Guided Inquiry: A framework for learning through school libraries in 21st century schools

Dr. Carol C. Kuhlthau & Dr. Ross J. Todd

Quality school libraries: the foundation for Guided Inquiry

Considerable research evidence exists which clearly shows that school libraries are vital to student's education. This research, which spans almost four decades, shows that many factors contribute to the establishment and operation of effective school libraries to enable them to contribute substantially to student learning and achievement. These include essential building level foundations and essential learning foundations and instructional partnerships which enable meaningful learning to take place. Guided Inquiry recognizes and builds on these important infrastructure and learning foundations.

Building level foundations for Guided Inquiry

Adequate and Appropriate Information Resources
Effective school libraries in 21st century schools provide students with up-to-date and diverse resource collections in a variety of information formats and readability levels that are aligned with the local curriculum requirements, and support state academic content standards. Quality resources provide rich information necessary for students to discover and build new ideas.

From Learning to Read to Reading to Learn: Becoming Lifelong readers
Guided Inquiry has its foundation in students able to read, who are motivated to read, write and listen in order to learn. Research tells us that:

- access to reading materials in school libraries predicts motivation to read and reading achievement;
- long-term development of reading interest and grade-level achievement has a stronger base in "print-rich environments"
- a rich supply of high-interest diverse sources provides sources of ideas for the knowledge construction process, and a basis for students becoming independent, efficient readers
- more flexible access to the school library and free voluntary reading results in increased interest in books, more enjoyment of reading and improved learning
- a good reading environment, including comfort and quiet, as well as larger library collections, promote reading, literacy development and

reading scores.

Effective school library programs further promote and encourage reading for academic achievement and life-long learning through:

- reading enrichment programs;
- participation in national and state reading celebrations and initiatives;
- collaboratively plans reading and writing enhancement activities with classroom teachers and literacy specialists
- providing the skills to enable students to interrogate diverse information sources and build their own understandings and viewpoints

State-of-the-Art Information Technology

Guided Inquiry in 21st century schools needs and utilizes a rich technology environment. The development of the World Wide Web in particular has created an information environment that is complex and fluid, connective and interactive, diverse and unpredictable. The fusion of print and electronic information environments now places considerable responsibility on learners to be able to navigate this complex and often ambiguous information space, to locate pertinent information, to make judgments about the quality of the information, to make sense of the multiple perspectives, and to somehow construct their own understanding of their chosen topics. The school library, as the hub of the school's information collection, can play a significant role in enabling students to utilize this wealth of information in their inquiry.

Research shows that while young people enjoy searching for information on the Web and are motivated to use it as a communication and entertainment tool, they exhibit patterns of interacting with information which suggest that many students often:

- lack adequate understanding of information seeking processes in digital environments
- experience information overload and difficulties with managing and reducing large volumes of information;
- face problems formulating search strategies and navigating web spaces to locate and retrieve highly pertinent sources
- do not have a conceptual understanding of systems being used
- experience considerable insecurity and uncertainty when searching
- tend to guess appropriate search terms, often the result of little prior knowledge of the topic

- are reluctant to critically read or scan results returned, resulting in superficial assessment of web sites for quality and relevance
- demonstrate a range of coping strategies such as filtering, simplification, accepting of errors, delegating searches to someone else;
- inappropriately favor visual cues, such as looking at pictures rather than textual information as signs of relevance;
- paste chunks of text without regard for and understanding of ethical practices of information use;
- willing to construct answers based on limited pertinent information
- are satisfied with somewhat-relevant hits rather than the best hits.

Research also shows that:

- success in searching is influenced by the extent of knowledge about the topic in question, prior experience, cognitive abilities, developmental level, type of search task, task complexity and how this complexity is characterized
- students value the instructional interventions which enable them to be efficient, discriminating and responsible information seekers and information users in electronic environments.

Research studies: Bilal, D. (2002, 2001, 2000, 1999, 1998); Chelton & Cool (2004); Dresang, (1999); Fidel, Davies, Douglass, Holder, Hopkins, Kushner, Miyagishima, &Toney, (1999); Hirsh, (1999); Kafai, & Bates, (1997); Large & Beheshti (2002); McNicholas & Todd, (1996); Schachter, Chung & Dorr (1998), Todd & McNicholas, (1997); Martin & Rader, 2002.

This research highlights the importance of 21st century schools providing a state-of-the art information technology environment to support and enhance teaching and learning throughout the school. The school library and school librarians use information technology to:

- acquire, organize, produce, and disseminate information;
- provide leadership to students and faculty in the use of electronic resources and tools for information access and knowledge creation and sharing;
- facilitate the instructional integration of information technologies so that students can use technology tools to discover and construct new ideas;
- foster the development of information and technological competencies, including critical thinking and communication skills, which enable student to construct and present their deep

understanding of curriculum topics.

Essential learning foundations for Guided Inquiry

Expert Instructional Leadership in the School Library

Research tells us that effective school libraries are an integral part of teaching and learning. This does not happen by chance, or through the mere existence of a physical library facility. Research shows that a credentialed school librarian working as an information-learning specialist, together with classroom teachers, plays a key role in the learning and instructional process. A credentialed school librarian brings:

