



Article

An Emerging Theory for Evidence Based Information Literacy Instruction in School Libraries, Part 1: Building a Foundation

Carol A. Gordon
Associate Professor
School of Communication, Information and Library Studies
Rutgers, The State University of New Jersey
New Brunswick, New Jersey, United States of America
E-mail: cgordon@scils.rutgers.edu

Received: 27 February 2009

Accepted: 06 May 2009

© 2009 Gordon. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract

Objective – Part I of this paper aims to create a framework for an emerging theory of evidence based information literacy instruction. In order to ground this framework in existing theory, a holistic perspective views inquiry as a learning process that synthesizes information searching and knowledge building. An interdisciplinary approach is taken to relate user-centric information behavior theory and constructivist learning theory that supports this synthesis. The substantive theories that emerge serve as a springboard for emerging theory. A second objective of this paper is to define evidence based information literacy instruction by assessing the suitability of performance based assessment and action research as tools of evidence based practice.

Methods – An historical review of research grounded in user-centered information behavior theory and constructivist learning theory establishes a body of existing substantive theory that supports emerging theory for evidence based information literacy instruction within an information-to-knowledge approach. A focused review of the literature presents supporting research for an evidence based pedagogy that is performance assessment based, i.e., information users are immersed in real-world tasks that include formative assessments. An analysis of the meaning of action research in terms of its purpose and methodology establishes its suitability for structuring an evidence based pedagogy. Supporting

research tests a training model for school librarians and educators which integrates performance based assessment, as well as action research.

Results – Findings of an historical analysis of information behavior theory and constructivist teaching practices, and a literature review that explores teaching models for evidence based information literacy instruction, point to two elements of evidence based information literacy instruction: the micro level of information searching behavior and the macro level of the learning task. On the micro level users are confronting information, and searching is seen as the entire process of the interaction of users with a series of information tasks, as described in Kuhlthau’s Information Search Process. The micro level is the level of deep understanding as critical thinking skills craft the connection between information and knowledge. On the macro level the learning task, designed by an instructional team, shapes the inquiry. It is the context for information tasks. The learning task is relevant, engaging, and rigorous to sustain the interest and interaction of the user with information and emerging knowledge. The macro level is the level of instruction whereby the learning task fosters self-reflection, self-correction, and self-regulation. The role of evidence, which is generated by performance assessment and action research, is critical to both levels. On each of these levels the learning task informs the information search.

Conclusion – Evidence is the link between information and knowledge in the learning process called inquiry. Sources of this evidence are information tasks embedded in the learning task, which are nested in a teaching and learning culture of inquiry. In order to generate evidence continuously throughout the inquiry unit, the task is characterized by research-based tools such as performance-based assessment and action research. The synergy of these elements in Part 1 of this article establishes the foundation for building a theory that supports further research of evidence based information literacy instruction.

Introduction

School libraries are complex environments where information literacy is taught in the context of curriculum content. This integrated approach of academics and information literacy sets the expectation that young information users will apply targeted information skills to their learning tasks. The content of inquiry derives from school curricula and state standards that are conducive to this kind of problem based learning. The collaboration between school librarian and classroom teacher provides support to users in the information and technology rich environment of the school library. The intent is that the school library

will function as a laboratory for users to construct knowledge as they use information skills as information management tools within the learning tasks that structure the inquiries. In everyday practice, however, school librarians are struggling with the recent shift to information literacy instruction that stresses information use. It is not uncommon to observe young people successfully searching, retrieving, and locating more than enough information but feeling overwhelmed when they are expected to use the information to resolve conflicting viewpoints, or synthesize facts to create new meaning, or integrate the information with what they already know about the topic.

These are examples of the information to knowledge connection whereby users construct meaning from information. However, they may resort to cutting, pasting, and plagiarizing because they lack the skills to process the information and successfully create learning outcomes that are representative of their new knowledge.

This paper posits that performance based assessment and action research are tools of evidence based practice when school librarians gather evidence to inform their practice and then engage in reflection to continuously improve that practice. Performance based assessment is a method of teaching that generates evidence of student progress. Action research provides a structure for this kind of teaching in the complex environment of the school library in order to:

- identify problematic areas in the design, implementation, and evaluation of the instruction;
- develop teaching strategies that generate data about student performance;
- collect evidence using qualitative methods in naturalistic settings;
- analyze evidence at the point of need and apply it to the revision of instruction; and
- apply evidence to determine how to do improve instruction in the future.

The purpose of this paper is to set a foundation for building a theory that supports the study of evidence based information literacy instruction. Part I describes significant shifts in school library instruction over four decades from the perspectives of theory and practice. It traces the evolution of information skills instruction, as well as information science research, which has been informing best practice since the 1970s. It examines performance based assessment as a

pedagogy that develops the concept of information use. It explores the place of action research in this pedagogy. Part II of this paper will develop a theory for evidence based information literacy instruction based on this foundation.

An Historical Review of the Practice of Information Literacy Instruction

The most significant shift in information literacy instruction has been from teaching information skills in isolation to an integrated approach that facilitates the information to knowledge connection. The American Association of School Librarians (AASL) introduced the concept of information literacy with the publication of revised information standards (“Guidelines”). AASL defines information literacy as the recognition of an information need and the ability to search, find, evaluate, and use information (“Partnerships”). These standards set benchmarks for information literacy but did not develop the concept of information use. They were revised in 1998 to include two important additions: 1) school librarians and teachers work as instructional partners to teach these skills in the context of academic school curricula and state and national standards; and 2) performance based assessments (or authentic assessments) (e.g., rubrics, journals, and portfolios) provide ongoing feedback, or evidence, to information users through self- and peer-evaluation, as well as teacher-student interactions. This teaching approach is a significant shift that places the teacher in the role of facilitator and provides opportunities for school librarians to create meaningful, inquiry-based learning tasks and assessments. In practice, however, school library instruction continues to focus on the basics of information searching and finding.

For several years teaching and learning in school libraries has been shifting from

behavioral, tool-based instruction to a constructivist user- and learner-centric approach. During the first forty years that libraries operated in schools in the United States tool-specific instruction focused on reference sources such as *The Readers' Guide to Periodical Literature* and the *World Almanac and Book of Facts*. Scope and sequence library curriculum documents mimicked core content curriculum, dictating when information skills were taught by grade level, with little relevance to what was happening in classrooms. In the United States two recent developments signify a change in classroom and school library instruction. Partnership for 21st Century Skills (P21) is a consortium of educators, corporate technology companies, stakeholders, and policymakers who developed a framework for 21st century teaching (Figure 1).

