in the infrastructure of the ICT-based activities (Bruce 2002). The Internet engendered rapid evolving information spaces to accommodate an exponential growth of a wide range of scholarly information resources cast over the Web. Capturing and retrieving relevant and usable information from the Web represents however one of the most laborious search tasks bring about unwelcome phenomena such as information overload and information search anxiety. Thus, e-literacy is inevitably an instrument for adopting appropriate information seeking behaviour, channels and tactics to obtain information well-fitted to user needs (Taha 2004). The university education constitutes the foundation for basic

professional knowledge, and precursor of new skills for in-depth information acquisition and applications. In this intellectual sphere, e-learning has sprung up in the higher education communities getting the most benefits from the dynamic advancements in the ICT applications. Such advancements have precipitated far-reaching changes in the Web from a text-only medium to expanding multi-media communication system, which in turn provided an impetus for fundamental changes in the delivery mechanisms of scholarly information, online courses and training programmes (Taha 2006)

OBJECTIVES

The theoretical references of this study are the Eisenberg and Berkowitz's Big6™ model (Eisenberg & Berkowitz 2001), Ellis's model (1993), relevant information seeking behaviour theories (Borgman 1986; Fidel 1991; Kuhlthau 1991; Vakkari 2001; Wilson 1981, 1999), and ACRL standards (ACRL 2003). This paper solicits to articulate these works into an applicable model to represent the spatial interrelationships of the core concepts of the e-literacy pathway. The proposed k-map aims eventually at facilitating e-literacy for scholarly use of the Web and information searching in ICT-enhanced learning environment. This is presumed to equip the students with necessary skills to carry out an effective evaluation of the retrieved information to be used and utilized in a knowledge base. The hypothesis behind the presented k-map for e-literacy is that representation of knowledge in diagrammatic illustrations would effectively enhance the students in developing search skills that help in scholarly use of the Web in e-learning environment. The k-map obeys the following assumptions:

- K-map is a useful knowledge representation technique for representing *static* relationships between the attributes in searchable queries or learning objects
- These concepts can be represented in dynamic cyclic information maps to represent the functional relationships within e-literacy schema

E-literacy phases could be represented in a k-map for providing effective approaches to make e-information searching, retrieval and evaluation easier in a professional manner.

REVIEW OF RELATED LITERATURE

The widespread adoption of the computer-aided libraries in the early 1980s and currently the digital library paradigms has provided an impetus for a series of scholarly investigations focusing on information seeking behaviour in changing computing environments. Subsequently, a considerable amount of research works has been increased. These works have produced fundamental theories, principles, and models to answer a raised pertinent question: How the user seeks effectively topical information in a networked searching environment such as OPAC, online databases, the Web, etc. Special emphasis is placed on the citations pertinent to the theories and models generated in fields of information literacy, knowledge map, and information seeking behaviour to develop the e-literacy schema.

Information literacy: fusing of various concepts

Information literacy has been the area of active research in library and information science (LIS) domains. The entrance of ubiquitous computing in library services has substantially accelerated the growth of IL-related information that mushroomed since the advent of the Internet in early 1990s (Bruce 2002). Within this context of information plethora and rapid developments in the ICT, IL has increased its popularity (Mutch 1997;

Grafstein 2002). Bawden (2001) traced the evolving genre of IL concepts to argue that the basic concept of the literacy has been expanded to include the emerging form of literacies more suitable for tangled information environment such as web literacy, hyper-literacy, digital literacy as synonymous terms and phrases that sometimes used interchangeably.

Definitions of information literacy are numerous in regards with information-specified topic, but not varying in the type of core skills (Macpherson 2004). Moreover, most of the definitions of IL have been concerned with literate user rather than IL itself (Plotnick 1999). Parang et al. (2000) defined IL as a blend of ICT literacy, information ethics, critical thinking, and communication skills. Therefore, information literacy instruction (ILI) requires a shift in focus from teaching specific information resources to a set of critical thinking skills involving the use of information. This change is reflected within the Information Literacy Competency Standards for Higher Education, developed by the Association of College and Research Libraries (ACRL) in 2000 (Doyle 1992), commonly known as the seven pillars:

- The ability to recognize purpose and extent of information need.
- The ability to construct strategies for retrieving information.
- The ability to compare and critically evaluate information retrieved from different sources.
- The ability to organize, apply and communicate information to others in appropriate means.
- The ability to synthesize and build upon existing information for the creation of new knowledge.
- The ability to understand the economic, legal and social issues surrounding information use.