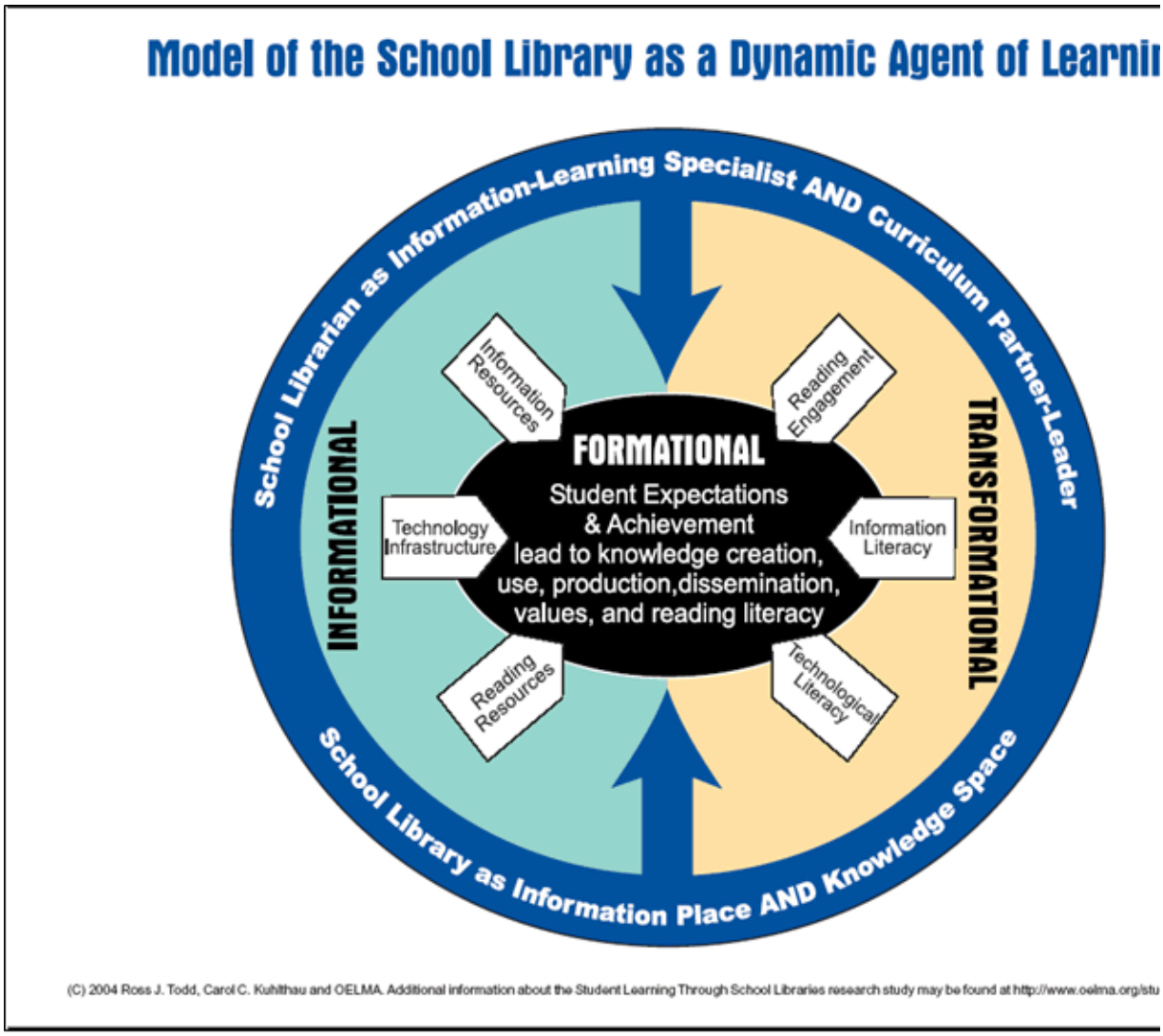
- expertise in Guided Inquiry: mutually collaborating, negotiating, planning and implementing instruction with classroom teachers that is tied to specific academic content standards that guides and enables students to learn through diverse, complex and multi-format resources, and become quality researchers and information seekers and users;
- expertise as partner-leader in the provision of learning-oriented professional development for Guided Inquiry targeted to whole school success with learning outcomes;
- expertise as a school library administrator who mutually negotiates, plans and implements (with school leaders, teachers, students and parent community) a whole-school library program which focuses on achieving content standards

Learning spaces

Effective school libraries provide multi-dimensional learning spaces to meet diverse information needs, learning tasks and instructional approaches. This space is structured to:

- accommodate multiple learning styles and teaching styles
- facilitate multiple pathways to information and constructing and representing new knowledge
- access to the tools to enable information to be transformed into deep knowledge and deep understanding by students.

These are the building blocks for Guided Inquiry, and are represented in the following model, which was developed by Todd and Kuhlthau (2004) from extensive data collected in 39 school libraries across Ohio, and which involved 13,123 students and 870 faculty.



Library Power Research – Inquiry Learning

One of the most comprehensive projects providing insights into the school library's role in learning is the De Witt Wallace-Readers' Digest Library Power project, undertaken from 1988-1999. Donham, et al, 2001; McAfee Hopkins & Zweizig (1999); This project was designed to promote the use of the school library in instruction in public elementary and middle / junior high schools and to improve opportunities for student learning through the school library. The project involved school librarians, classroom teachers, principals, and district leaders from 19 communities across the USA, and an investment of some $45 million. Funding was used to renovate library space, purchase new books and upgrade print and electronic collections, and to provide professional development to librarians, principals and

teachers to learn how to work together to make the best use of their libraries. The project was evaluated over a period of two years, using surveys and case studies to collect data from 446 librarians, 417 principals and 1185 teachers. Driving the evaluation of this project was the central question: what differences did the Library Power Program make? Some of the findings include:

- teachers believe that new, relevant materials encourage more frequent student use of the library and more student initiative, and resulted in more positive attitudes about learning and going to the library;
- teachers indicated increased use of library materials in teaching
- teachers saw the expanded collection as the key Library Power contribution, and the collection was the initial basis for the teacher-school librarian collaborations;
- the wider implementation of full or partial flexible scheduling of the library, which most principals saw as a "radical innovation", was highly valued;
- most principals reported that their school faculty collaborated in developing the school library collection

The evaluation of this significant program highlights some of the key dynamics of effective school libraries:

- student learning is a shared interest built on sustained partnerships at resource and instructional levels, and founded on constructivist principles of learning
- networking is critical to effecting change, and the power of this network as a support agency rests on teachers, principals, librarians, district curriculum leaders and community activists working together
- shared instructional planning for Guided Inquiry is necessary and worth the effort

- shared professional development opportunities build both a common vision and common action in maximizing student learning.

"To furnish the means of acquiring knowledge is the greatest benefit that can be conferred upon mankind. It prolongs life itself and enlarges the sphere of existence" - John Quincy Adams 1846

Constructivist Learning and Guided Inquiry

Guided Inquiry is founded on the belief that learning is a process of personal and social construction. A view of learning as a process of social and personal construction is deeply embedded in the American educational tradition, and has been developed by influential 20th century educational thinkers such as John Dewey (1859-1952), George Kelly (1905-1967), Jerome Brunner (1915 -), Jean Piaget (1896-1980) and Lev Vygotsky (1896-1934).

Constructivist learning gives emphasis to an active search for meaning and understanding by learners:

- learners construct deep knowledge and deep understanding rather than passively receiving it
- learners are directly involved and engaged in the discovery of new knowledge
- learners encounter alternative perspectives and conflicting ideas so that they are able to transform prior knowledge and experience into deep understandings
- learners transfer new knowledge and skills to new circumstances
- learners take ownership and responsibility for their ongoing learning and mastery of curriculum content and skills
- learners contribute to social well being, the growth of democracy, and the development of a knowledgeable society.

Six characteristics of Guided Inquiry

I. Students learn by being actively engaged and reflecting on that experience

II. Students learn by building on what they already know

III. Students develop higher order thinking through guidance at critical points in the learning process

IV. Students' development occurs in a sequence of stages

V. Students have different ways of learning

VI. Students learn through social interaction with others

▪

I. Students learn by being actively engaged and reflecting on that experience (Dewey, 1933, 1944)

- John Dewey described learning as an active individual process, not something done to someone but rather something that a person does.

Learning takes place through a combination of acting and reflecting on the experience and its consequences, what Dewey called reflective experience or reflective thinking. This is highly personal and individual. Dewey particularly emphasized hands-on learning as opposed to authoritarian methods in teaching and considered that the experience of the learner and critical inquiry were essential to meaningful learning. He believed that education must engage with and enlarge experience, enlist natural curiosity, be directed towards the investigation of matters of interest, and which would fulfill and enrich the current lives of students as well as prepare them for work, citizenship and living in a free and democratic society.

