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Interactive Teaching Methods in Relation to Electronic Information Access[1]

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In the spring issue 1996 of the electronic journal *Educom Review*, two information professionals - not librarians - proposed what to some may be a radical idea: "information literacy as a liberal art." They also exposed one of the best kept secrets in modern librarianship, namely that information professionals - and librarians are after all information professionals - are not simply concerned with the implementation or uses of information technology, but also with providing "knowledge and literacy about this technology." Shapiro and Hughes ask: "What sort of 'information literacy' - an often-used but dangerously ambiguous concept - should we promote, and what should it accomplish? Is it merely something that will reduce the number of tech-support calls that we have to deal with? Something to grease the wheels of the information highway? Something that, as defined by representatives of the library

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community, enables people to be "effective information consumers'?" (1996, p. 1)

The electronic infrastructure in today's academic libraries has a tremendous impact on the research process, and on the way users approach the library or information tools in general. As early as 1986, studies showed that the OPAC (Online Public Access Catalog) produces in users a false sense of confidence in their understanding of its content and their "knowledge required to use it effectively (Baker, 1986, p. 36). By now, many academic libraries have expanded their online catalogs to include access to periodical databases, commercial multi-databases, and the Internet. These one-stop-access-to-all-information-tools or "supercatalogs" further shield from the users the complexities of contemporary information access. The result may be more users with a faulty sense of confidence, or the opposite - users with a sense of bewilderment, confusion, and frustration.

The situation gives new impetus to the teaching role of information professionals today. Academic librarians need to reexamine teaching methods, learner attitudes, and the place of technology within the teaching context. Instruction based on tool demonstration without student interaction or instruction that includes hands-on sessions without clear objectives fails to teach students the critical thinking skills needed to make sense out of the multi-dimensional, dynamic information environment. Such teaching underscores users' perception that mechanical manipulation of an access tool is equivalent to mastering the research process. To provide users with the necessary tools for exploiting the plethora of available information and its access mechanism, library instructors need to put conceptual concerns and interactive teaching methods ahead of mechanical database demonstrations and exercises.

Modern Library Users

Everybody today, including information professionals, experiences information overload. For many academic library users, however, the experience is often overwhelming because they lack understanding of how information resources appear and how they connect. In the age of information overload even experienced researchers can get lost among the myriad of information access tools. While they possess the analytical skills and content knowledge of a particular field to discriminate among available material, researchers cannot always keep up with the development of new information technology pertaining to their filed. Many of them also lack the technological expertise to manipulate high powered database systems effectively. The problem is magnified for the inexperienced researcher who lacks content knowledge and a sense of the research process. Every academic librarian has encountered what Cerise Oberman calls the "uninformed user, who exerts total faith in the technology and equates access to electronic databases with availability of all pertinent and relevant data" (1996, p. 317). On the spectrum of "uninformed users" some consider themselves masters in interface manipulation and are not afraid to migrate from system to system; others are intrigued and at the same time intimidated by the apparent power of the machine and often readily admit their techno phobia. Both are ineffective in their approach to the research process.

The "uniformed user" is the product of what Neil Postman calls "technopology," the 20th century belief in human efficiency through technology, the belief that technical calculations are superior to human judgements (1992, p.51). The Internet is a good example of the latest form of technopology: many view it as an informational silver bullet, but few understand its volatile nature and how that

affects the research process. The concept of technopology is also reflected in the way research in the computer industry portrays the average users of computer technology: users are not interested in interface design or data structure; they simply want the machine to accomplished a task. In the information field that task is usually not information retrieval but document delivery. Furthermore, users want to accomplish their task with minimum cognitive involvement, and they are more likely to continue to use systems if they find the task pleasurable (Marchionini, 1992). Such research tells us something about human nature, which can lead to better system design, but it fails to address the problem of how users of the electronic library can tackle the problem of information overflow. Academic librarians are often witness to students' anxiety and frustrations in dealing with assignment deadlines, the challenge of choosing the right information access tools, and the quantities of seeming information dead-ends.

Many students today lack a clear understanding of information concepts related to access, retrieval and evaluation of information. To become information literate, students must learn the concepts of information access, for example being able to relate a topic to various subject fields to determine a focus and eventually choose the relevant access tools. They must understand retrieval concepts, for example be able to build mental maps of database structure and learn the role of controlled vocabulary. Finally they must learn to apply principles of evaluation in order to facilitate the discrimination among the retrieved information. Once users of modern libraries possess this knowledge, they start to gain a sense of empowerment over the highly technical library environment. As Nahl explains, they start to operate tools "by systematic trial and error, instead of semi-randomly or illogically" (1997, p.1). Becoming information literate,

however, requires the application of higher level thinking skills, which is an unpopular suggestion in a time when many library users, want quick answers and perceive the technology as providing total access without discrimination.