The outer rim of the rainbow in Figure 1 includes Life and Career Skills, Learning and Innovation Skills, and Information, Media and Technology Skills. These skills center around Core Subjects (i.e., science, language arts, mathematics, social studies, and history) and 21st Century Themes (e.g., globalization and the environment). The pool at the foot of the rainbow illustrates the support systems for teaching this curriculum: Standards and Assessments, Curriculum and Instruction, Professional Development, and Learning Environments.

The P21 curriculum framework influenced

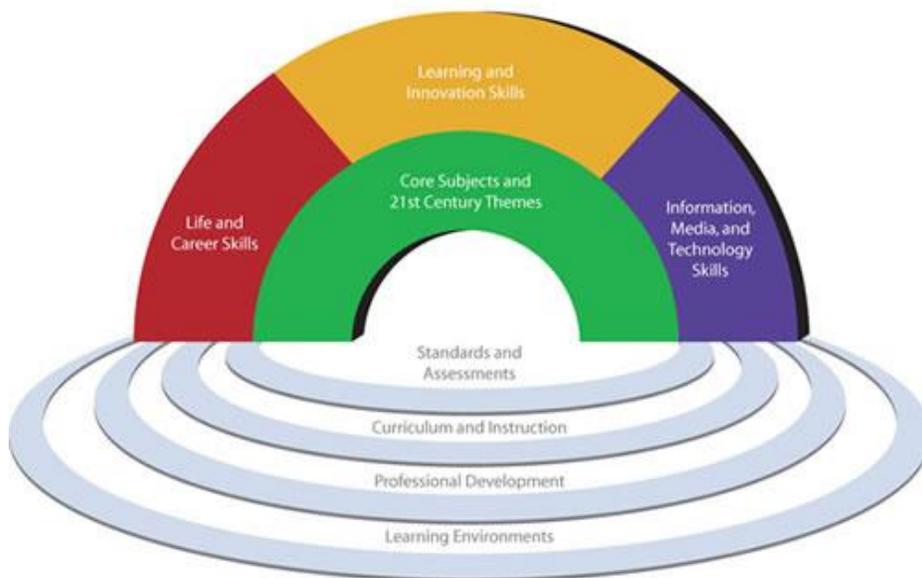


Fig. 1. Framework for 21st Century Learning

Source: <<http://www.21stcentury skills.org>>. Used with permission of the author.

the revision of national information literacy standards set by the American Association of School Librarians. AASL's *Standards for the 21st Century Learner* identified four goals:

Learners use skills, resources, and tools to:

1. Inquire, think critically and gain knowledge.
2. Draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge.
3. Share knowledge and practice ethically and productively as members of our democratic society.
4. Pursue personal and aesthetic growth. ("Standards")

These developments indicate a major shift in how information literacy is defined. It goes beyond information searching and retrieval to incorporate inquiry and critical thinking. The destination is no longer information, but knowledge, with a strong focus on information ethics, productivity, and personal growth. The P21 framework and AASL standards clearly represent a holistic approach to information literacy instruction that considers the needs of young people who are being educated for a world characterized by fast-paced change and global competition in a high tech, collaborative environment, where innovation and problem-solving are essential skills.

An Historical Review of the Theory of Information Behavior Research

The major shift in information literacy instruction described in the previous section is predicated on a theoretical shift from system to user-centric information science research. Information science research has

traditionally set the parameters for instructional practice in school libraries. Tool-based instruction echoed information retrieval studies. Most of this research consisted of online user studies focusing on adult searching behavior based on the behavioral-based best-match principle. Initial studies took place in higher education and were, for the most part, experimental and related to the system-oriented school of thought. A survey of the research found that most studies were bound by the system's definition of needs, with the menu of responses coming from the system, and not the user (Dervin and Nilan). Significant attempts to solve problems of the best-match principle included association relevance, or searching based solely on document collection characteristics (Croft) and relevance feedback (Robertson and Sparck-Jones), which is the use of information gathered from relevance judgments in modifying request formulations. Both remained within the best-match principle paradigm since they assumed that the eventual format of the request was equivalent to the ideal document (Belkin, Oddy and Brooks).

The shift from a system- to a user-centric focus began with attempts to define relevance, and eventually multi-dimensional definitions captured the complexity of the concept (Schamber and Eisenberg), incorporating both topicality and user need. A description of relevance as the usefulness of an answer or an indication of its significance to an important purpose (Saracevic), reflects a user-oriented approach. Models of information seeking evolved toward a problem-oriented school of thought grounded in cognitive science. The search process, it was theorized, progressed through phases, beginning with a vague notion of a lack of information. Belkin identified an anomalous state of knowledge (ASK) in which there were inadequacies, such as misconceptions. The

information need was defined as the gap between the user's knowledge about the problem and what the user needed to know in order to solve the problem. People acknowledged an information need, but because of lack of knowledge, found it difficult to specify precisely what information was missing. The expression of an information need, then, was a statement of what the user did not know (Belkin, Oddy, and Brooks) and could not be assumed to resemble the document to be retrieved, which was a representation of a coherent state of knowledge. Despite this shift to cognition, "...information science is traditionally based on the classic model that describes communication as the transfer of a message from a source to a destination - in information retrieval terms, from a system to a user" (Schamber and Eisenberg 5).

User-centric research laid the foundation for a process approach whereby users learned information skills in the context of inquiry. Learning tasks that grew out of content area curricula, such as social studies, language arts, and science, served the dual purpose of teaching information skills and course content. There has been recognition of the need for a generally accepted theoretical base to judge the value of existing programs and to provide direction for developing new programs of library skills instruction (Kuhlthau *Information Skills*). The concept of student-as-researcher (Gordon "Students") emerged to replace the transmission approach to teaching implied in behavioral learning theory (Richelle), where the teacher's instructional role is "sage on the stage," rather than "guide at the side." The former denotes teacher as lecturer; the latter, teacher as facilitator. The belief that behavior could be shaped by reinforcing, or rewarding, desired responses to environment led educators to devise steps to help learners achieve desired behaviors, or learning outcomes. However, behavioral approaches with step-by-step directions do

not accommodate the complex thinking processes required for doing research (Richelle). Cognitive learning theory states that knowledge acquisition occurs when learners relate new knowledge to prior knowledge, or the relevant concepts or propositions they already possess (Ausubel).