- Like Dewey, Jerome Bruner's research and writing (1973, 1975, 1990) confirm that people are actively involved in making sense of the world rather than passive receivers of information. Bruner believes that it is not enough to merely gather information; rather, learning involves "going beyond the information given" to create "products of mind."

II. Students learn by building on what they already know

- Past experience and prior understandings form the basis for constructing new knowledge (Kelly, 1963; Piaget, 1976; Bartlett, 1932; Ausubel, 1963, 1968). The central concept is that connections with a student's present knowledge are essential for constructing new understandings. Todd's research (1999a, b) shows that students build their knowledge in selective and deliberate ways in the context of individual frames of reference such as personal experience, existing knowledge, and current stage of life cycle, and shaped by desired cognitive intent. This research shows five information intents: Get a Complete Picture; Get a Changed Picture; Get a Clearer Picture; Get a Verified Picture; and Get a Position in a Picture. As drivers and outcomes of using information, these information intents enable learners to move forward in their information endeavors, constructing new pictures that represent new understandings.
- Ausubel was also concerned with how individuals learn large amounts of "meaningful" material from verbal/textual lessons in school. He contended that "the most important single factor influencing learning is what the learner already knows." (Ausubel, 1968) According to him, a primary process in learning is subsumption in which new material is related to relevant ideas in the existing cognitive structures. Ausubel proposed the use of advance organizers as an instructional approach which act as a "subsuming bridge" (Ausubel, 1963) between new learning material and existing related ideas.

III. Students develop higher order thinking through guidance and instructional intervention at critical points in the learning process (Vygotsky)

- Higher order thinking entails deep processing that leads to understanding. Deep processing requires engagement and motivation fostered by authentic questions about a subject that are drawn from the student's own experience and curiosity. Deep processing also requires the development of intellectual skills that go beyond the locating and gathering of facts. According to Bloom (Bloom's Taxonomy), the skills of comprehension, application, analysis, synthesis and evaluation help stimulate inquiry that leads to deep knowledge and understanding, rather than shallow processing in response to simple or superficial questions with prescribed answers.

IV. Students' development occurs in a sequence of stages (Piaget)

- Learning is both a cumulative and developmental process of becoming informed. Students progress through stages of cognitive development, with their capacity for abstract thinking increasing with age. This development is a complex process that involves the whole person thinking, acting, and reflecting, discovering and linking ideas, making connections, developing and transforming prior knowledge, skills, attitudes and values.
- Jean Piaget, for example, identified four stages of cognitive development:
- 1. Sensorimotor stage (Infancy)
  2. Pre-operational stage (Toddler and Early Childhood)
  3. Concrete operational stage (Elementary and early adolescence)
  4. Formal operational stage (Adolescence and adulthood) (In Huitt & Hummel, 2003).

V. Students have different ways of learning (Gardener, 1983)

- Learning is a holistic experience with many ways of knowing. Students learn through all of their senses. They apply all of their physical, mental and social capabilities to construct deep understandings of the world and one's life in it. Reading, listening, viewing, and observing are joined

with writing, speaking, visualizing, performing, and producing to encompass a holistic experience of learning.

- Howard Gardener, for example, characterized it in terms of multiple intelligences: Verbal/ Linguistic Intelligence, Logical/ Mathematical Intelligence, Visual/Spatial Intelligence, Bodily/ Kinesthetic Intelligence, Musical Intelligence, Interpersonal Intelligence, Intrapersonal Intelligence, Naturalist Intelligence.

VI. Students learn through social interaction with others

- Students live in a social world in which they are constantly learning through interaction with others around them. Parents, peers, siblings, teachers, acquaintances, and strangers are all part of the social environment that forms a learning milieu in which students are continuously constructing their understandings of the world and making meaning for themselves. Vygotsky, responsible for the social development theory of learning, proposed that social interaction profoundly influences cognitive development. Vygotsky believed that this life long process of development was dependent on social interaction and that social learning actually leads to cognitive development. This phenomena is called the Zone of Proximal Development, described by Vygotsky as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978). In other words, a student can perform a task under adult guidance or with peer collaboration that could not be achieved alone. The Zone of Proximal Development bridges that gap between what is known and what can be known. Vygotsky claimed that learning occurred in this zone.

Summary: Characteristics of Guided Inquiry

I. **Students learn by being actively engaged and reflecting on that experience**
II. **Students learn by building on what they already know**
III. **Students develop higher order thinking through guidance at critical points in the learning process**
IV. **Students' development occurs in a sequence of stages**

V. Students have different ways of learning

VI. Students learn through social interaction with others

- These characteristics, drawn from educational research are the heart of Guided Inquiry. They characterize Guided Inquiry as an instructional approach, and provide a framework for planning and implementing it in schools, particularly in terms of thinking about and providing the range of instructional interventions which develop students' competencies and skills with accessing and using information sources effectively to build new knowledge.

Implementing Guided Inquiry through the school library

Guided Inquiry as an approach to learning does not conflict with standards-based education. Standards define what is to be learned in each subject, and inquiry defines how learning might be enabled. Through inquiry learning, students are able to transform a myriad of information inputs made available through information sources to personal knowledge.

Based on the six characteristics, Guided Inquiry is an approach that focuses on the process of thinking that builds understandings by engaging students in stimulating encounters with information – encounters which capture their interest and attention, and which motivate and direct their ongoing inquiry. Students learn by constructing their own understandings of these experiences by building on what they already know to form a personal perspective of the world. Underpinning the inquiry process is a thinking process that requires extensive interrogation and exploration of ideas and formulation of thoughts before moving on to collecting, organizing and presenting ideas in ways which demonstrate personal understanding and ownership.

The school library plays an active and integral role in developing meaningful inquiry in curriculum by enabling students to address these essential questions through resource-based learning tasks.

The key principles of implementing Guided Inquiry through the school library

1. Effective inquiry through the school library is guided and structured
2. Guided Inquiry revolves around mediation and intervention.
3. The Information Search Process provides a useful framework for understanding students' journey of information seeking and use, and a basis for guiding and intervening to ensure learning is meaningful
4. Effective inquiry through the school library is shared.
5. Specific interventions are determined by the stage of the search process,

the affective, cognitive and behavioral needs of the learners, and the curriculum standards and goals to be achieved
6. Guided Inquiry is an opportunity for the school to provide some comprehensive evidence of how the teaching and learning focus of the school library improves student learning outcomes

1. Effective inquiry through the school library is directed and structured. (Callison, 2003, Donham et al, 2001). Students are guided through inquiry that begins by engaging them in questions about the subject being studied:

- What do I already know?
- What questions do I have?
- How do I find out?
- What did I learn?

