

Theme Section

Adolescents of the Information Age:
Patterns of Information Seeking and Use,
and Implications for Information
Professionals

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This article provides an overview of the field of human information behavior as it shapes and affects the provision of quality information services and products to children and adolescents. It is a diverse, dynamic, and complex field and one shaped by many situational, personal, social, and organizational factors. This review sets the theme for this issue's focus on adolescents' information seeking and use. It briefly explores some of the key themes, theories, and challenges and explores how these shape the professional responsibilities and actions of school librarians.

Introduction: The Field of Human Information Behavior

The focus on understanding the key dimensions of human information behavior has emerged over the past 25 years. Simply defined, human information behavior is the study of the interactions between people, the various forms of data, information, knowledge, and wisdom that fall under the rubric of information, and the diverse contexts in which they interact. Typically, the field of human information behavior addresses concepts such as people's information contexts, information needs, information seeking behaviors, patterns of information access, retrieval and dissemination, human information processing, and information use. Related concepts include sources, uncertainty, and satisfaction. Its theory building, research, and development are based on the belief that information is essential to the functioning and interaction of individuals, social groups, organizations, and societies, and to the ongoing improvement of the quality of life. Underpinning this is the belief that information has the potential to change what people already know and to shape their decisions and actions. This "effects" perspective of information is consistent with the Latin and Greek origins of the word: information: inform.ere informo, informare, informavi, informatus as "inward forming."

The central dilemma of studying human information behavior is concisely expressed by Baran and Davis (1995), a dilemma of an information-intense

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society that focuses on understanding how people and information come together and how information professionals respond:

Each day we are exposed to vast quantities of sensory information; we take in only a small fraction of it, process and use an even smaller fraction, and then we finally store a tiny fraction of this in long-term memory. According to some cognitive theorists, we are not so much information handlers as information avoiders ... Very little of what goes on around us ever reaches our consciousness and most of this is soon forgotten, (p. 267)

A key influence in the development of this field was the publication of a seminal review by Dervin and Nilan (1986). In reviewing information needs and uses research, they identified a clear shift in the scholarly and professional field of librarianship and information science from a system-oriented paradigm to a user-oriented paradigm. They characterized this shift by a set of assumptions underlying central concepts such as information, information users, information seeking behavior, and information use, as illustrated in Table 1.

This set of user-centered assumptions put forward by Dervin and Nilan (1986) has guided research and scholarly activity for the last 15 years. It has triggered multiple inquiry paths that collectively have sought to identify and understand the behavioral, affective, and cognitive dimensions of people's engagement with information and how this enables them to meet their information needs and to get on with their lives as informed and knowing people. It has also put emphasis on articulating how libraries and information agencies provide more responsive service, based on an understanding of the uniqueness, individuality, and diversity, rather than on conformity and modification. As Garvey states,

It becomes increasingly clear that the success of information services is more likely to be achieved through adjusting the services to meet the specific needs of an individual rather than trying to adapt the individual user to match the wholesale output of the information system. (Dervin & Nilan, 1986, p. 7)

This has been an enormous challenge, and one that has not always been received positively, with some scholars considering that the field has been "charmed by incantations about user needs," that it is "largely a waste of time," and that outcomes can potentially "be worse than better" (Dervin & Nilan, 1986, p. 9).

Despite this dissention, since the mid 1980s, considerable attention has been given to understanding the information behaviors of varied professional, social, and cultural groups such as physicians, engineers, immigrants, the elderly, student groups, cancer patients, even prisoners. These studies have focused on identifying their information needs, preferred paths to information seeking and gathering, how they put the information to personal use, as well as identifying barriers and enablers to information seeking and use. In addition, many of these studies have sought to articulate organiza-

