

Designing a Platform of Online Inquiry-Based Learning for Information Literacy

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Abstract

In today's information-rich society, the need for information literacy has urgency. Three tasks of information processing are filtering, meaning-matching, meaning-construction that could be strengthened through inquiry-based learning. The cycles of reflection and practice develop the habit of mind, or conscious information processing that allow the learners to acquire higher level of information literacy. An on-line inquiry-based learning environment designed for information literacy may help learners to perform their lifelong learning better with the ability to appreciate, locate, evaluate, and use information effectively.

Keywords : Information Literacy, Inquiry-based Learning, Online learning environment

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I. Introduction

The necessity of information literacy is increasing in this information-saturated society where it is essential for us to keep pace with the knowledge and technological expertise necessary for finding, applying, and evaluating information. Given the ever-expanding sea of information at our disposal, the ability to locate, evaluate and use effectively the needed information is critical to learning process, especially to life-long learning. Those who are information literate can analyse and interpret information and this ability enables them to respond critically and creatively to problems. The acquisition of information literacy involves mastery of certain skills, construction of specific knowledge and the adoption of certain attitudes.

Though the importance of information literacy is recognized, progress on education and research related to information literacy concerns is too small to go beyond introduction of its concept (Kim, 2001). It is time we dealt with the more practical and concrete methods of how to help learners to acquire information literacy. One of the critical issues in information literacy is how individuals deal with the information and create their own information. Understanding of the concept of information literacy will help us to know how we can facilitate learners to acquire carry out their self-directed learning more actively than they learn in traditional classroom.

As for a theoretical background, inquiry-based learning on the basis of constructivist epistemology provides essential principles for designing a learner-centered environment. The web has potential by nature for realizing learning environment fit for constructivism. In inquiry-based learning, the process of acquiring the knowledge rather than the 'knowledge' itself is emphasized. The purpose of inquiry-based learning is to facilitate higher order thinking and self-directed learning. On the web, learners are able to inquire into the solutions by themselves.

The purpose of this study is to design a platform of inquiry-based learning for information literacy. The design principles of this environment promote information processing of filtering, meaning matching, meaning construction, which are inquiries and reflections on direct experiences, and support collaborative learning and individual knowledge construction. Guides to resource utilization, learning activities, and directions of learning are provided.

II. Theoretical Framework

1. Information Literacy

The Korea Institute of Life-long Education Evaluation has defined information literacy as the ability to create knowledge that is meaningful in their real lives, and to manage the way the knowledge is communicated in their community (KILEE, 2002). The information literacy requires both ability to use digital technology and critical power. The American Library Association (ALA)'s Presidential Committee has defined information literacy as the ability to know when information is needed, [and] to be able to identify, locate, and effectively use that information for lifelong learning and problem solving. In this report, the ALA Presidential Committee called for a restructuring of the learning process in order to create a new information age school characterized by interactive, self-initiated learning with the teacher as the guide to learning. The Council of Australian University Librarians (CAUL) released the first edition of the Australian standards for information literacy as follows (CAUL, 2001);

- **Awareness** of information needs.
- **Search** strategies for information.
- **Evaluation** of information and its sources.
- **Storage and retrieval** of information.
- **Use** of information to expand, reframe or create new knowledge.

- **Socio-cultural, ethical and legal** information literacy practice.
- **Lifelong learning context** of information literacy practice.

Acquiring these information literacy competencies requires higher order thinking and inquiring into the meaning and the context of the accessible information. Learners cannot acquire these competencies through 'delivering content,' rather through cultivating 'habits of mind (Hobbs, 1998),' and 'creative power.' The information literacy competencies are not the goal themselves but developing the capacity trained for solving problems faced in the way of real life. So the 'habits of mind' and 'creative power' are the desirable outputs of modern education.

2. Information Processing

Learners may have the habits of mind and creative power when they continue to question and weigh what they hear, see, and read in everyday life as well as in the classroom. Then they perform three tasks in information processing; the filtering task, meaning-matching, and meaning construction.

Among the vast number of information in almost all environments, learners decide to pay attention to the messages and not to pay attention to the others. When learners undertake filtering tasks consciously, they control their attention according to the level of their drive energy and knowledge structures. More motivated by specific needs, and more elaborate knowledge structures, they can keep their costs low (Potter, 2004).