Guided Inquiry takes students out of the predigested format of the textbook and rote memorization into the process of learning from a variety of sources to construct their own understandings. They learn to think through subject content apart from prescribed responses or preset solutions. Students move away from traditional library research approaches and approaches to learning that emphasize finding the right answer, memorizing specific facts, and repackaging information. They are guided through a process of intellectual construction to help them to build on what they already know and to come to a deeper understanding of the concepts and problems underlying the subject. Inquiry-based learning calls for thinking and reflecting in the process of information seeking that other approaches rarely accommodate. Models that emphasize structuring instruction to transmit specific facts and skills are not inquiry models.

2. Guided Inquiry revolves around mediation and intervention. The pedagogical focus of Guided Inquiry is to build a community of learners, and mediation and intervention are key mechanisms in this process. Mediation is defined as the "human intervention to assist information seeking and learning from information access and use. … A mediator, however, implies a person who assists, guides, enables, and otherwise intervenes in another person's information search process" (Kuhlthau, 2004, p 107).

A mediator is different to an intermediary, the latter being something that "intercedes between the information and the user, but this interchange may not involve any human interaction" (p. 107). Intervention centers on the way in which "mediators become involved in the constructive process of another person … in information seeking and use" (Kuhlthau, 204, p. 127).

Kuhlthau's research shows that most library interventions tend to be based on sources, that is, matching a student's query with the organized collection, and often with little attention given to the holistic experience of students in the process of constructing new understandings and meanings. Guided Inquiry calls for guiding students through the information seeking and using process, guiding them in the process of building new understandings.

Borrowing from Vygotsky's concept of a zone of proximal development, guidance can be developed around a "zone of intervention," in which a student can do with advice and assistance what he or she cannot do alone or can do only with great difficulty (Kuhlthau, 1993).

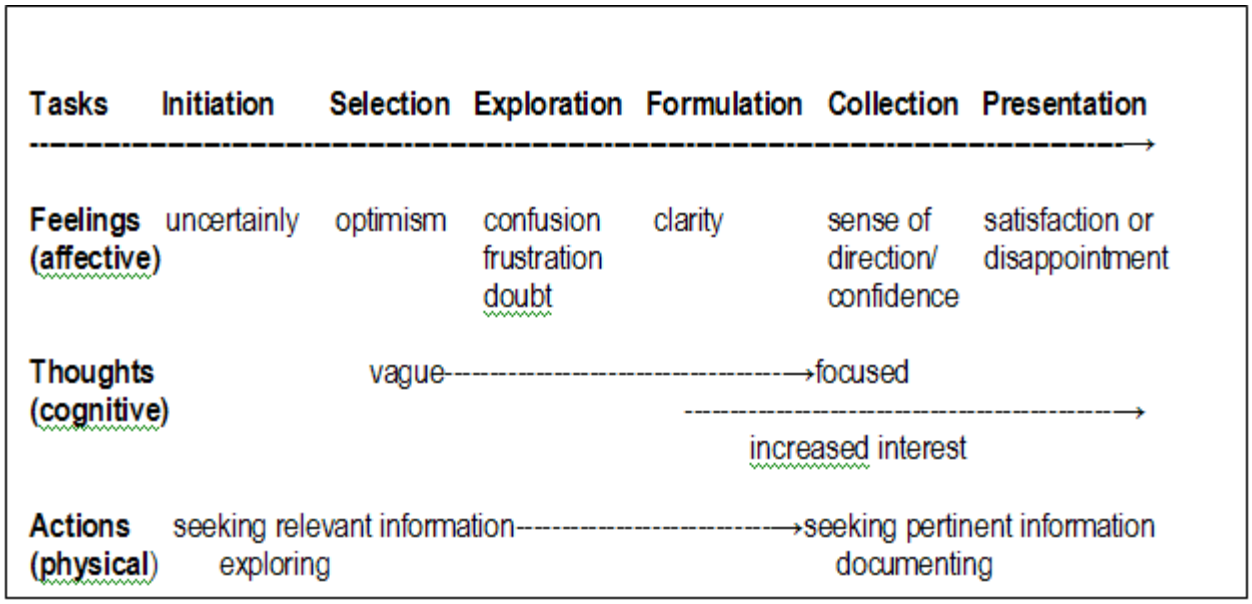
3. The Information Search Process provides a useful framework for understanding students' journey of information seeking and use, and a basis for guiding and intervening to ensure learning is meaningful

The research of Kuhlthau (1985, 1986, 1987a,b, 1991, 1994, 1999, 2004), extending over two decades, provides an empirical framework for implementing Guided Inquiry through the school. This framework, called the Information Search Process, describes the thoughts, actions and feelings commonly experienced by students in each stage of the inquiry process as they search for and engage with information to build personal knowledge and understanding.

The framework gives particular attention to feelings. The feelings of students while they are engaged in an inquiry project reveal much about the learning process they are experiencing and the interventions they need.

The Information Search Process forms the basis for developing a program of inquiry-based learning, and for guiding students in their inquiry. It provides a mechanism for teachers and school librarians to recognize those critical moments when intervention and instruction is essential, and then to tailor interventions to enable students to achieve successful outcomes in their inquiry.

Model of the Information Search Process



The Information Search Process has been found to occur in seven stages: Initiation, Selection, Exploration, Formulation, Collection, Presentation, and Assessment as shown in the model in the ISP model). These stages are named for the primary task to be accomplished at each point in the process.

Initiation: the teacher announces an invitation to research an engaging question. The comprehensive engaging question is developed by the teacher and school librarian from the instructional goals and standards of the curriculum, and is one that is designed to motivate students to undertake the inquiry process. The task of students in this stage is to contemplate the question and the accompanying assignment in preparation for the investigation ahead.

Selection: students choose what to pursue in response to the initiating question by considering what they already know and what they want and need to find out. In the early stages, initiating and selecting are facilitated by making connections with what they already know and forming questions about what they don't know.

Exploration: students explore the initiating question and develop questions of their own that arise as they begin to learn about the subject. They build their background knowledge further, and often encounter information that is inconsistent and incompatible with what they already know and what they expect to find. In all three of the beginning stages of the Information Search Process students often experience confusion, uncertainty, and apprehension, and often need guidance and instruction in working with sources to help them undertake the complex information processes involved.

Formulation: students become aware of the various dimensions, issues, ramifications of the initiating question and begin to form their own focused perspective of the subject under study.

Collection: students gather pertinent information that defines, extends and supports the focus that they have formed. During Collection their interest and confidence commonly increases as they gain a sense of ownership and expertise in the subject. Students typically need guidance and instruction in structuring their ideas in meaningful ways to represent their new understandings, such as information analysis, synthesis, developing arguments, incorporating evidence, working with information in ethical and responsible ways.

Presentation: students are involved in the task of preparing to share what they have learned with the others in their learning community. They typically need guidance and instruction in communicating their ideas clearly and effectively.

Assessment: students reflect on what they have learned to discover what went well and what might be improved, providing vital feedback to enable school librarians and classroom teachers to document the learning outcomes, and inform the instructional process.