Constructivism supports a more flexible model for student inquiry that allows for reflexivity, active engagement, and collaborative learning. Constructivist learning theory posits that learners make their own meaning by building mental models, or constructs. This derives from the work of Piaget who described schemata—mental structures by which individuals organize their perceptions into categories to classify specific information. These schemata adapt during the learning process through assimilation, by which the learner integrates new information into existing schemata, or by accommodation, whereby existing schemata are modified to create new mental structures. Piaget's assumption that the individual is a critical thinker from birth laid the foundation for later research in cognition (Kulleseid) and the movement toward teaching critical thinking skills.

Constructivist type of learning is transferable to situations in the real world. Information users learn to think through issues that do not have prescribed responses or preset solutions. Information users learn to identify what is important to them, to construct new meanings, and to explain their new understanding to others in some way that is authentic to the topic. (Kuhlthau "Learning" 711)

Another initiative that promotes active learning, the problem-solving approach, dates to the work of Bloom and Broder. Identifying four categories of problem-

solving behavior was useful in discriminating between the problem-solving behavior of successful and unsuccessful information users. Successful problem-solvers question their knowledge and use that information to break the problem down into more manageable components.

The emergence of constructivism in education coincided with the emergence of cognitive psychology that has been applied to research on information searching behavior. The theory of personal constructs stated, "A person's processes are psychologically channelized by the ways in which he anticipates events." (Kelly 46) The function of a construct is to enable learners to anticipate events and predict outcomes; behavior is based on the predictions they make. Change in behavior is a response to a change in personal constructs. If the prediction proves accurate, the construct is validated; if the predication proves faulty, the construct is reconstructed. Kuhlthau's ("Facilitating") application of Kelly's theory

to information searching is based on the premise that the search process is a process of assimilation and construction involving feelings as well as thoughts. Throughout the information search users refine and re-state the research topic. For Kuhlthau, users' constructs of their information topics change as they become informed by the information they find ("Longitudinal"). This informs Kuhlthau's Information Search Process (ISP) ("Facilitating") in Figure 2.

Information seekers move from feelings of uncertainty to satisfaction or dissatisfaction according to the way they have handled the search prior to and subsequent to focus formulation, which clarifies the user's thoughts. Actions are considered as searchers advance from seeking relevant information to seeking pertinent information. When applied to the high school seniors the stages indicated information seeking is a complex learning process involving finding meaning (Kuhlthau "Information Search Process").

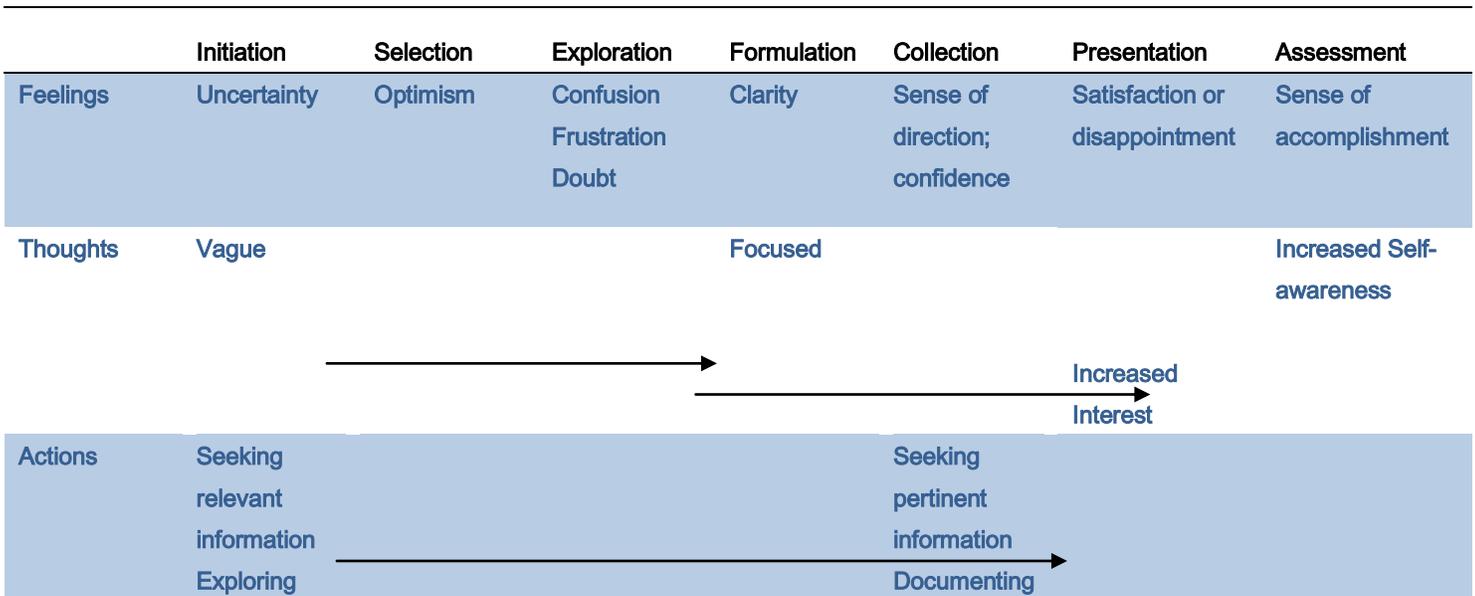


Fig. 2. Kuhlthau's Model of the Information Search Process Used with permission of the author.

Another study verified the model in a wider sample of users in academic, public, and school libraries (Kuhlthau, Turock, George and Belvin). Two longitudinal studies showed that the model held up over time by tracking the perceptions of the search process after users completed four years of college (Kuhlthau "Perceptions" and "Longitudinal").

Since the ISP model is generalizable and predictive, it serves as a diagnostic tool for school librarians to apply interventions to help information users at specific ISP stages. The theoretical framework for this concept is Vygotskii's Zone of Proximal Development (ZPD) that represents the learner's inability to move forward without assistance (*Mind*). The ISP helps educators identify zones of intervention based on the symptoms exhibited in stages of the ISP. For example, some users may not have the prior knowledge needed for initiating the learning task when they are expected to engage in background reading to build their knowledge. Interventions that provide images, descriptions, and explanations may be needed to help them fill gaps in their knowledge. Intervention is conceived as Guided Inquiry when a collaborative team of school librarian and classroom teacher(s) provides help that is critical for young people to move along the continuum from novices to experts, or independent learners (Kulthau, Maniotes and Caspari). The ISP and Guided Inquiry call for an evidence based approach to teaching where instructors gather evidence in the guise from the work of information users who may be trapped in the ZPD. Evidence also helps instructors to assess the effectiveness of their interventions, or help, so they can make informed decisions about revising their instruction when needed.