Learners access to the meaning of an information by meaning-matching. With new information they ask an authority what it means. Once they have learned to recognize the information and absorb its meaning, then the meaning matching is automatic. However learners need to concentrate not just on the literal meaning but on the contiguous meaning in the situation.

With the skill of deduction, learners access a general principle observing a specific occurrence.

The skill of deduction is also used in the process of meaning construction together with the skill of induction. The learners can access more information from either outside sources especially through internet or inside sources from already existing knowledge structures. With more highly developed skills of analysis, evaluation, and grouping and more elaborate knowledge structures, learners have more resources to bring to meaning-construction tasks.

3. Inquiry-based Learning

Inquiry is defined as 'a seeking for truth, information, or knowledge by questioning (Byun, 1999).' From birth, individuals carry on the process of inquiry even when they don't reflect on this process. The process of inquiry begins with gathering information and data through applying the human senses of seeing, hearing, touching, tasting, and smelling. On the bases of reflective thinking, they constructs much of understanding of the natural and human-designed worlds, and produces appropriate resolutions.

The information is very important in the process of inquiry, but as a means to an end, not as an end in itself. As the content of disciplines is constantly expanding and changing, no one can ever learn everything. The skills and the ability to continue learning is the most important outcomes, which is the rationale for why inquiry-based learning environment is needed for lifelong learning.

The critical parts of the inquiry-based learning are follows:

- to ask questions to find problems
- to investigate multiple sources or media for the most appropriate solution
- to create with active engagement in learning

- to discuss including collaborating and understanding diverse views, and
- to reflect and learn how to learn.

Bruce and Davidson's (1996) study provides a model of inquiry for acquiring literacy competency. In that study, the process of learning starts from what the learners already know or what they have questions about. From these knowledge and questions, new questions and new knowledge branched out through observation, communication, reflection, and detailed construction. Learners will have the habits of mind while they go through this process. For the habits of mind are nurtured through asking questions and reflection. Guides of learning and useful questions should be provided to learners. These scaffoldings help learners to ask their own questions. Useful questions guide and facilitate learners to use critical thinking on the given problematic situation.

In an on-line learning environment for information literacy, learners will consciously plan, self-manage their own inquiry activities, and continually construct their knowledge base with asking, investigating, creating discussing

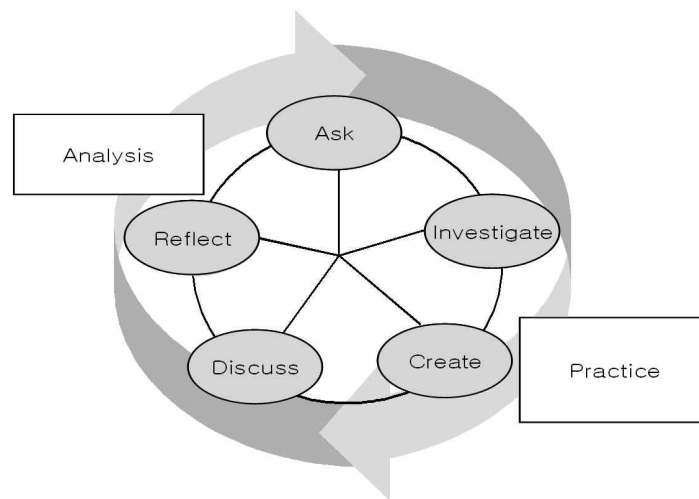


Figure 1. The process of inquiry in information literacy
(from Bruce & Davidson, 1996)

and reflecting. In figure 1, a cycle of inquiry-based learning adapted to information literacy helps to visualize how five activities of inquiry within the analysis-practice recurring structures comes into play(Bruce & Bishop, 2001).

The distinctive features of the on-line environment fit the activities of inquiry-based learning, and learner-centred environment which is one principle of constructivism. In an on-line environment, learners do carry out their learning by themselves, participate in it, and have ownership for it. They have access to unlimited resources for inquiry and opportunities to develop their inquiry and problem solving (Bonk & Dennen, 1999). We made the process of learning in an on-line learning environment for information literacy (see Figure 2). The process has components of learning