When the Information Search Process is used as a framework for developing and guiding inquiry, students move away from simply collecting information and putting it together to please the teacher; rather, right from task initiation, they are engaged and guided in a thinking process that requires extensive exploration of ideas and formulation of thoughts before moving on to the later stages of collecting and preparing to present. They avoid missing the critical stages of learning by allowing time for reflecting and formulating while they are exploring and collecting information.

4. Effective inquiry through the school library is shared (Donham, et al, 2001, Harada, 1999, Haycock, 2003)
Inquiry learning is enhanced by partnerships between teachers, librarians, and all of the school community. This is not something done solely by the school librarian. It is a whole school approach, with many people working to bring the best learning opportunities for students. In particular, school librarians and classroom teachers work closely together as partner-leaders. In this partnership, school librarian brings into the learning equation their information-learning expertise of knowing how students engage in seeking and using information, guided by the Information Search Process. This is carefully integrated with the disciplinary knowledge and skills of classroom teachers to create meaningful research tasks, learning experiences and

instructional interventions that actively involve students in discovering and constructing their mew understandings to meet curriculum objectives and content standards.

The Student Learning through Ohio School Libraries research (Todd & Kuhlthau, 2004) also sought to capture the perceptions of 879 faculty from the 39 participating schools (Todd & Kuhlthau, 2005). Faculty were given opportunity to identify how they know that the school library has helped students with their learning. Responses were received from 621 faculty: 522 teachers, 45 school librarians, 17 principals, 17 assistant principals, and 20 technology leaders. The faculty in these schools identified four key enablers of learning outcomes through the school library:

- Resources: diversity of resources that provide diversity of ideas, and resources targeted to reader ability and interest;
- Instructional intervention: knowing a research process linked to learning task; use of print sources and online databases; technical and evaluative skills, particularly the determination of information quality; identifying pertinent ideas; identifying ideas in conflict; recording and structuring ideas; developing arguments; developing organizational structures for ideas;
- Guided Inquiry approach to learning through the school library: learning the stages of the research process; provision of staged feedback during the search process; learning the tools to construct knowledge and create information products; opportunities to practice new skills; opportunity to ask questions and engage in open dialogue about research task and process;
- Shared instruction targeted to curriculum standards: Library as extension of classroom; planning and teaching lessons with teachers; planning resources together; planning assessment tasks together; open scheduling of the school library

For school librarians and classroom teachers, some important questions to ask in the planning process of Guided Inquiry are:

- How do I guide students in their inquiry?
- When do I intervene?
- What is the nature of the intervention in terms of intellectual and affective scaffolds for enabling inquiry?
- How do I enable students to stay focused and not be detracted from the learning task at hand?
- How do I motivate and engage students who may perceive task of searching as primarily one of gathering information to a task of forming a focused perspective from the information encountered?

- How do I know what learning has taken place?
- How do I foster ongoing learning?

5. Specific interventions are determined by the stage of the search process, the affective, cognitive and behavioral needs of the learners, and the curriculum standards and goals to be achieved

Instructional intervention focuses on the cognitions, behaviors and feelings related to understanding of what good research is about, how you undertake good research, the stages of inquiry, and knowing the desired outcomes of doing good research.

The Information Literacy Standards (AASL/AECT, 1998) provide a framework for determining appropriate instructional interventions in the context of curriculum standards and learning goals to be achieved. A considerable body of research exists in relation to information literacy development. This research shows that contextualized and integrated information literacy instruction:

- enables students to effectively engage in the inquiry process, and results in improved performance in terms of personal mastery of curriculum content
- results in more positive attitudes to learning; increased active engagement in the learning environment; and more positive perceptions of students themselves as active, constructive learners
- This research also makes clear that successful information literacy interventions are ones that:
    - are aligned with curriculum goals and content standards
    - target specific learning dilemmas and needs
    - set clear expectations and manageable objectives
    - establish realistic timelines
    - gather meaningful and systematic feedback from students and teachers on the learning impacts

Research: Doyle, Bruce 1997; Candy & Bruce, 2000; Loertscher & Woolls, 2004; Haycock, 2003; Todd & Kuhlthau, 2004; Todd, 1995; Moore, 2000, 2002).

INFORMATION LITERACY STANDARDS

Standard 1 - The student who is information literate accesses information efficiently and effectively.

Indicator 1. Recognizes the need for information
Indicator 2. Recognizes that accurate and comprehensive information is the basis for intelligent decision making
Indicator 3. Formulates questions based on information needs
Indicator 4. Identifies a variety of potential sources of information
Indicator 5. Develops and uses successful strategies for locating Information

Standard 2 - The student who is information literate evaluates information critically and competently.

Indicator 1. Determines accuracy, relevance, and comprehensiveness
Indicator 2. Distinguishes among fact, point of view, and opinion
Indicator 3. Identifies inaccurate and misleading information
Indicator 4. Selects information appropriate to the problem or question at hand

Standard 3 - The student who is information literate uses information accurately and creatively.

Indicator 1. Organizes information for practical application
Indicator 2. Integrates new information into one's own knowledge
Indicator 3. Applies information in critical thinking and problem solving
Indicator 4. Produces and communicates information and ideas in appropriate formats

Standard 4 - The student who is an independent learner is information literate and pursues information related to personal interests.

Indicator 1. Seeks information related to various dimensions of personal well-being, such as career interests, community involvement, health matters, and recreational pursuits
Indicator 2. Designs, develops, and evaluates information products and solutions related to personal interests

Standard 5 - The student who is an independent learner is information literate and appreciates literature and other creative expressions of information.

Indicator 1. Is a competent and self-motivated reader
Indicator 2. Derives meaning from information presented creatively in a variety of formats
Indicator 3. Develops creative products in a variety of formats

Standard 6 - The student who is an independent learner is information literate and strives for excellence in information seeking and knowledge generation.

Indicator 1. Assesses the quality of the process and products of personal information seeking
Indicator 2. Devises strategies for revising, improving, and updating self-generated knowledge

Standard 7 - The student who contributes positively to the learning community and to society is information literate and recognizes the importance of information to a democratic society.

Indicator 1. Seeks information from diverse sources, contexts, disciplines, and cultures
Indicator 2. Respects the principle of equitable access to information

Standard 8 - The student who contributes positively to the learning community and to society is information literate and practices ethical behavior in regard to information and information technology.

Indicator 1. Respects the principles of intellectual freedom
Indicator 2. Respects intellectual property rights
Indicator 3. Uses information technology responsibly

Standard 9 - The student who contributes positively to the learning community and to society is information literate and participates effectively in groups to pursue and generate information.

Indicator 1. Shares knowledge and information with others
Indicator 2. Respects others' ideas and backgrounds and acknowledges their contributions
Indicator 3. Collaborates with others, both in person and through technologies, to identify information problems and to seek their solutions
Indicator 4. Collaborates with others, both in person and through technologies, to design, develop, and evaluate information products and solutions

6. Guided Inquiry is an opportunity for the school to provide some comprehensive evidence of how the teaching and learning focus of the school library improves student learning outcomes (Todd, 2001a,b; Todd, 2003; Loertscher with Ross Todd, 2003)

Evidence-based practice is an evolving concept in many professions, including education. Its focus is day-to-day professional work that is directed towards demonstrating the tangible impacts and outcomes of sound decision making and implementation of organizational goals and objectives. Guided Inquiry provides school librarians and classroom teachers with a range of strategies that will enable them to chart and document learning outcomes of their teaching-learning activities. It enables them to be able to build a portfolio of local school evidence that shows the importance and value of the school library to their school communities, and the learning that is enabled through it.