The Role of Technology in Conceptual Learning

In evaluating the effectiveness of hands-on training in the electronic classroom at Brigham Young University, library instructors found inconclusive evidence to assert that students who received hands-on training gained better library literacy skills than those who attended lecture/demonstration library session. The results of the study were attributed to students' lack of knowledge about the overall organization of information and its intellectual access points (Wiggins, 1994). The study confirms that one can simply not accept as a foregone conclusion that hands-on training in an electronic classroom automatically leads to effective information literacy skills. Computers are tools for learning. They assist learning and contribute to students' motivational factor in learning, but they do not substitute for student involvement in the cognitive process.

Researchers have only fairly recently started to explore the relationship between use of computer technology and cognitive development. Kozma states: "Given the uniqueness of the medium, it may be that we have yet to fully exploit our understanding of computes or explore their untapped potential" (1987, p. 21). With the exception of software packages that are specifically designed to extend or enhance human cognition, most instructional technology only stimulates learning related skills that are already present in the learner, so the learner can use the activated skills to develop other skills or declarative knowledge. The "cut and paste" capability in a

word processor, for example, can enhance the process of the revision, but not the quality of the revision process (Kozma, 1987). Likewise, database searching can enhance the speed of the research process, but not necessarily the quality of the process. Unless hands-on sessions in the electronic library classroom are integrated into the conceptual framework of the overall information seeking process, their contribution to the teaching of information literacy is limited.

Calls for using a conceptual approach in library instruction are not new. Instruction librarians in the late seventies and during the eighties produced several models for switching from a tool-based approach to a concept-based approach in the teaching of library instruction (Oberman and Strauch, 1982; Tuckett and Stoffle, 1984; Reichel and Ramey, 1987; Nahl-Jakobovits and Jakobovits, 1988). Nevertheless, as early as 1982, Oberman lamented the fact that concept based library instruction was giving in to the teaching of "tool usage." She was one of the first in the field to assert the need for incorporating critical thinking into the library curriculum, stressing that research is not "a series of predetermined procedures," but rather "open-ended, involving problem-solving and creative thinking" (1982, p. 111). Jon Lindgren implied the same message in her formulation of a theory for library instruction in 1982:

> The academic library contains a reference apparatus that enables much better handling of information sources than students commonly use, and it is the functioning of that apparatus in the process of intellectual inquiry that provides a theoretical foundation of library instruction (p. 29).

The changed "reference apparatus" of the contemporary academic library creates an urgency for academic libraries to reaffirm and implement that theory in their library instruction programs. As modern library users are faced with the vast array of information

resources, accessible through widely divers formats and infinite subjects, they need to understand more than ever how that "apparatus" functions in the research process.

The Theoretical Basis for Concept-based Learning

Cognitive scientists have demonstrated that the development of expertise in a field of knowledge or the acquisition of a skill require an active process whereby received or self-generated information interacts with the knowledge base in the learner's domain (Chi, Glaser & Farr, 1988; Kuhn, 1988; Kintsch, 1994). According to Bruner's theory of education, learners are more motivated and can retain knowledge better if it is presented within a structure that ties it together and relates it to the learner's cognitive structure. He notes, "learning that has fallen short of a grasp of general principle has little regard in terms of intellectual excitement" (1963, p. 31). Learning takes place when the learner becomes aware of information, relates it to previous knowledge, and recognizes the relationship between the two through a process involving acquisition, assimilation and consolidation (Ausubel, 1998).

In the Pigetian developmental scheme this "active process" occurs during the "formal operational level, "when individuals have learned the reasoning process, for example the ability to formulate, test, and discard the whole range of possible solutions to a problem until the appropriate solution is found (Inhelder and Piaget, 1958). As such, the learning of bibliographic concepts involves activities as assimilating analyzing, categorizing, synthesizing and evaluating, which are the tenets of what we call critical thinking. For example, before even using an electronic access tool, users have to analyze the various available tools for different disciplines. To gain a conceptual

framework for searching a bibliographic database, users have to be able to do the following: break down components of the database (analyze), recognize the relationship between the elements in order to understand its structure (synthesize), and judge the validity and criteria of the elements, for example recognizing the importance of subject fields (evaluate). In order to evaluate the retrieved information, a user needs a conceptual understanding of the process of publication, for example the difference between primary and secondary sources or refereed and open publications.