Knowledge maps: bridging the disciplinary divide

Knowledge is the psychological result of perception, learning and reasoning. Yet, there are two kinds of human knowledge: (a) Tacit knowledge such as expertise, understanding, or professional experience; it is highly personal and context-specific; therefore, it hard to be formalized and communicated, and (b) Explicit knowledge refers to codified knowledge; it is transmittable in systematic language and easily transferred by communication means (Howells 1996; Johannessen et al. 2001). However, illustration of human knowledge as fragmented information in learning process represents a continually difficult problem (Howard 1989). Pictures have been a means of human expression and illustration of ideas and thoughts since prehistoric eras. The ancient cultures produced many artistic and sculptures of ritual significance. In natural sciences, however, educators, researchers and scientists need to express their ideas in formulae and models. Consequently, various mapping devices have been suitably schemed to represent knowledge tree through illustrating relationships and linkages among complicated concepts. These devices, collectively known as knowledge maps, include concept map, mind map, and cognitive map (Dreher 1997). The hegemony of the Internet in the information society has initiated a series of *e-based* applications and media, along with emerging of expanding virtual environments in business and learning domains. Experts in these virtual domains manipulated ICT and multimedia applications to develop a wide variety of knowledge maps (Lin & Lin 2001; Lin & Hsueh 2006) to be incorporated in instruction and training (Chou & Lin 1998; Khalifa & Kwok 1999), in

developing engineering design and IT models (Gómez *et al.* 2000; Howard 1989; Kautz & Nielsen 2004), and in business and knowledge management (Eppler 2001; Vail 1999).

User study approaches: understanding information seeking and search tactics

User study covers a wide range of interdisciplinary themes and topical research; from the cognitive factors involved in initiating information-seeking task to the user behaviour in conducting search and selecting relevant resources through the reactions of the user to the Web search output. Thus, the user study is a dynamic research field focusing on investigation of the following aspects:

- User: to investigate user needs, contexts, motivations, expectations and tasks
- Use: to investigate enablers and barriers that related to the use of a particular information source
- Information system: to investigate aspects of technology, design, human interaction, and evaluation.
- Organization setting: to investigate the contextual aspects of the organizational setting; addressing both internal and external factors such as resources, administrative procedures, strategies, and policies (Banwell & Coulson 2004; Pharo 2004).

However, the Web has created a virtual interactive medium, which largely changed the tactics and strategies involving in the task-based information searching and retrieval (Vakkari 2003). These obvious changes have significantly affected information seeking behaviour of the users in a digital environment (Tabatabai & Shore 2005). In typical practices, e-literacy addresses particular skills and abilities for executing a variety of Web-based complicates processes and transactions (Bawden 2001). The earlier work of Wilson (1981) depicted in Figure 1 focused on the factors that involved in influencing the user information needs and behaviour while conducting information search. Wilson's model appreciates two information processes: (a) Information need: incorporates interrelation factors involved when the individual engages in information-seeking process towards the satisfaction of needs, and (b) Information seeking: defines the processes in which the user purposefully engages to acquire and build up new knowledge through successive processes rather than a quest for true answers (Bates 1979; Kuhlthau 1991; Pharo 2004; Vakkari 1999; Wilson 1981, 1999).