An example of evidence-based practice
During 2003-2005, the Center for International Scholarship in School Libraries (CISSL) at Rutgers University (New Jersey), with funding from the Institute for Museums and Library Services at) undertook a research and development project "The Impact of School Libraries on Student Learning" to provide sustained empirical evidence of the impact of school libraries on student learning, and in doing so, provide an easy-to-use and reliable measurement toolkit to enable school librarian and teacher teams to show the growth of student learning through Guided Inquiry. For more detailed information about the project, including findings, please see the project Web page at http://cissl.scils.rutgers.edu/imls

The CISSL-IMLS project involved 574 students from 10 diverse public schools in New Jersey undertaking Guided Inquiry projects. The students were from grades 6 to 12, and were learning a range of curriculum topics, such as Middle Ages, Westward expansion and chemical compounds .The study involved 10 teacher-school librarian teams, consisting of 10 school librarians working on 17 different curriculum projects with 17 classroom teachers.

The research sought to measure student learning in multidimensional ways including growth of knowledge of their curriculum topic, interest, feelings, and experiences during the inquiry process, and their reflections on their learning. A combination of qualitative and quantitative methods were used to examine and measure the students' learning. The data were collected at three stages of the students' inquiry process – at the initiation of the research task, midway during the task, and at the completion of the task. Data were collected through three short survey instruments which captured responses to open-ended questions as well as categorical responses. At the completion of their research task, the students were asked the same questions as in the previous questionnaires, and additionally asked to reflect on what they had learnt through their projects.

The SLIM toolkit was further developed and refined from this process, including feedback from participating school teams, critical feedback from the school library research community and further verification from school librarian-teacher teams not involved in the initial research. This testing and refining has shown that this toolkit is workable in a school setting and capable of documenting learning outcomes of Guided Inquiry units lead by school librarian-teacher teams. The SLIM toolkit can be used in various settings, involving a diversity of curriculum topics and grades.

Through using the toolkit in the New Jersey schools, the school librarian-teacher teams were able to show several key learning outcomes that could be documented through applying the SLIM toolkit:

- they learned topical content in deep ways, which went well beyond describing the topic, to showing understanding of complex concepts and explanatory and predictive relationships of topical content;
- they became more skillful and confident as information seekers;
- they became increasingly engaged, interested and reflective during their learning process, and saw information seeking as a constructive process of building both deep knowledge and deep understanding
- they became more critically aware of the broad variety of sources and their different purposes;
- they gained practical skills in independent information seeking;
- they underwent a significant conceptual change regarding information. They showed increasing awareness of the varied quality of information, as well as information as a problematic and often contradictory, construct that needed to be scrutinized in the process of building new understandings. This altered their conception of information seeking as fact-finding into a broader reflective notion.

Through applying the SLIM toolkit and using it to measure learning, the school librarian-teacher teams were able to provide substantial evidence that their students had grown more information literate through their inquiry-based research tasks. They valued the instructional interventions that helped them learn through complex information resources, and were able to demonstrate their learning in substantial ways.

Summary of principles of implementing Guided Inquiry through the school library

1. Effective inquiry through the school library is guided and structured
2. Guided Inquiry revolves around mediation and intervention.
3. The Information Search Process provides a useful framework for understanding students' journey of information seeking and use, and a basis for guiding and intervening to ensure learning is meaningful

4. Effective inquiry through the school library is shared.
5. Specific interventions are determined by the stage of the search process, the affective, cognitive and behavioral needs of the learners, and the curriculum standards and goals to be achieved
6. Guided Inquiry is an opportunity for the school to provide some comprehensive evidence of how the teaching and learning focus of the school library improves student learning outcomes

The learning environment for Guided Inquiry

Learning environments and instructional interventions that focus on Guided Inquiry will typically show many of the following attributes (Kuhlthau, 2004; Gore, Griffiths, & Ladwig. (2002; Callison, McGregor, & Small, 1998).

- Guided Inquiry is initiated though compelling situations, and questions which meaningfully engage students in wanting to know, and which provide challenge and opportunity
- instructional activities put emphasis on meaningful, authentic activities that help the learner develop skills relevant to problem solving and to construct understandings
- students are more motivated to engage in their inquiry when they are able to exercise some choice over the specific questions they want to answer and how to present their new understandings
- an attempt is made to connect with students' background knowledge
- instructional activities involve the students in thinking, acting, and reflecting, discovering and linking ideas, making connections, developing and transforming prior knowledge, skills, attitudes and values - higher order thinking and critical analysis occurs throughout
- instructional activities enable students to develop deep knowledge, deep understanding
- Students see that inquiry learning is developmental, an iterative process of advancing, consolidating, reinforcing, and involving whole person; opportunities for students to provide their understanding of concepts or ideas, and opportunities for sustained dialogue between students, and between teachers / school librarian and students
- learning activities closely resemble the ways that students will be expected to use their knowledge and skills in the real world, and to equip them for work and living in a democratic society: assigned work has resemblance or connection to real life contexts and a focus on identifying and solving intellectual and/or real-world problems
- structured interventions are informed by the Information Search Process enable students to have the information seeking and use skills to engage in an active search for meaning and understanding; they provide students with the knowledge and skills to work competently and

responsibly with information, and to represent their new understanding in appropriate ways

- students know how to engage with diverse information sources to build background knowledge, formulate a focus and collect pertinent information – the focus is constructing mew knowledge, not just a source orientation
- students encounter deep knowledge and build deep understanding of the curriculum content
- students demonstrate a personal process of construction through the products they create that show their new understandings
- students have opportunity to communicate and share their new understandings
- the inquiry learning environment is one where academic and personal success and intellectual inquiry are valued and acknowledged, and one where students feel connected, cared for and trusted
- students are given feedback throughout their inquiry process that advances and nourishes their learning and continues to motivate them
- students are given opportunity to practice their new skills to sustain and support their learning beyond the formal classroom and school library experience
- inquiry learning is responsive to students' personal, social and cultural worlds, valuing differences and cultivating an inclusive community

Implementing Guided Inquiry at Gill St Bernard's School Gladstone, New Jersey

Goal of case study: To understand more fully how students build new understanding in a Guided Inquiry project framed by Kuhlthau's Information Search Process, and curriculum content standards for Grade 9.

Participants: 43 Grade 9 students at Gill St Bernard's School, Gladstone NJ (21 girls, 22 boys).