This historical analysis of the practice and underlying theories for information literacy

instruction point to two distinct elements of evidence based information literacy instruction: the micro level of information behaviors and the macro level of the learning task. On the micro level users are confronting information and searching is seen as the entire process of the interaction of users with a series of information tasks, as described in Kuhlthau's Information Search Process. Information behavior is not confined to searching, locating, and evaluating information. It incorporates the concept of information use whereby information is the raw material for building knowledge. The micro level is the level of critical thinking that engages users in deep understanding as they craft connections between information and knowledge. On the macro level the learning task, designed by an instructional team, shapes the inquiry. It is the context for information tasks. As such, it informs information searching behavior. The learning task is relevant, engaging, and rigorous in order to sustain the interest and interaction of the user with information and emerging knowledge. The macro level is the level of instruction whereby the learning environment, or task, fosters self-reflection, self-correction, and self-regulation. The role of evidence, and action research as a tool of evidence based practice, is critical to both the micro and macro levels of information literacy instruction.

A theory that supports a pedagogy for evidence based information literacy instruction rests on the substantive theory presented in this paper, i.e., a user-centric view of information seeking, a constructivist view of learning, and a process approach to library and information services that grows from the ISP and Guided Inquiry. The learning task is the engine that drives this manner of instruction that is predicated on evidence based practice. The substantive research in constructivist learning and information-seeking theory, as well as

developments that define best practice, point to the need for the practitioner to create learning tasks that relate to the real world and offer opportunities for critical thinking, problem solving, and revision of work. Our understanding of the affective, as well as cognitive components of information seeking and learning indicate that learning tasks engage information users and invite them to construct their own meaning. Concepts of relevance, engagement, and motivation, as they emerge from constructivist-based research, suggest that learning tasks must offer diverse opportunities for learning and interpreting information and data. It is clear that a monolithic research assignment, restricted to reading and note-taking as the only methods of discovery and presentation, is not adequate to accommodate the highly personalized model of information searching and use suggested by the convergence of substantive theories identified in this paper.

Literature Review: Research Based Models of Evidence based Information Instruction

Authentic learning tasks (Wiggins "Creating") are ideal for an evidence based practice approach whereby information users engage in "...the kind of work real people do..." (Wiggins *Educative* 21). The learning task is set in a real-world problem-solving situation in which the information user plays a role. This pedagogy is performance-based: information users demonstrate their knowledge and skill through authentic assessments that are anchored in the learning task.

In the world of professional work and civic or social life, self-assessment and self-adjustment are vital skills based on sizing up unfolding situations and bringing work to successful fruition by

comparing where we are and where we need to be. An educative assessment system would therefore deliberately build in and make central challenges that require the student to attend to feedback and make adjustments accordingly in authentically complex situations. (Wiggins *Educative* 35)

Such situations might include: design work and new product development; legislation and public policy; a business or personal financial plan; raising children; winning games as a player or coach (Wiggins, *Educative*). These contexts are well-suited to role-playing as information users conduct their searches in the context of a problem or challenge, as demonstrated by the following scenario:

You are a rescue worker who is sent to a natural disaster site in a developing country to identify the most pressing problems caused by a tsunami and to make recommendations to your government for the types of aid that will help victims.

In this case a summative assessment might be a written report to the government outlining a rescue plan, which is assessed by traditional grades. On the other hand, formative assessment focuses on evidence generated at various times throughout the unit, rather than on the final product. Evidence consists of the student's progress and is viewed as feedback. In the case of the rescue worker scenario, it might be a series of images collected by the information users, along with their written commentary chronicling life-threatening challenges of natural disasters at the collection ISP stage. The rationale for this kind of pedagogy is ongoing and continuous assessment that gives users the chance to revise. It also promotes academic rigor.

Do we want to evaluate student problem-solving in the visual arts? Experimental research in science? Speaking, listening and facilitating a discussion? Thoroughly reviewing a piece of imaginative writing until it works for the reader? Then let our assessment be built out of such exemplary intellectual challenges. (Wiggins "Case")

Authentic learning and assessment offer a diagnostic approach that generates indicators of where help, or intervention, is needed, so that remediation, or alternative teaching strategies, can be employed. In this case, an example of feedback might be maps generated by information users, or outlines of what they know at mid-point in the inquiry process. Their work might reveal that some users have not read enough about the health hazards resulting from natural disasters. Other examples of formative assessments embedded in instruction are clearly defined criteria for good work embodied in rubrics, users' thoughts, feelings, and actions recorded in journals, blogs, checklists, peer reviews, self-evaluation charts, and collaborative processes posted on wikis. The learning tasks become the assessments, as teachers and school librarians analyze the evidence generated as part of a process, rather than restricting assessment to final products.

Models of evidence based information literacy instruction in school libraries that use performance based assessment evolved from the author's work reported in three studies. The first focused on determining how ninth grade information users perceive inquiry when their teacher requires them to go to the school library to learn something about how mathematics is used in the real world (Gordon "Fish"). This study took place in a large international school in Europe. The curriculum emphasized academics and college preparation. Data

were collected through participant observation, focus groups, and journaling. Three student collaborators were interviewed at different stages of the project; two participated in focus groups three times, and one student participated twice. Information users revealed that their perception of doing research was writing a grammatically correct report that was well-presented and provided other peoples' answers to someone else's question. The research process was not internalized in the school library; it was perceived as an extension of classroom practice. Users talked about the research assignment as if it were a test; creativity and inquiry were not perceived as part of the process, and grades were perceived as the most important measure of success. While their teacher had a clearer conception of research as a way of learning, she thought it took too much time from the curriculum, and her students agreed. They valued what was taught in the classroom more than what they discovered in the library. They regarded their information searching in the library as inefficient, indicating that they could have been learning more in the classroom. Their attitude toward discovery through information searching reflected a top-down approach to learning that valued what was transmitted through the teacher rather than what was discovered by the student. This study set the agenda for finding and testing performance based approaches to inquiry.