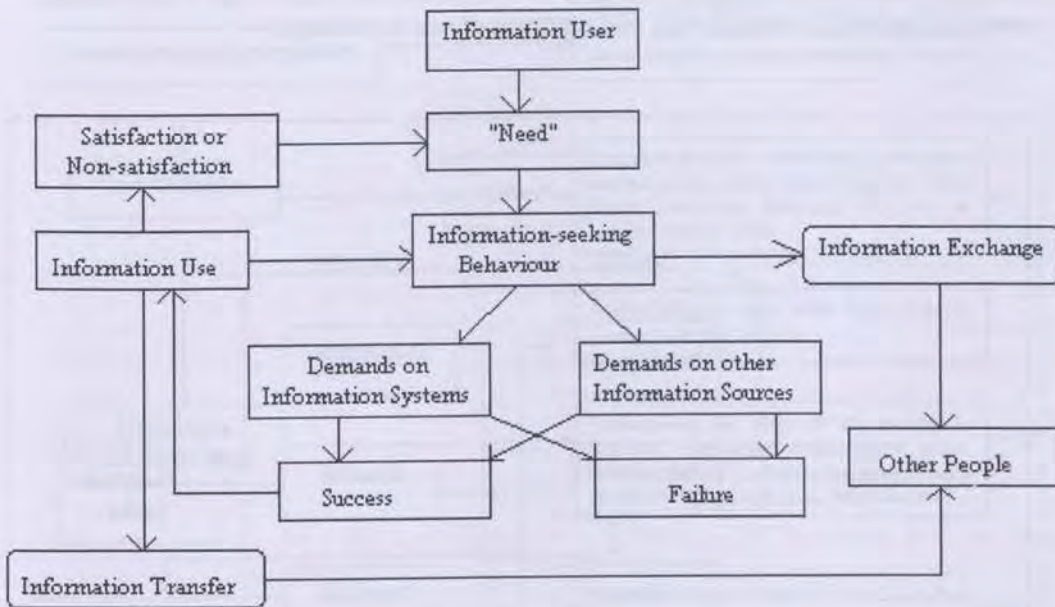


Figure 1 : Understanding user needs model (Wilson 1981)

Development of E-literacy schema: A k-map approach

Wilson's model has extremely helped in proposing a variety of models for understanding information needs and behaviour in different contexts (Borgman 1988; Dervin & Nilan 1986; Ellis 1993; Fidal 1991; Kuhlthau 1991; Saracevic & Kantor 1988; Vakkari 2003). Information seeking strategy takes different pathways through successive phases in a cyclic chain of foursome: (a) Task definition, (b) Search tactics and strategy, (c) Location and access, and (d) Retrieval and use information in a knowledge base (Vakkari 2003). These phases are search-specific; they might be modified according to user abilities, searching task and purposes of information use, yet complexity of information retrieval systems. However, the following examples represent how the four phases are chained in different models:

- David Ellis (1993): Browsing → Chaining → Monitoring → Differentiation → Extraction → Synthesis
(Information-seeking pattern, grounded theory)
- Kuhlthau (1991): Initiation → Selection → Exploration → Formulation → Collection → Presentation
(Information search process, ISP)
- Eisenberg and Berkowitz (2001): Task definition → Seeking strategy → Location → Access → Use and synthesis → Evaluation (Big6)

The building blocks of a conceptual model must adhere to (a) Concepts, (b) Relations, and (c) Functions (Gómez et al 2000). Therefore, a k-map for e-literacy created to accommodate the core successive phases of information seeking models previously mentioned. The k-map defines the interconnectedness of subject domains to cross

boundaries between disciplines. Figure 2 illustrates the two main steps in processing query requirements: query analysis and synthesis of new knowledge.

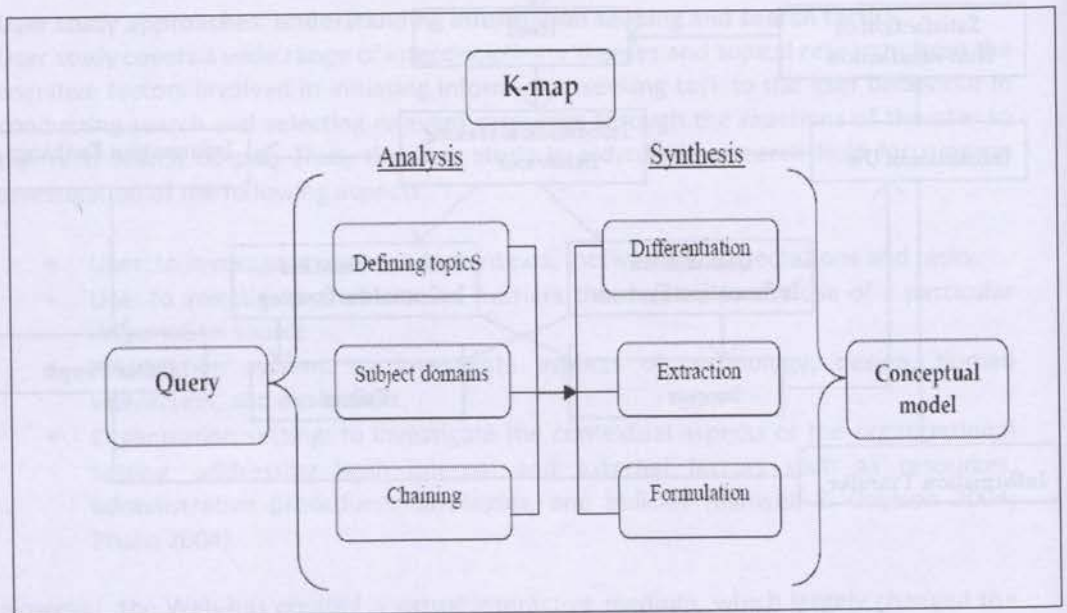


Figure 2: A k-map concept (modified from Gómez et al 2000)