Guided Inquiry project: The Guided Inquiry took place in a semester long course "Research Project". The course is a school librarian / teacher partnership which seeks to develop students as effective researchers. Instructional intervention centered on: understanding the information search process, information searching, information analysis and recording of ideas, information structuring and presentation. The Guided Inquiry project was based on free-choice research paper over a 7 week period around the theme "Celebration in Culture"

Data collection: Surveys at three stages in the Information Search Process (Initiation, Formulation, Presentation); structured search logs kept by each

student during the progress of assignment; a log documenting students' feelings through the process, as well as product analysis at completion of the assignment. These protocols enabled us to uncover students' base knowledge, perceptions on levels of knowledge and their information seeking and use experience, to measure changes in the knowledge construction process, and to examine how their knowledge, attitudes and behaviors changed from initiation to presentation.

Findings:

Initiation Stage
Students' initial representations of knowledge about their topics were:

- typically lists of unrelated concepts, and generalities
- statements were primarily property (is a), manner (describe how something happens)
- average number of statements 4 (range from 0-11)
- knowledge tended to be randomly represented: unstructured, no clear sequence or organization
- guess work was evident
- some inaccuracy / misrepresentation
- typically acknowledge that they knew very little
- because personal choice of topic was part of the inquiry project, the students were motivated to learn, and cited personal experiences, personal connections, knowing intriguing facts about topic, and personal curiosity, as key reasons for engaging in the research.

Focus / Formulation Stage

- dramatic increase in number of propositional statements
- range from 6-34 statements; average number 17
- still a focus on property and manner statements, there was increased embedding of reason statements - explanations of how and why
- evidence of organizational structure of ideas
- some attempt to develop conceptual grouping
- focus on getting a bigger picture (building background) getting a changed picture (correcting misinformation); and getting a clearer picture.
- move from broad, general topics, to more specific targets topics

Collection and Presentation Stages

- clear and precise listing of properties, manner and increasing use of set membership, as well as representations that were also stronger on reasons, outcomes, causality, implications, predictive, reflective
- increased complexity of representing ideas
- average number of statements - 31 (range 8-63)
- for 4 students, decrease in number of statements reflect higher levels of synthesis: coalescing lists of properties and manners into conceptual categories
- higher levels of structural centrality and conceptual coherence -i.e. overall integrated and interlinked structure, yet subgroups of ideas

Key outcome of study: Through Guided Inquiry, where instructional intervention focused on developing students as effective researchers and developing their experience - the output was growth of intellectual quality:

- higher order thinking and deep knowledge: movement from description to complex explanation and reflection
- increased specificity of topic focus and coherence of knowledge structures
- deep understanding, evident in extent of recall and in the types of causal and predictive relationships portrayed
- substantive conversation, as shown in fluency in written statements
- capacity to deal with factual conflict or conflicting viewpoints and formulating their own (choice of topic); also evident in constructing arguments that show a basis for the claims they were making
- use of language specific to the topic domain: not just provision of terms, but clarity of understanding these terms
- increasing complexity of the language used to describe their knowledge, and the ordering of this knowledge into conceptually coherent units

Learning Environment and Social Support: key enablers

- staged process of learning, clear benchmarks to be reached and instruction in critical processes needed to complete task successfully
- feedback at focus, collection and presentation stages
- attention to personal engagement: personal choice: provide a will to know
- high expectations
- social support: community of scholars where consistency of support of teachers and school librarian, teacher and librarian on the same page
- instructional support - knowing the steps of good research
- students' self regulation and direction: decisions about what next to do, identifying problems, opportunity to discuss problems.

SLIM Toolkit

The School Library Impact Measure (SLIM) is a toolkit and handbook for tracking and assessing student learning outcomes of Guided Inquiry through the school library

SLIM was developed in the Center for International Scholarship in School Libraries at Rutgers University (CISSL) through a research and development grant provided by the Institute for Museum and Library Services (link to http://www.imls.gov/) 2003 – 2005.

SLIM consists of four instruments that elicit students' reflections on their learning at three points in their inquiry process. The toolkit will enable collaborating school librarian – teacher teams to chart changes in students' knowledge and experiences throughout the process.

BIBLIOGRAPHY

American Association of School Librarians and the Association for Educational Communications & Technology (1998). Information Literacy Standards for Student Learning. Chicago: American Library Association.

Ausubel, David P. (1963). The Psychology of Meaningful Verbal Learning. New York: Grune & Stratton.

Ausubel, David P. (1968). Educational Psychology, A Cognitive View. New York: Holt, Rinehart and Winston, Inc.

Bartlett, F. C. (1932). Remembering: A study of experimental and social psychology. Cambridge: Cambridge University Press.

Bilal, D. (2002). Children's use of the Yahooligans! Web search engine. III. Cognitive and physical behaviors on fully self-generated tasks. Journal of the American Society for Information Science & Technology, 53, 1170-1183.

Bilal, D. (2001). Children's use of the Yahooligans! Web search engine. II. Cognitive and physical behaviors on research tasks. Journal of the American Society for Information Science & Technology, 52, 118-137.

Bilal, D. (2000). Children's use of the Yahooligans! Web search engine. I. Cognitive, physical, and affective behaviors on fact-based tasks. Journal of the American Society for Information Science, 51, 646-665.

Bilal, D. (1999). Web search engines for children: A comparative study and performance evaluation of Yahooligans!, Ask Jeeves for Kids, and Super Snooper. Proceedings of the 62nd ASIS Annual Meeting, 36, October 31-Nov. 4, Washington, D.C. (pp. 70-82).

Bilal, D. (1998). Children's search processes in using World Wide Web search engines: An exploratory study. Proceedings of the 61st ASIS Annual Meeting, 35, October 25-29, Pittsburgh, PA (pp. 45-53).

Bruce, C. (1997). The Seven Faces of Information Literacy. Adelaide: Auslib Press.

Brunner, J. (1973). Beyond the information given: Studies in the psychology of knowing. New York: Norton & Co.

Brunner , J. (1975). Toward a theory of instruction. Cambridge: Harvard University Press.

Brunner, J. Acts of meaning. Cambridge: Harvard University Press.

Callison, D. (2003). Key Words, Concepts and Methods for Information Age Instruction: Methods for Teaching Information Inquiry. Baltimore: LMS Associates.

Callison, D., McGregor, J. & Small, R. (1998). Instructional Interventions for Information Use. Salt Lake City: Hi Willow Research and Publishing.

Candy, P. & Bruce, C. (Eds) (2000). Information Literacy Around the World: Advances in Programs and Research. Charles Sturt University Center for Information Studies.

Chelton, M. K. & Cool, C. (Eds) (2004). Youth information seeking: theories, models and approaches. Lanham, MD: Scarecrow Press.

Dewey, J. (1933). How we think. Lexington, MA: Heath.

Dewey, J. (1944). Democracy and education. New York: Macmillan.

Diakiw, J. 1997. “Children’s literature and Canadian national identity: A revisionist perspective.” Canadian Children's Literature 23: 36-49.)

Donham, J. K., Bishop, K., Kuhlthau, C, & Oberg, D. (2001). Inquiry based learning: Lessons from Library Power. Worthington, OH: Linworth.