Implications for Teaching Methods

As evidence from cognitive science indicates, generative learning is an active process: an individual does not simply absorb information, but processes new information within an existing cognitive pattern. Interactive methods or "active teaching," a term often used to denote the same thing, stimulate the active learning process. According to Bonwell and Eison, active learning occurs in a classroom under the following conditions: students do more than just listen or pay attention; they are involved in higher-order thinking and engaged in activities such as reading, discussing, writing and problem-solving. Finally, students are asked to pay attention to their own attitudes and values about learning (1991, p.2). As Oberman explains, active teaching is a "pedagogical tool that assists students in drawing on their own experience as a bridge to new experiences," a tool "that allows students to discover and apply concepts or the problem at hand, most importantly, [sic] a tool which explicitly demands that students think critically and act creatively" (1991, p. 199).

Interactive techniques either stress interaction between the teacher and student or between or among students themselves. Techniques include, among others, teacher or student generated questions, discussion, in-class writing, peer-teaching, group work, case studies, or other techniques that initiates reasoning or problem solving activities. The goals of the learning process determine the teaching techniques that should be chosen (Weinert and Helmke, 1995). Weinert and Helmke, in their study of appropriate methods for effective learning, conclude that teacher-controlled methods for active learning are more suitable when the desired outcome is "knowledge acquisition and academic performance," whereas students centered learning may be more appropriate if the goal is to assist students in the process of becoming independent learners (1995, p. 140). Even though the traditional goal in library instruction has been and still is to produce "self-reliant library users" (Robinson, 1876; Nahl, 1997), both techniques have their place in the library classroom, where students must internalize conceptual frameworks in order to become independent information seekers. It must be noted that even in classrooms where students engage in independent learning activities, the instructor maintains a certain level of control. Such learning activities, to be effective, must have clearly stated goals and performance guidelines and, as Cerise Oberman notes, the instructor must be present at all times, assisting students in their "discovery process" by providing "feedback and reinforcement" (1991, p. 199).

To instigate the discovery process for self-directed learning, instructors must confront students with a problem-solving activity, an exercise that challenges the mind to think actively and constructively (Oberman, 1991, p. 198). Cris Guenter calls such assignments creative problem-solving assignments. A creative problem-solving

act satisfies two criteria: it "provides a workable solution to the problem," and "most people could not or would not have arrived at the same solution" (1994, p. 64). One way to trigger such activity is through a methods known as "effective questioning" (Bonwell and Eison, 1991, pp. 27-29; Hansen, 1994; King, 1994). Instructors using these techniques discriminate among various types of questions, favoring those that address higher cognitive levels such as analysis, application, comparison, or evaluation, such questions as "explain why or how....," "What would happen if...," "What is the difference between...," "What is the best and why..." (King, 1994, pp. 22- 24).

"Effective questioning" can be integrated into various other interactive teaching methods such as group work or the lecture. In a modified lecture (Bonwell and Eison, 1991), the instructor pauses periodically to initiate students participation through effective questioning. Students either interact with the instructor directly or in group work with their peers, or they engage in a short informal writing exercise, for example summarizing a concept or engaging in a free writing exercise.

Several researcher have recognized that the affective domain is as important as the cognitive domain in the learning process (Mellon, 1986; Kuhltau, 1993; Mark and Jacobson, 1995; Fassinger, 1997). This is especially true in group activity. Small group work can provide energy and interaction, if a creative problem-solving assignment defines the focus of the task, and instructions to students are made explicit. "Effective questioning" lays the ground work for successful independent learning situations. Peer interaction can amplify student involvement. In a small group environment, students often assist each other and are responsive to each other, because the constraints of public exposure are greatly reduced in small student groups. The potential for individual frustration is also greatly

diminished (Oberman 1991, p. 199). Likewise, when working in pairs, students feel a similar relief of pressure and often a desire not to "let the partner down" (Nahl-Jakobovits and Jakobovits, 1985, p. 25). However, not every student feels comfortable working in a group setting.

For some students, peer pressure creates fears of appearing unintelligent. Starting a group activity with an exercise to bolster student confidence might be a good idea when students do not know each other. It relieves uneasiness. For example, when writing down their emotional reaction to the search process and sharing their apprehensions with other group members, students will recognize that peers often have similar emotions when dealing with a research assignment. They gain a sense of confidence when sharing those feelings with others in the class context (Fassinger, 1997)1985, p. 26). This technique also works for students' individual exploration of their affective domain when faced with a research problem. Journals for example, can provide a context for individual dialog between the student and the instructor, and they can promote understanding and reduce anxiety (Mark and Jacobson, 1995).