The K-map model for e-literacy is purposely designed to help effectively in the information seeking process involved in scholarly use of the web, for instance e-research information retrieval from the web, navigation through networked online databases, etc. The theoretical references of Howard, Ellis, Eisenberg and Berkowitz, Kuhlthau, and Vakkari were logically elaborated to articulate spatial relationships between the components of the cyclic six steps. E-literacy schema could serve as catalysts to bridge disciplinary divide among subject domains. E-literacy is a critical tool for utilizing the myriad scholarly information available cast over the web, and for discovering the web as media, which provides a wide range of access to abundant information resources with powerful search engines. The model will equip the web user with subject analysis ability to produce searchable attributes for conducting effective web search. While in Figure 3 the author elaborates Ellis's model and the Big6™ to obey ACRL IL standards in a k-map illustration.

Initiation of ISP

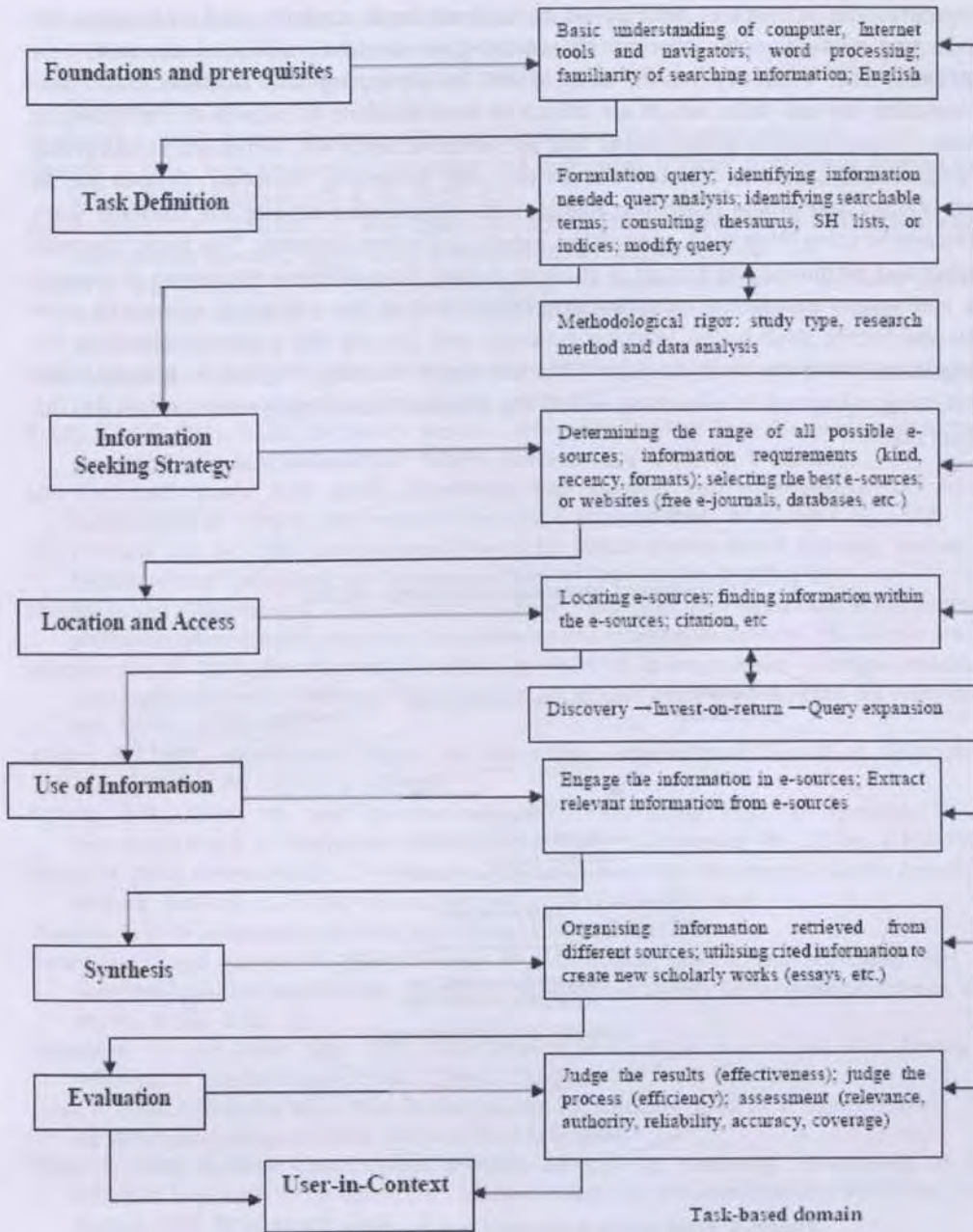


Figure 3: K-map for e-literacy schema

DISCUSSION AND CONCLUSION

The advent of the Web-based applications in the library learning settings has created a new searching virtual environment within which it is making possible to stretch library and learning resources beyond physical premises and time restrictions. Thus, the greatest impact of the Web does not come from the availability of plethora of information resources; rather the greatest impact is attributed to the significant improvement in the vastly access to scholarly information. The widespread adoption of CMS-enhanced learning through *Blackboard* platform motivated positioning this e-literacy schema within the Laptop Education Project "e-learning initiative" at UAE