Doyle, Christina S. (1994). Information Literacy in an Information Society: A Concept for the Information Age. Syracuse: ERIC Clearinghouse on Information & Technology.

Dresang, E. (1999). More research needed: Informal information-seeking behavior of youth on the Internet. Journal of the American Society for Information Science. 50(2), 24-37.

Driscoll, Marcy P. (1994). Psychology of Learning for Instruction. Needham, Ma: Allyn & Bacon.

Fidel, R., Davies, R., Douglass, M., Holder, J., Hopkins, C., Kushner, E., Miyagishima, B., &Toney, C. (1999). A visit to the information mall: Web searching behavior of high school students. Journal of the American Society for Information Science, 50(1), 24-37.

Gardner, H. (1983). Frames of Mind: The Theory of Multiple Intelligences. New York: Basic.

Gardner, H. (2000). Intelligence Reframed: Multiple Intelligences for the 21st Century. New York: Basic.

Gore, J., Griffiths, T., & Ladwig, J. (2002). Exploring 'productive pedagogy' as a framework for teacher learning, Paper prepared for presentation at the Annual Meeting of the Australian Association for Research in Education, Brisbane, December 2-5, 2002. Retrieved November 4, 2004, from: http://www.aare.edu.au/02pap/gor02267.htm

Harada, V. (1999). The art of collaboration. Teacher-Librarian, 27, 9-14.

Haycock, K. (2003). The crisis in Canada's school libraries: The case for reform and reinvestment, Association of Canadian Publishers, Toronto. Retrieved November 4, 2004, from: http://www.peopleforeducation.com/librarycoalition/Report03.pdf

Hirsh, S.G. (1999). Children's relevance criteria and information seeking on electronic resources. Journal of the American Society for Information Science, 50(14), 1265-1283.

Huitt, W., & Hummel, J. (2003). Piaget's theory of cognitive development. Educational Psychology Interactive. Valdosta, GA: Valdosta State University. Retrieved [date] from http://chiron.valdosta.edu/whuitt/col/cogsys/piaget.html

Kafai, Y. and Bates, M. (1997). Internet Web-searching instruction in the elementary classroom: Building a foundation for information literacy. School Library Media Quarterly. Winter, 103-111.

Kelly, G. A. (1963). A theory of personality: the psychology of personal constructs. New York: Norton.

Krashen, S. (2001). Text and tech: The two-way bridge to learning. Presentation at the American Library Association, San Francisco, CA.

Krashen, S. (1997). Bridging inequity with books. Educational Leadership 55 (4): 18-22.

Krashen, S. (1993). The power of reading: Insights from the research. Englewood, CO: Libraries Unlimited, Inc.

Krashen, S. (1989). We acquire vocabulary and spelling by reading: Additional evidence for the Input Hypothesis. Modern Language Journal 73: 440-464.

Krashen, S. (1988). Do we learn by reading? The relationship between free reading and reading ability. In Linguistics in context: Connecting observation and understanding. Ed. D. Tannen. Norwood, NJ: Ablex.

Kuhlthau, C. C. (1985). Teaching the library research process: A step by step program for secondary students. West Nyack, NY: Center for Applied Research in Education.

Kuhlthau, C. C. (1986). Facilitating information seeking through cognitive modeling of the search process. NY: Rutgers University, School of Communication, Information and Library Studies. (ERIC Document Reproduction Service No. ED 328 268)

Kuhlthau, C. C. (1987a). An emerging theory of library instruction. School Library Media Quarterly, 16(1), 23-28.

Kuhlthau, C. C. (1987b). Information skills for an information society: A review of research. Syracuse, NY: Syracuse University. (ERIC Document Reproduction Service No. ED 297 740)

Kuhlthau, C. C. (1989). Information search process: A summary of research and implications for school library media programs. School Library Media Quarterly, 18(1),19-25.

Kuhlthau, C. C. (1996). Seeking meaning: A process approach to library and information services.
Norwood, NJ: Ablex.

Kuhlthau, C. C. (2004). Seeking meaning: A process approach to library and information services. 2nd ed. Westport, CT: Libraries Unlimited.

Large, A., & Beheshti, J. (2002). The Web as a Classroom Resource: Reactions from the Users. Journal of the American Society for Information Science, 51, 1069-1080.

Loertscher, D., with Ross J. Todd. (2003) "We Boost Achievement! Evidence-Based Practice for School Library Media Specialists." Salt Lake City: Hi Willow Research & Publishing.

Loertscher, D. & Woolls, B. (2001). Information Literacy: A Review of the Research: A Guide for Practitioners and Researchers, 2nd edition.. Salt Lake City: Hi Willow Research & Publishing.

McAfee Hopkins, D. & Zweizig, D. (1999). Student learning opportunities summarize Library Power. School Libraries Worldwide, 5(2), 97-110.

Martin, A. & Rader, H. (eds) 2002. Information and IT Literacy: Enabling Learning in the 21st Century. New York: Neal-Schuman, 2002.

McNicholas, C., & Todd, R. (1996). New kids on the box: Is it worth the investment? Scan, 15 (4), 40-42.

Moore, P. (2000). Towards Information Literacy: One School's Journey. Wellington: New Zealand Council for Educational Research (NZCER).

Moore, P. (2002). Information Literacy: What's it all about? Wellington: New Zealand Council for Educational Research (NZCER).

Piaget, 1976

Schachter, J., Chung, G.K.W.K., & Dorr, A. (1998). Children’s Internet searching on complex problems: performance and process analyses. Journal of the American Society for Information Science, 49(9), 840-849.

Todd, R. (1995). Integrated information skills instruction: Does it make a difference? School Library Media Quarterly, 23 (2), 133-139.

Todd, R., & McNicholas, C. (1997). Electronic information and learning organisations. In Information online & on disc 97. Proceedings of the Eighth Australasian Information online & on disc conference and exhibition. Sydney Convention and Exhibition Centre, Sydney Australia (pp. 363-373). Sydney: Information Science Section, Australian Library and Information Association.

Todd, R. (2002). Evidence-based practice I: The sustainable future for teacher-librarians. Scan, 21(1), P. 30-37.

Todd, R. (2002). Evidence based practice II: Getting into the action. Scan, 21(2), 2002, P. 34-41.

Todd, R. (2003) Evidence-Based Practice: Difference, Intervention and Transformation. Scan. 22(4), 30-37.

Todd, R. (2000) Accessing networked information: research, issues and implications. The New Review of Information Networking. Volume 6. P. 61-79.

Todd, R. (1999) Utilization of heroin information by adolescent girls in Australia: A cognitive analysis" Journal of the American Society for Information Science. 50(1). P. 10-23.

Todd, R. (1999) Back to our beginnings: Information utilization, Bertram Brookes and the Fundamental Equation of Information Science. Information Processing & Management. 35. P. 851-870.

Vygotsky, L.S. (1978). Mind and society: The development of higher mental processes. Cambridge, MA: Harvard University Press.