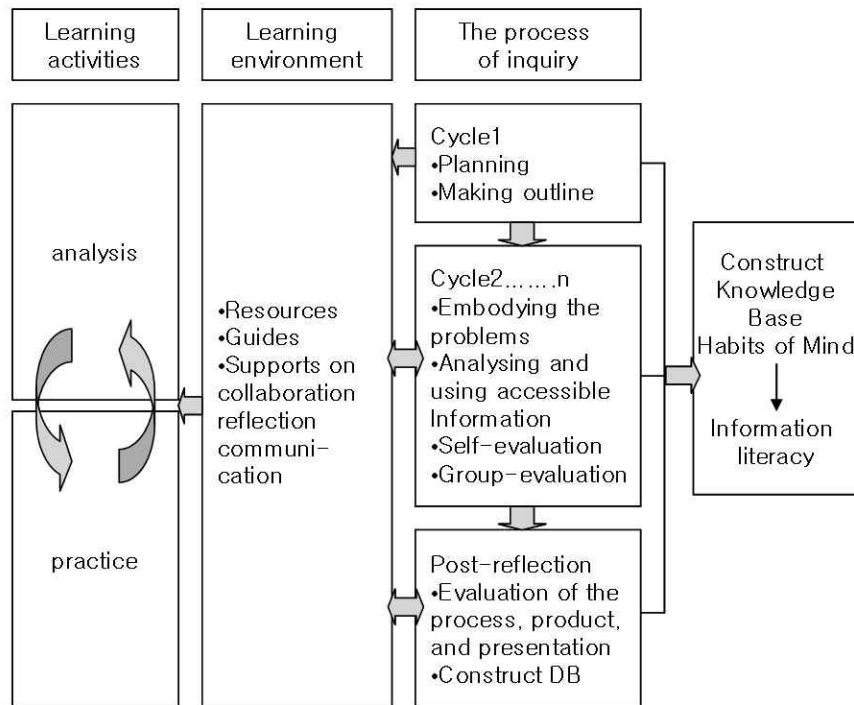


Figure 2. Process of learning in an on-line learning environment for information literacy

activities, learning environment, the process of inquiry, and knowledge base and habits of mind as the products.

This process of learning reflects the view that it is not technical delivery of knowledge that make habits of mind that are part of the character of the information literate, but rather the cycles of inquiry through close interaction of analysis and practice. It emphasises learning environment as a spaces where the activities are performed, and as resources that fuel the process of inquiry. The elements of learning environment are embodied as spaces - spaces for individual learning, group work, communication, resources sharing, and others. In the spaces the learners perform inquiry activities.

III. Designing an Online Learning Environments

The on-line learning environment is the place where learners are able to carry out the inquiry and access unlimited on-line information, construct knowledge base and value system, and finally present their own information. The principles on the basis of inquiry-based learning for such environment are as follows:

- Learners learn through direct experiences on the basis of inquiry.
- The process of inquiry has cycles and progress with reflection.
- Support collaborative learning and individual knowledge construction.
- Diverse learning resources are provided.
- Guides to self-directed learning are provided.

Based on these principles, design strategies for the on-line learning environment are suggested (see Table 1). First, help learners to experience directly what they need to learn more effectively with supports to inquiry and practice. Awareness on the learning process and methods of inquiry enables learners performed their learning actively. Resources and best examples of information

Table 1. platform of on-line learning environment for information literacy

	space	contents
especially for information literacy	Classroom	<ul style="list-style-type: none"> •Introduction to this program •Information inquiry •Information creating process •Gallery-providing best practices, sharing results, and exchanging opinions with peers •Chat room-synchronous communication •Discussion room-asynchronous communication
	My room	<ul style="list-style-type: none"> •Album •Schedule •Reflection notes •Messenger-addresses, mail, message exchange •My library
	Group workshop	<ul style="list-style-type: none"> •Project management-sharing project goals, schedule, roles •Sharing information of team members, community building supports (searching, bulletin board) •Whiteboard
for general activities	Resource room	<ul style="list-style-type: none"> •Links to relative sites •Data base
	Lounge	<ul style="list-style-type: none"> •Chat room for social communication
	Helps	<ul style="list-style-type: none"> •Q&A, FAQ •Notices •Site map

creation practice are also provided. Learners study the basic concept and methods as required initial subjects, and then select what they want to study among the various and specific resources according their interests and their roles in the team. Learners plan the schedule and check it.