The second study looked at performance-based learning and assessment in the context of every day information searching behavior grounded by personal interests. The learning task structured by performance based assessment was based on the information user's personal interests and everyday information behaviors, resulting in a project that could be anything except a written paper. The study took place in a high school of four hundred students in an independent, international school located in

Europe. It focused on the effects of a performance based independent project on the meta-cognitive behavior and motivation of one hundred ninth grade students participating in the inquiry unit. The leaning goal of the project was to support information users' management of their own projects. The theoretical framework for the study was grounded in research in meta-cognition and self-regulated learning (Vygotskii). The design of the project was based on research findings that the most effective learners are self-regulatory and that key to effective self-regulation is accurate self-assessment. The learning task required users to create a project of their choice which could be any format other than written papers. The learning task was designed as an authentic learning task with performance based assessment practices, i.e., rubrics, journals, self-evaluation, and peer review. Users received continuous feedback about their self-management skills. Parents and other family members, advisors, and friends played important, but not dominant roles in providing help. The absence of "academic" content shifted the focus to awareness of personal interests and management skills such as meeting deadlines, organizing the project, and working with an adviser. These learning objectives were documented in student journals and self-assessed by student and adviser using a rubric. Information searching during this inquiry unit was just-enough-just-in-time. Users relied on resources from home and community, rather than from the school library. Since each information user was required to have an adviser, they relied on these adults to provide information or refer them to resources, usually community members. There was a summative assessment administered through an exhibition of student work, which was rated qualitatively by parents, teachers, and community members (Gordon "Putting"). Rather than receiving traditional grades, each grade nine

student received a narrative attached to their records and a certificate of completion. The role of the school librarian centered on self-assessment and the affective aspects of information searching and learning.

The absence of a set curriculum and the traditional research paper shifted the focus to information users' awareness of their own interests and their roles as project managers. Student engagement was high, as evidenced by a strong trends toward ethnic-related projects that involved families and favored the arts and non-existent curriculum subjects (e.g., design technology, crafts), or "minor subjects" (e.g., art, music, dance, theatre). Non-native English speakers preferred to work in groups were homogeneous with regard to gender and culture. Users who chose projects with concrete outcomes were more focused on product; those who created projects that were activist in nature described outcomes in terms of process and learning goals, and demonstrated meta-cognition more frequently. There is strong evidence from this study that users are responsive to performance assessment based learning, sustaining self-discipline, organizational skills, and responsibility to themselves and their members for the duration of the project.

The third study took a different view of an intellectual challenge. Rather than asking information users to create products that expressed what they learned about a personal interest, the learning task challenged them to use traditional research methods appropriate to the academic discipline in which their investigation was grounded, and to write a 2000-word research paper using primary research methods appropriate to the academic discipline. This approach, called 'authentic research (Gordon "Students") goes beyond note taking to include data collection and analysis. English teachers and the school

librarian collaborated to gather data in the manner of action research to assess the effectiveness of the assignment. The assignment was based on a structuralist approach whereby information users learn the structure of the academic discipline and its ways of knowing, or particular research methods, in order to engage in rigorous inquiry (Bruner). This pedagogy was combined with performance based assessments, including rubrics, journals, and peer editing.

Information users posed research questions, theses, or hypotheses, as appropriate to their topics, developed proposals, and learned techniques of display and analysis using tables, figures, and citation. Their information seeking was intensive throughout the project as they prepared to conduct interviews, create surveys, or engage in participant observation and journaling. The use of qualitative data collection motivated them to seek information from traditional and non-traditional resources. Users who chose quantitative-friendly topics analyzed data using descriptive statistics. A content analysis of the papers indicated that users engaged in critical thinking: application, analysis, synthesis, and evaluation. Their information searching relied heavily on library resources. They interacted with the librarian on a regular basis and received targeted instruction in the use of electronic resources. The majority of users chose topics that related to an event or situation in their personal lives, such as a learning-disabled sibling, an anorexic friend, or divorced parents. Consequently, most users adopted qualitative research methods suited to social science research. Concurrently, their teachers engaged in action research, gathering data from observation, journals, and a survey administered at the end of the unit to determine the strengths and weaknesses of the assignment. Information users responded positively when asked,

“How was this research assignment different from what you have done in the past?” “Longer, more depth, more detailed, more demanding.” Student-generated comments mentioned precise instructions, format, and regulation as unpleasant aspects of the assignment, but the same number of comments revealed that they felt more independent. “In the past I was given full instructions on the essay. Now I had to do it by myself.” When asked about the best aspect of the project, one student wrote, “That we stood on our own two feet!” Comments also reflected an appreciation for the distinction between reporting and research: “I never did proper research before. It was the first real serious research I have done. It was much longer and more difficult than previous papers. It was also much more interesting and more fun as well” (Gordon “Students”).

These studies indicate that authentic, performance-based instruction generates evidence that informs student and teacher performance in the context of a freely chosen personal task (Gordon “Putting”) and in the context of a curriculum based academic task (Gordon “Students”). In both cases information searching was an integral part of the learning task. However, differences between the learning tasks were paralleled by differences in information searching behavior in terms of resources used and the kind of help users sought. The findings of these studies support the design of learning tasks that generate evidence for the improvement of student and teacher performance. The methodology of authentic research promotes critical thinking skills and knowledge construction in the context of a research, rather than report mode (Gordon “Fish”). The effective use of this approach, however presumes that school librarians know how to do research and how to teach information users to do it. Just-enough-just in time training is needed since the study of research methods are not part

of undergraduate, or even graduate schooling for school librarians and educators. Evidence based practice offers a solution that seamlessly introduces reflection into instructional practice that is informed by evidence.

The Evidence Based Practice Movement in School Library Instruction

A fundamental shift in school library instruction occurred when evidence based practice (EBP) became a best practice for school librarianship.

In order for school libraries to play a key role in the information age school, I believe there needs to be a fundamental shift from thinking about the movement and management of information resources through structures and networks, and from information skills and information literacy, to a key focus on knowledge construction and human understanding, implemented through a constructivist, inquiry-based framework. (Todd "Transitions")

Todd challenged practitioners to make data-driven decisions about their practice that were informed by relevant research:

Evidence based school librarianship uses research-derived evidence to shape and direct what we do. EBP combines professional wisdom, reflective experience, and understanding of students' needs with the judicious use of research-derived evidence to make decisions about how the school library can best meet the instructional goals of the school.
(Todd "Evidence Based")

To accomplish this, Todd advocated that school librarians collect evidence to document how their practices affect student achievement, i.e., the development of deep knowledge and understanding in the competencies and skills for thinking, living, and working ("Evidence Based"). He identified three dimensions of evidence based practice: Evidence for practice; evidence in practice; and evidence of practice (Figure 3).