University. The schema is anticipated to support both students and instructors for conducting professionally information searching in electronic environment with new approach. The e-literacy model also assists in equipping the students with new information literacy skills, which are critical to help students to cope with the changing within ICT-rich learning environment. The presented schema was tested with small group of engineering students; the test return was very promising. However, serious gap in Web literacy and online searching abilities was experienced despite the students were proficient in using Web tools as chatting, email, and entertainments. This paper deemed further test within varying groups of students drawn from different disciplines to support the continuous evaluation, updating and refinement of the e-literacy schema to cope with the future Web-based learning process, and chasing the potential channels for integrating e-literacy module into CMS-enhanced learning. Figure 4 presents the positioning e-Literacy in e-learning within the academic computing environment at UAE University.

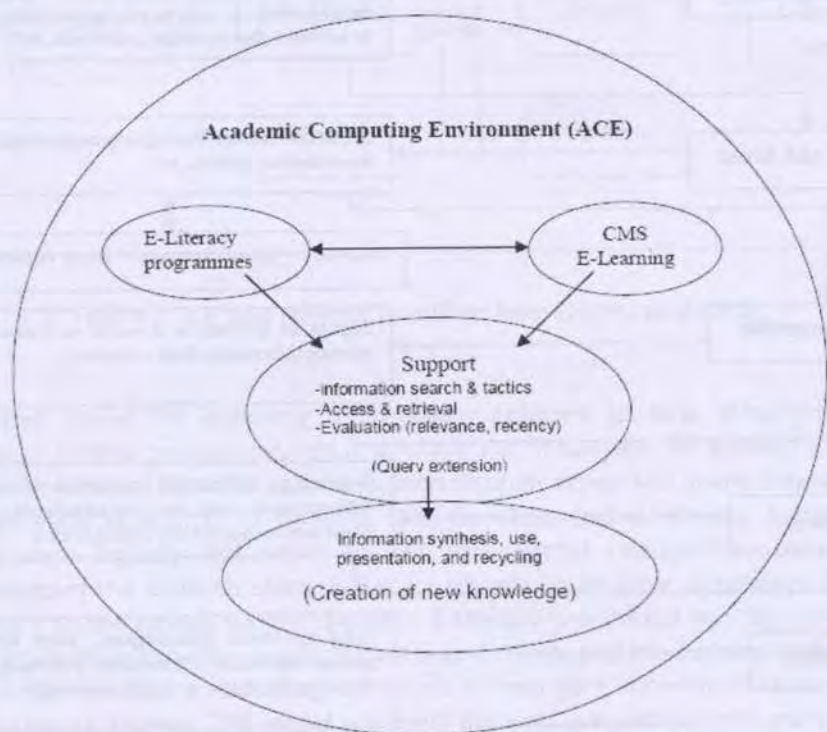


Figure 4: Positioning e-Literacy in e-learning within ACE

On the other hand, the instructors are required to encourage the students to participate actively in the present day virtual learning environment so as to stay-in-touch with the prompt development in educational technology, and to cope with progressive complexity of knowledge and learning process. E-literacy is yet needed to empower the students with search and analytical skills to make effective use of CMS-aided courses. Knowledge or concept map (k/c-map) is a technique learning objects that dedicated to e-learning offerings (Howard 1989).

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