Second, help learners to reflect the process of learning. With reflecting it,

learners have a thorough grasp of how they are carrying out their tasks, what goes too far, and what is short of. Based on learners' judgement the process of learning is continually improved. The progress of their project is shared with other project teams who are facilitated to exchange questions and advice. And learners may reflect the experts' practices through experts' modelling. Analysis on the experts' information processing and creating enables learners to understand what information literacy competency is and helps them to present their knowledge they construct originally by themselves. Analysis on the information is one of the reflections which is comparing how they think, carry out their tasks, and solve their problems with how the experts do.

Third, help learners to collaborate with communication tools and co-working support tools for collaboration. With these tools, learners are able to construct common understanding and co-work with the minimum noise (Kang, Seo, & Kwon, 2000). These tools include tools for awareness sharing, schedule checking, task planning, idea exchanging, making out product in cooperation. These tools should be effectively integrated for users' convenience.

Fourth, help learners to use diverse learning resources according to their interest. Learners will participate in learning more actively when they collaborate and share the information as well as opinion with peers. They can be the learners who have same interests or take same roles in other teams. Support to communication between groups will guide them to create their own learning resources spontaneously. And learners can learn more efficiently with taxonomy and introduction of provided resources and links. These meta-data will be useful for learners to evaluate and process the information by themselves. Learners may exchange their opinions and useful information.

Fifth, help learners to plan and control their own learning. They may make

a note of what they learn and think in the process of problem solving. Documentation helps learners to check what they have done and what they are doing with peer learners, and to internalize what they have learned collaboratively. Learners should realize that they are the subjects of their learning. Guides that lead them to ask new questions through reflections should be provided indirectly. When learners are provided with scaffoldings of appropriate questions in making a note of reflection, and reflection on the experts' modelling, they can deepen their understanding, and improve their learning activities. They are allowed to select what they are interested in after they finish the required subjects. They can check the process of their learning, and rearrange their plans.

IV. Results

Based on the principles and the strategies, a prototype for an on-line learning environment for information literacy is developed. This environment (see Table 1) has a 'classroom' containing elements related to learning activities, 'my room' related to individual knowledge construction, and a 'group workshop' for collaborative learning. In learners' asynchronous communication, learning materials and results, and resources and links in a 'resource room,' which are managed in Data Base, diverse types of information is provided to learners, and the direction of learning is suggested through underlying guidance in 'information' and learning activities.

The components of the on-line learning environment are divided into two parts; spaces for information literacy, and spaces for general activities. The design that was adopted relied heavily on the visiting-the-school metaphor and incorporated navigation based on use of a school metaphor. It has resource room, lounge, and helps for general activities. For information literacy, it has the 'home page', a 'classroom', 'my room', and 'group workshop' as follows:

1) Home page

When learners log in the learning environment, they are welcomed at the 'home page' designed with familiar metaphor of a school. The basic ideas about information literacy and the program are provided before learners begin their activities in this program.



Figure 3. home page



Figure 4. gallery in 'classroom'

2) Classroom

The cycle of inquiry in information literacy is supported. Teaching and learning are implemented at this classroom. Resources directly related to the learning contents are provided at the gallery. Learners may read experts' explanation and observe experts' products. Learners reflect on the experts' process of information inquiry comparing with theirs. They may make meeting with teachers and peers with synchronous and non-synchronous communication tools; forum and chat room.

3) My room

The number of the messages sent in the owner's absence appears in a pop-up mini-screen. The learners may decide which part and how much of their room they will share with peers. Others can read and write with the owner's permission. The menu of the 'my room' includes 'Reflection notes', 'my schedule', 'album', and 'my library'.

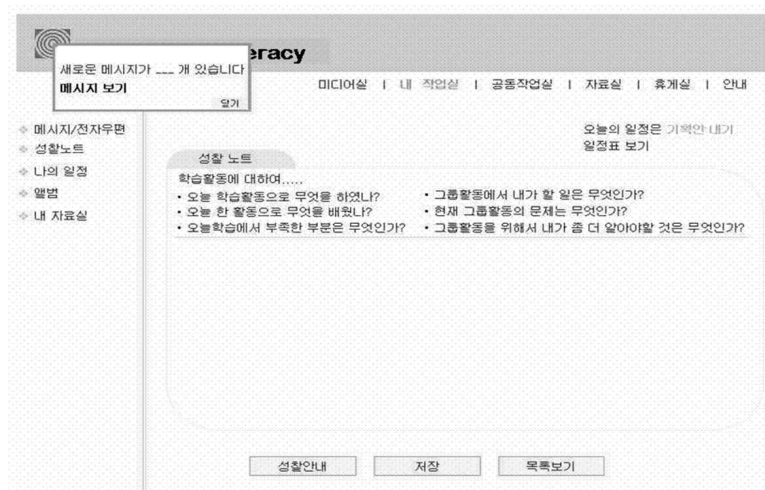


Figure 5. reflection note in 'my room'