Fig. 3. Three Dimensions of Evidence Based Practice in School Librarianship (Todd)

- 1) Evidence *for* practice examines and uses empirical research to inform practice. This dimension consists of knowledge of theory that drives practice, as well as studies that test or apply theory. It includes a clear vision of best practice that bridges theory and practice. This kind of evidence is comparable to what formal research calls the literature review.
- 2) Evidence *in* practice integrates the research evidence with professional experience, as well as local evidence that identifies learning needs and achievement gaps. In this dimension, evidence in practice is the conceptual framework for action research investigation; it activates professional expertise to direct how the evidence is collected, how it is analyzed, and how it is applied to the identified problem.
- 3) Evidence *of* practice is derived from systematically measured, student-based data that focuses on learning outcomes. This dimension of evidence based practice is the evidence, or data, extracted from student work or from evidence collected using qualitative or quantitative data collection methods.

These three functions of evidence based practice provide the underlying beliefs and values of inquiry based learning in school libraries, thereby serving as a paradigm of best practice. The paradigm is used in two ways. It serves a social and cultural purpose in molding a culture of inquiry for information literacy instruction. Evidence

based practice embraces reflective practice that seeks continuous improvement through the collection and application of evidence for informed decision-making. It challenges conventions of library and classroom environments characterized by top-down lines of authority, rule-bound communication, and homogeneous, depersonalized interaction dictating a passive role for the young user-learner. Implicit in this concept is the need for a systematic approach to the collection of evidence for improvement of teaching and learning, thereby enhancing the role of school librarians in fulfilling the mission of schooling. Evidence based practice in school librarianship is the overriding concept for continuous improvement of practice. A need exists, however, to systematically and unobtrusively integrate evidence collection with instruction.

Action Research as a Tool of Evidence based Practice

The confluence of constructivist learning theory, authentic learning practice, the ISP, Guided Inquiry, and performance based assessments set the stage for using action research as a tool of evidence based practice. While there is some disagreement about action research as a methodology, its function is to collect evidence from practice to improve practice. Action research is problem focused, context specific, and future oriented, and it aims at improvement and involvement (Hart and Bond). Boomer defined it as a “deliberate, group, or personally owned and conducted, solutions oriented investigation” (8), which indicates its function as reflective practice. A more formal interpretation defines action research as “insider research done by practitioners using their own site as the focus of their study...it is oriented to some action or cycle of actions that practitioners wish to take to address a particular situation” (Anderson, Herr, and Nihlen 2). In this instance, action

research takes on a methodology resembling qualitative research methods. Patterson and Shannon view it as a recursive process involving reflection, inquiry, and action (Figure 4).

established as a strong tradition by the work of Corey, who defined action research as the process through which educators study their own practice to solve personal practical problems.



Fig. 4. Action Research is Reflection, Inquiry, and Action (Patterson and Shannon)

The origins of action research are attributed to Lewin ("Action"), the social psychologist whose research approach, set in social and organizational settings, is focused on social action. His work shares concepts with John Dewey's experiential learning and "the inductive scientific method of problem solving as a logic for the solution of problems in such fields as aesthetics, philosophy, psychology and education" (McKernan 8). Lewin defined the spiraling nature of action research: identifying a general or initial idea; fact finding; planning; taking the first action step; evaluating; amending the plan; and taking the second action step (*Field* 240). The application of action research in educational settings was

Research on educational change indicates that change is more likely to occur when participants feel ownership of a problem and feel connected to the solution (Anderson, Herr, and Nihlen). Action research can engage educators in examining the effectiveness of their methods when they have identified an area of concern and use the research process to gather evidence for their theses. Reflection helps practitioners understand what they are currently doing, why they are doing it, whether it is what they want to do, and what they should do in the future (Patterson). Reflection can identify weaknesses and strengths, and it validates decision-making inherent in the teaching process through the use of

evidence. Reporting results of action research can provide the vicarious experiences related by narrative accounts from schools and classrooms which educators find more helpful than formal educational research (Anderson, Herr, and Nihlen). Action research can be described as the illegitimate child of formal research: Although it bears a strong family resemblance to its qualitative and quantitative cousins, its validity and reliability is regarded with skepticism by its positivist parents. It sits outside of the positivist tradition that sets the gold standard for empirical research, i.e., the randomized, controlled experiment. "Unlike scientific inquiry, which is based on the premise that the environment can be controlled and that variables can be strictly introduced and accounted for, social science research is more disorderly." (Rose 23) The precarious status of action research raises an important question: Is empirical research restricted to the positivist tradition, or can other kinds of systematic investigation be scientific, or at least credible? Qualitative research struggled with this question for decades and has established its credibility through theory generation and methodologies that accommodate the contextual nature of research questions such as, "How do we learn?" Situating action research in the tradition of qualitative research distinguishes it from the limitations of quantitative research in investigations of complex phenomena that defy representation through numbers. However, as a form of qualitative research, action research shares its perceived weaknesses:

- lack of internal validity
- lack of reliability
- contingency of the research findings; action research is seen as inappropriate to generalizable findings.
- low control of the environment; action research is deemed

inappropriate to test and produce strong theories, or to build up research models based on solid evidence.

- personal over-involvement; action research introduces personal biases in its conclusions. (Orlikowski and Baroudi)

Action research establishes internal validity through replication and theory verification, and reliability through triangulation of data collection that uses multiple methods. It meets challenges of external validity, or generalizability, with the concept of transferability of results to similar populations. Action research is meant to be local, contextual, and specific, and it is not generalizable from sample to population. The population is the subject of inquiry; the concept of a sample is irrelevant, because effect size is not an issue. Action research is participatory ethnographic research; it is culture-bound and contextually-specific to the population studied. It collects verbal data through interviews, surveys, observation, journaling, as it uses numerical data such as descriptive statistics. In its early days Lewin used quantitative measures and mathematical formulas to treat data collected in problem-specific fields of society for the purpose of social reform. Action research in education, however, is largely qualitative. Action research is not meant to test theory, but to examine how theory translates into practice to improve practice. It can produce models of best practice, as well as theory-based models that inform practice (Gordon "Study"). Action research is personal in that the practitioner researcher is at once the object of study and the object of improvement of practice, but this is not the same as bias, which can be controlled through researchers' sustained awareness of themselves as objective research instruments.