Each component in the library research process provides a context for developing creative problem-solving assignment. In 1980 Cerise Oberman applied techniques from other fields to incorporate problem-solving exercises into the library curriculum. For example, in a question- analysis exercise, students are asked to sort questions into two labeled piles. In the sorting process, students must determine whether questions are simple, compound or complex, which then determines what type of sources need to be consulted (Oberman, 1980). Oberman describes another technique called "guided design," whereby students are lead step by step through a problem-solving exercise (1980, p. 8-9). A considerably body of

literature outside the library field provides example of interactive techniques (see for example Halpern, 1994; Weimer, 1986). A technique called "example sequencing" lends itself to teaching students the process of narrowing a topic and fitting the topic into disciplines, and eventually to research tools. The technique makes use of the semantic organizers for brainstorming but extends one step further, where students must draw diagrams to depict particular relationships between the generated ideas (Newell Decyk, 1994 pp. 51-54). For example, students might brainstorm a broad topic like alcohol and through the sequencing technique recognize the different aspects of the topic and how each fits into a different discipline, and consequently requires a different access tools. Either one of these techniques lends itself to group or pair activity.

As early as 1987, Baker articulated the need for a new approach to online catalog instruction, a pedagogy that promotes "understanding of the structure of the system with principles for determining the procedures used to search the system" (1987, p. 203). However, efforts in developing techniques to teach database concepts for information retrieval have been slow to say the least. Kupersmith (1986) explored the idea of a graphical representation of an online catalog, and his use of the Venn Diagram to represent boolean searching is now widely used in library instruction. However, there is a need to design techniques that force students to explore database concepts. Janet Martorana and Carol Doyle provide students with a "tool analysis" worksheet which forces students to explore specifically the scope and access points in a particular database. They conclude that "tool analysis demystify students' illusion of the magical 'black box' by showing the relationship between a search and its results" (1996, p. 191). Several studies outside librarianship have confirmed the benefits of teaching

database design and structure (Ehman, et al 1992; Warner, 1988; Hannah, 1987). For example, with a basic computer program, students can create a simple database and learn field structure and how information in fields relate to each other (see Hannah, 1987). Librarians must explore multi-media tools that could be applicable to teaching database concepts. The "Learning Tool" described by Kozma, for example, is designed to assist in the learning of concepts, facts, and relationships (19987, p. 23).

To start implementing interactive teaching methods, instructors have to accept the assumption that critical thinking is more important than subject matter. Using interactive methods means sacrificing content; it also means facing the challenge of developing good problem-solving activities and exercises. Other barriers exist. Many instructors feel uncomfortable giving up control in the classroom, even though the literature on active learning presents evidence that such techniques produce learning at a higher cognitive level. Finally there is the time barrier. Although it is possible to incorporate interactive methods into a one-hour or two hour session. one-shot session (Ridgeway, 1987 and 1989; Dyckman, 1995), a sound pedagogy based on concepts and problem-solving requires more time. Thus librarians have the added task to convince the rest of the academic community that information literacy cannot be taught in single short sessions, but needs to be a fully integrated component into the university curriculum.

If academia were to treat the concept of information literacy as a "liberal art," it would recognize that library instruction involves more than the teaching of technical skills to manipulate information databases. One way to move towards that goal is to develop an information pedagogy that emphasizes conceptual concerns through interactive teaching, and then implement it.

References

Ausubel, D. (1968). *Educational Psychology: A Cognitive View*. New York: Holt, Rinehart and Winston.

Baker, B. (1986). A new direction for online catalog instruction. *The Journal of Academic Librarianship 12*(2), 35-41.

Bruner, J. (1963). *The Process of Education.* New York: Random House.

Bonwell, C. and Eison J. (1991). *Active learning: creating excitement in the classroom.* (ASHE-ERIC Higher Education Report, no. 1). Washington, D.C.: Geroge Washington University School of Education.

Chi, M.T.H.Glaser, R. & Farr, M.J. (1988). *The nature of expertise*. Hillsdale, N.J.: Erlbaum.

Dyckman, L. (1995). Beyond "first you push this button, then ...": a process oriented approach to teaching searching skills. *The Reference Librarian, 51/52,* 249-265.

Ehman, L., Glenn, A., Johnson, V., and White, Ch. (1992). Using computer databases in student problem solving: a study of eight social studies teachers' classrooms. *Theory and Research in Social Education, 20*(2), 179-206.

Fassinger, P.A. (1997). Classes are groups: thinking sociologically about teaching. *College Teaching*, 45(1),22-25.

Guenter, C. (1994). Fostering creativity through problem solving. In D. F. Halpern and Associates (Eds.), *Changing college classrooms* (pp.64-73). San Francisco: Jossey-Bass.