4) Group workshop

At project, learners may set the goals of the team and the team schedule, divide the roles, share the information useful for their work, exchange their opinions, and negotiate with peers for the task performance. Learners may search and come in contact with the people who are playing the same role with them in other teams. The learners with similar interests can build communities in this 'group workshop'.

5) Resource room, Rounge, and Helps

The learners may access to the useful links of relavant resources. They can participate in activities such as uploading new resources, taking resources to the resource room of 'my room', and voting for or against individual items. They may make social interactions in the rounge, talking freely with others, and sharing other resources unrelated to the activities.

Helps are provided in Q&A, FAQ, and site map. The learners may ask about learning difficulties as well as technical problems and also participate in answering for the questions with teachers or administrators. They may

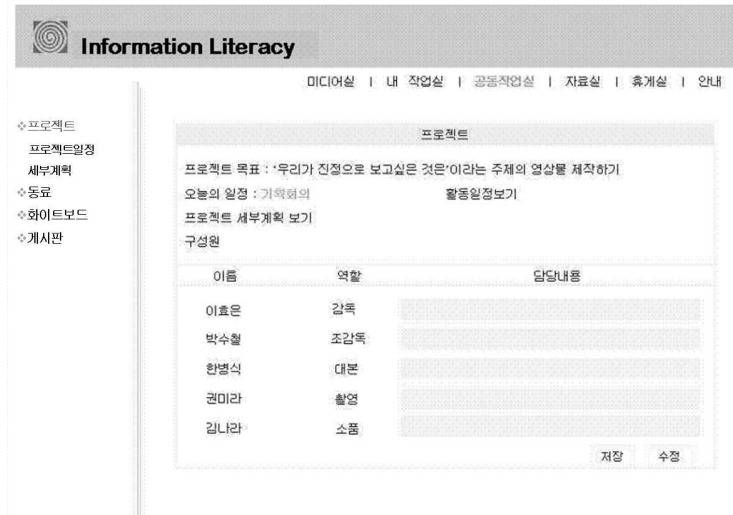


Figure 6. project in 'group workshop'

move to any room where they want to go through the site map. The notice can be checked at Helps.

The on-line learning environment for information literacy was developed on the basis of inquiry-based learning, and three graduate students tested the program. The learners recognized the usefulness of the spaces divided according to the activities, the importance of information inquiry, the needs for strategies of inquiry, and supports on effective communication. The conceptual knowledge on the information literacy provided before they delved into problem solving in earnest positively affected their activities.

The learners said, “The web is one of the most appropriate tools for information literacy because they acquire, analyse, synthesize, and create the information through the web recently. The web may also provide them with the authentic context of learning information literacy. The constructive theories and methods are fit to this web-based learning environment. Next phase of development would be focused on building learning community in the environment, especially creating incentives for the external experts to participate continually in the community.”

V. Conclusion

In this inquiry-based learning environment, it is learners who set topics for inquiry, collaborate with members of other teams as well as those of their team. They do not only absorb the existing information but also create new information. It is not teachers but learners who manage learning process and schedule with monitoring the entire process. They continue reflecting on experts' best modelling while acquiring information literacy about how to create information from 'information creating process' in 'classroom' and analysing existing information in 'information inquiry'. On the other hand, they are engaged in cyclic inquiry with practise of creating and exchanging

influence so that they may develop information literacy. With more development of contents, this platform will be use for information literacy classes.

Research on the information literacy is only fledgling despite of the high speed of information communication technology (ICT) development and its diffusion. This study is the first to incorporate the strong point of on-line learning environment for information literacy, which is inquiry-based learning. It will contribute to establishing the inquiry-based learning environment for the information literacy and shed light on the future development.

The on-line learning environment for information literacy should be improved and complemented through continuous research in the future. First, there should be principles and strategies to induce and motivate learners' active participation. Second, the operation, management and assessment of learning should be taken into account in the on-line learning environment. Third, more experimental research should be carried out by refining the prototype into a practically applied environment.

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