Action research enables the study of human behavior in naturalistic settings where the phenomenon is complex. It is advantageous to the study of evidence based information literacy instruction in school libraries, which cannot be replicated in laboratories. However, models of this approach can be developed in the fieldwork of teaching and learning in school libraries. A model for evidence based information literacy instruction derives from the concurrent use of performance-based assessment and action research (Gordon "Study"), both of which utilize the three dimensions of evidence based practice. A critical element for implementation of the model is the mentoring of educators by a trained researcher who can help them to recognize student work as evidence, create learning tasks that generate that evidence, and integrate qualitative research methods with their teaching. Underpinning this model are the ISP and Guided Inquiry, which provide diagnosis of problems and design of interventions to help information users through information tasks, as well as the learning task. In the first dimension of this model authentic learning and performance based assessment engage users in a role that situates them in a real world problem, as described in this paper. Concurrently, the instructional team of school librarian and classroom teacher(s) work in the second dimension of the model: they identify a problem in their practice and collect evidence to help them make informed educational decisions about the problem. Educators may want to know how a variety of note taking methods worked for users. Did users prefer note cards, graphic organizers, mapping, or color-coding print-outs? Was there a connection between student performance and the note taking methods? There are two ways that this evidence can be generated. The first is through formative assessments flowing from authentic learning tasks, as previously described. The second way to collect

evidence is through the application of traditional qualitative or quantitative data collection methods. For example, school librarians might administer a survey at the end of the unit to find out why users did not use subscription databases in their research, or to learn how users evaluate the unit in terms of what worked and what didn't work. The first and second dimensions of this pedagogical model are concurrent as users engage in performance based learning tasks and educators engage in action research. Results of the study (Gordon "Study") indicate that when students and educators analyze the evidence their work generates, they achieve a heightened awareness of how to revise: Information users have opportunities to learn from mistakes; school librarians and teachers have opportunities to differentiate their teaching to meet individual needs of information users. Everyone performs research to continuously improve performance. Everyone becomes his or her own best critic through self-reflection based on evidence. Action research not only functions as a tool for professional development, it fosters a culture of inquiry that features the school librarian as a leader of data-driven instruction. It brings structure to collaboration between library and classroom. It creates a community of practice that improves transactions between information users and teachers, between school librarians and teachers, and among information users.

Implications for Further Study

Although there is a strong tradition of constructivism that supports authentic learning, the ISP, and Guided Inquiry, theory that supports evidence based information literacy instruction, and the place of evidence based practice as a paradigm for action research, has not been established. A theory is needed to support further research of information literacy

instruction in school libraries for two major reasons. The first is the need for theory to develop and test models for evidence based information literacy instruction that works in diverse information environments. A theoretical framework that grows from such theory is indicated to support empirical studies that address the nature of this kind of action research application and the way it is conducted. The findings of the historical analysis of information theory and instructional practice, as well as the analysis of relevant research that tests an emerging information to knowledge pedagogy, point to a distinction between the macro level of information behavior, which consists of the learning task embedded in structured inquiry, and the micro level that consists of specific information searching behaviors. On the macro level, inquiry informs information searching behavior and has important implications for designing the learning task. On the micro level, information searching is seen as the entire process of the interaction of users with a series of information tasks, as described by Kuhlthau's Information Search Process. Information behavior is no longer confined to searching, locating, and evaluating information. It incorporates the concept of information use whereby information is the raw material for building knowledge. Critical thinking skills are the instruments that craft the connection between information and knowledge.

The second need for evidence based information literacy instruction is the development and testing of training models that prepare school librarians and educators to design learning tasks that are evidence based, i.e., that generate the evidence needed to help information users remediate and progress through the learning task. Inquiry informs information searching behavior through the learning task, which emerges as the critical element that is central to theory building for information literacy instruction. Research is needed to develop

the concept of performance based assessment and action research as tools of professional development. How would such a theoretical framework be built, and what would it look like when applied to the learning environment of the school library?

Part II of this paper will examine an emerging theory built on the foundation of substantive theory described in this paper, using evidence based practice as the paradigm that sets the beliefs and values for this construct. Substantive theories discussed in this paper emerge from research from three disciplines: Information science, cognitive science, and education to inform evidence based information literacy instruction. Do they have a place in the theoretical framework for evidence based information literacy instruction? A meta-theoretical approach determines the nature of action research from the perspective of Dewey's work in defining action and reflections as two facets of thinking. Lewin's work in defining action research for purposes of social reform contributes substantive theory from the field of social psychology. The synthesis of Lewin's substantive theory and Dewey's meta-theory, along with substantive theory of constructivist learning, generates an emerging theory for studying evidence based information literacy instruction. The emerging theory indicates that a model for a culture of inquiry in the learning environment of the school library is interdisciplinary, bringing together user-centered information searching and learner-centered educational theory. It points to a research agenda and informs the methods appropriate for the study of evidence based information literacy instruction in school libraries.

Works Cited

- American Association of School Librarians and Association for Educational Communications and Technology. Information Power: Guidelines for School Library Media Programs. Chicago: American Library Association, 1988.
- American Association of School Librarians and Association for Educational Communications and Technology. Information Power: Partnerships for Learning. Chicago: American Library Association, 1998.
- American Association of School Librarians. Standards for the 21st Century Learner. Chicago: American Library Association, 2007.
- Anderson, Gary K., Kathryn G. Herr and Ann Sigrid Nihlen. Studying Your Own School: An Educator's Guide to Qualitative Practitioner Research. Thousand Oaks, CA: Corwin Press, 1994.
- Ausubel, David P. The Psychology of Meaningful Verbal Learning. New York: Grune and Stratton, 1963.
- Belkin, Nicholas J. "Anomalous States of Knowledge as a Basis for Information Retrieval." Canadian Journal of Information Science 5 (May 1981): 133-43.
- Belkin, Nicholas J., Robert N. Oddy and Helen M. Brooks. "ASK for Information Retrieval. Part I- Background and Theory." The Journal of Documentation 38.2 (June 1982): 61-71.
- Bloom, Benjamin Samuel and Lois J. Broder. Problem-Solving Processes of College Students: An Exploratory Investigation. Chicago: University of Chicago Press, 1950.
- Boomer, Garth. "Addressing the Problem of Elsewhereness: A Case for Action Research in Schools." Reclaiming the Classroom: Teacher Research as an Agency of Change. Eds. Dixie Goswami and Peter R. Stillman. Portsmouth, NH: Boynton/Cook Publishers, 1987, 4-13.
- Bruner, Jerome. The Process of Education. Cambridge: Harvard University Press, 1960.
- Corey, Steven. Action Research to Improve School Practice. New York: Teachers College, Columbia University, 1953.
- Croft, W. Bruce. "Organizing and Searching Large Files of Document Descriptors." Diss., University of Cambridge, 1979.
- Dervin, Brenda and Michael S. Nilan. "Information Needs and Uses." Annual Review of Information Science and Technology (ARIST) 21 (1986): 3-34.
- Dewey, John. How We Think. Boston: D.C. Heath & Co., 1910.
- Gordon, Carol A. "Is Fish a Vegetable? A Qualitative Study of a Ninth-Grade Research Project." School Library Media Quarterly 25.1 (Fall 1996): 27-33.
- Gordon Carol A. "Students as Authentic Researchers: A New Prescription for the High School Research Assignment." School Library Media