Halpern, D. (1994). *Changing college classrooms*. San Francisco: Jossey-Bass.

Hannah, L. (1987). Teaching data base search strategies. *Computing Teacher 14*(9), 16-20, 22-23, 51.

Hansen, C. B. (1994). Questioning techniques for the active classroom. In D. F. Halpern and Associates (Eds.), *Changing college classrooms* (pp.93- 106). San Francisco: Jossey-Bass.

Inhelder, B. and Piaget, J. (1958). *The growth of logical thinking: from childhood to adolescence.* New York: Basic Books.

King, A. (1994). Inquiry as a tool in critical thinking. In D. F. Halpern and Associates (Eds.), *Changing college classrooms* (pp.13-38). San Francisco: Jossey-Bass.

Kintsch, W. (1994). Text, comprehension, memory and learning. *American Psychologist, 49,* 294-303.

Kozma, R. (1987, November). The implication of cognitive psychology for computer-based learning tools. *Educational Technology, pp. 20-25.*

Kuhltau, C.C. (1993). *Seeking meaning: a process approach to library and information services.* Norwood, N.J.: Ablex.

Kuhn, D. (1988). *The development of scientific problem solving.* New York: Academic Press.

Kupersmith, J. 1986). The graphic approach. *Research Strategies 4* (2-4), 85-87, 143-144, 196-199.

Lindgren, J. (1982). The idea of evidence in bibliographic inquiry. In C. Oberman & K. Strauch (Eds.), *Theories of bibliographic education : Designs for teaching* (pp. 27-46). New York: R. R. Bowker.

Marchionini, G. (1992). Interfaces for end-user information seeking. *Journal of the American Society for Information Science, 43*, 156-163.

Mark, B. and Jacobson, T. (1995). Teaching anxious students skills for the electronic library. *College Teaching 43*(1), 28-31.

Martorana J. and Doyle, C. (1996). Computers on, critical thinking off: challenges of teaching in the electronic environment. *Research Strategies 14*(2), 184-191.

Mellon, C. (1986). Library anxiety: a grounded theory and its development. *College and Research Libraries, 47*, 160-65.

Nahl-Jakobovits D. and Jakobovits L. (1985). Managing the affective micro-information environment. *Research Strategies 3*(1), 17-28.

Nahl, D. (1997). *Forces against user-centered revolution.* [online]. Available: http://www2.hawaii.edu/slis/nahl/aritcles.

Newell-Decyk, B. (1994). Using examples to teach concepts. In D. F. Halpern and Associates (Eds.), *Changing college classrooms* (pp.39-73). San Francisco: Jossey-Bass.

Oberman, C. (1996). Library instruction: concepts & pedagogy in the electronic environment. *RQ 35*(3), 315-324.

Oberman, C. (1991). Avoiding the cereal syndrome, or critical thinking in the electronic environment. *Library Trends 39*(3), 189-202.

Oberman, C. and Linton, R. (1982). Guided design: teaching library research as problem-solving. In C. Oberman & K. Strauch (Eds.), *Theories of bibliographic education : Designs for teaching* (pp. 27-46). New York: R. R. Bowker.

Oberman, C. and Strauch, K. (1982). *Theories of bibliographic education : Designs for teaching*. New York: R. R. Bowker.

Oberman, C. (1980). *Pedals around a rose: abstract reasoning and bibliographic instructin.* Chicago: American Library Association.

Postman, N. (1992). *Technoplogy: the surrender of culture and technology*. New York: Knopf.

Reichel, M. and Ramey, M., Eds. (1987). *Conceptual Frameworks for Bibliographic Education.* Littleton, Co.: Libraries Unlimited.

Shapiro, J. and Hughes, S. (1996). Information literacy as a liberal art. *Educom Review 31* (2), 1-4.

Tuckett, H. and Stoffle, C. (1984, Fall). Learning Theory and the self-reliant library user. *RQ*, pp. 58-66.

Warner, M. (1988). Developing database files for student use. *The Computing Teacher, 15*(7), 44-47.

Weimer, M. (1986). Selecting instructional strategies. *Journal of Higher Education, 57,* 259-288.

Weinert, F.E. and Helmke, A. (1995). Learning from wise mother nature or big brother instructor: the wrong choices as seen from an educational perspective. *Educational Psychologist 30*(3), 135-142.

Wiggins, M. (1994). *Hands-on Instruction in an Electronic Classroom.* Washington, D.C.: Department of Education. Washington, D.C.: United States Department of Education,

Office of Educational Research and Improvement. (ERIC Document Service No. ED 369 391)