- Research 2.1 (1999): 1-21. 11 May 2009. <<http://www.ala.org/>>.
- Gordon, Carol A. "Putting the Learner in Charge. Are Information Literacy Skills Enough?" SCAN 19.1 (2000): 32-8.
- Gordon, Carol A. "A Study of a Three-Dimensional Action Research Training Program for School Library Media Programs." School Library Media Research 9.1 (2006): 1-21. 11 May 2009 <<http://www.ala.org/>>
- Hart, Elizabeth and Meg Bond. Action Research for Health and Social Care. Buckingham: Open University Press, 1995.
- Kelly, George. A. A Theory of Personality: The Psychology of Personal Constructs. New York: Norton, 1963.
- Kuhlthau, Carol C. Facilitating Information Seeking through Cognitive Modeling of the Search Process: A Library Studies Research Project. Ann Arbor, MI.: U.S. Department of Education, 1986. ERIC Document Reproduction Service ED328268.
- Kuhlthau, Carol C. Information Skills for an Information Society: A Review of Research. Syracuse, NY: Syracuse University, 1987. ERIC Document Reproduction Service ED297740.
- Kuhlthau, Carol C. "Longitudinal Case Studies of the Information Search Process of Users in Libraries." Library and Information Science Research 10.3 (1988): 257-304.
- Kuhlthau, Carol C. "Information Search Process: A Summary of Research and Implications for School Library Media Programs." School Library Media Quarterly 18.1 (Fall 1989): 19-25.
- Kuhlthau, Carol C. Seeking Meaning: A Process Approach to Library and Information Services. 2nd ed. Westport, CT: Libraries Unlimited, 1996.
- Kuhlthau, Carol C. "Learning in Digital Libraries: An Information Search Process Approach-Children and the Digital Library." Library Trends, 45.4 (1997): 708-724.
- Kuhlthau, Carol C., Leslie K. Maniotes, and Ann K. Caspari. Guided Inquiry: Learning in the 21st Century. Westport, CT: Libraries Unlimited, 2007.
- Kuhlthau, Carol C., Betty J. Turock, Mary W. George, and Robert J. Belvin. "Validating a Model of the Search Process: A Comparison of Academic, Public and School Library Users." Library and Information Science Research, 12 (1990): 5-32.
- Kulleseid, Ellen R. "Extending the Research Base: Scheme Theory, Cognitive Styles, and Types of Intelligence." School Library Media Quarterly 15.1 (Fall 1986): 41-8.
- Lewin, Kurt. Field Theory in Social Science: Selected Theoretical Papers. Ed. D. Cartwright. New York: Harper & Row, 1951.
- Lewin, Kurt. "Action Research and Minority Problems." Journal of Social Issues 2 (1948): 34- 46.

- McKernan, James. Curriculum Action Research: A Handbook of Methods and Resources for the Reflective Practitioner. 2nd ed. London: Routledge, 1996.
- Orlikowski, Wanda J., and Baroudi, Jack J. "Studying Information Technology in Organizations: Research Approaches and Assumptions." Information Systems Research 2.1 (1991): 1-28.
- Partnership for 21st Century Skills. 2004. 1 May 2009 <<http://www.21stcenturyskills.org>>.
- Patterson, Leslie. "Reliving the Learning: Learning from Classroom Talk and Texts." Research in the Classroom: Talk, Texts, and Inquiry. Eds. Zoe Donoahue, Mary Ann VanTassell and Leslie Patterson. Newark, DE: International Reading Association, 1996, 3-9.
- Patterson, Leslie, and Patrick Shannon. "Reflection, Inquiry, and Action." Teachers are Researchers: Reflection and Action. Eds. Leslie Patterson, Carol Minnick Santa, Kathy G. Short, and Karen Smith. Newark, DE: International Reading Association, 1993, 7-11.
- Piaget, Jean. Judgment and Reasoning in the Child. New York: Harcourt Press, 1928.
- Richelle, Marc N. B.F. Skinner: A Reappraisal. Mahwah, NJ: Lawrence Erlbaum, 1993.
- Robertson, Stephen E., and Karen Sparck-Jones. "Relevance Weighting of Search Terms." Journal of the American Society for Information Science 27.3, (1976): 129-46.
- Rose, Amy D. "Differing modes of inquiry in the field of adult education." Adult Learning 11.3 (2001): 23-4.
- Saracevic, Tefko. Introduction to Information Science. New York: Bowker, 1970.
- Schamber, Linda, and Michael Eisenberg. "Relevance: The Search for a Definition." American Society for Information Science, Atlanta, GA, 1988.
- Todd, Ross J. "Transitions for Preferred Futures of School Libraries: Knowledge Space, not Information Place-Connections, not Collections-Actions, not Positions-Evidence, not Advocacy." International Association of School Librarianship Conference, Auckland, New Zealand, July 10, 2001.
- Todd, Ross J. "Evidence-based Practice Manifesto for School Librarians." School Library Journal 54.4 (1 Apr. 2008): 38-43; 11 May 2009 <<http://www.schoollibraryjournal.com/article/CA6545434.html>>.
- Vygotskii, Lev S. Mind in Society: the Development of Higher Psychological Processes. Cambridge, MA: Harvard University Press, 1978.
- Wiggins, Grant. "The Case for Authentic Assessment," Practical Assessment, Research & Evaluation 1990; 2.2. 1 May 2009 <<http://PAREonline.net/getvn.asp?v=2&n=2>>.
- Wiggins, Grant. "Creating Tests Worth Taking," Educational Leadership 49.8 (May 1992): 26-33.

Wiggins, Grant. *Educative Assessment: Designing Assessments to Inform and Improve Student Performance*. San Francisco: Jossey-Bass Publishers, 1998.