Table 1: The Key Dimensions of System and User Perspectives

<i>Dimension</i>	<i>System Orientation</i>	<i>User Orientation</i>
How we view information	<i>Objective:</i> information as a real concrete object or thing that has an independent reality outside self and constant meaning; it can be recorded, stored, transported and exchanged.	<i>Subjective:</i> Information does not have a constant meaning; each person creates his or her own meaning; Information is the sense or internal knowing a person constructs to fill an information gap.
View of the user	<i>Passive:</i> Users typically portrayed as passive recipients of objective Information; Agencies exist to exchange information; exchange signifies state of being informed; Use of system seen as successful interaction; Little attention given to what people actually do with the information; people seen as robotic information processing systems.	<i>Active:</i> Users seen as purposive, self-controlling, sense-making beings who construct needs out of situations that arise in their time-space context; Exchange of information does not necessarily mean satisfaction of information need; Notion of user as active, constructive person.
How we predict user behavior	<i>Trans-situational:</i> Use of static, across time-space variables such as age, gender, broad situation; Observations fit all users in similar categories, for example, given set of demographic variables, users' responses are the same; Focus on defining the situations.	<i>Situational:</i> Attention is given to delineating the unique psychological, sociological, cognitive factors that shape information seeking and use; Identifying the dynamics of the immediate time-space context: the situational dimensions unique to the individual.
View of user experience	<i>Atomistic:</i> Typically focus only on the users' behaviors at point of interaction with the system that is when they come into the library; user's question taken as clear statement of need; need resolved when exchange of object takes place.	<i>Holistic:</i> focus on the whole social interaction, from time need arises out of situational contexts, to time need was satisfied; Consider needs, existing state of knowledge, helps required patterns of use, effects of interaction).
Determining information needs	<i>External:</i> Focus on external behaviors. For example, contact with sources, systems; Needs inferred from frequency of use, demand for resources, likes, dislikes, interests, activities, and community profiles.	<i>Internal:</i> Focus on internal cognitions, understanding of psychological and cognitive states: focus on cognitive behaviors as key.
Dealing with individuals	<i>Chaotic.</i> Views dealing with individuals as chaotic; Unable to deal with anything but orderly patterns of behavior; Individuality means lack of predictability, therefore chaos.	<i>Systematic individuality:</i> Acknowledges the right of user to be different; Acknowledge individual values are variable. Seek to understand the common dimensions of people's information experience: systematic individuality
Research approaches	Increasingly sophisticated quantitative techniques.	Use of inductive <i>qualitative</i> approaches; hearing the voice of the user; interview, focus groups, case studies, critical incident; brainstorming, ethnographic, phenomenographic studies.

tional implications for the library and information sector, with attention given to user-centered reference services, information interviews, user-centered interfaces to electronic retrieval systems, approaches to gathering user feedback, and design of physical facilities more responsive to user needs and behaviors. Against this broad framework, considerable attention has also been given to understanding the information seeking and use behaviors of children and adolescents, and from a range of perspectives: their learning at schools, their use of the World Wide Web, their reading and media patterns and preferences, and a range of information seeking and use behaviors related to life aspects.

Based on this wide-ranging research, some scholars have focused on generating models of human information behavior. One of the most widely cited models is that of United Kingdom information scientist Tom Wilson, shown in Figure 1 (Walsh & Wilson, 1995, p. 36).

This model concisely portrays the complex dynamics and interactions that shape people's information behavior: what prompts their information needs, what motivates them to search actively for information, what shapes their seeking with engagement with information, as well as the barriers and enablers to effective information seeking and use. Most models posit that at the heart of information behavior is the concept of information need and an attendant motive to engage in information seeking: the context or situation that prompts the need. This may be a need for new information to build a complete picture, or a need to clarify, modify, confirm, or change existing knowing, beliefs, and values, or to establish a personal perspective or position (Todd, 1999a). Wilson's (Walsh & Wilson, 1995) model suggests that a range of activating and intervening variables—personal, social, demographic, environmental, as well as characteristics of information sources themselves—shape the information seeking journey, as well as being shaped by perceptions of outcomes, the nature of the searching, and percep-

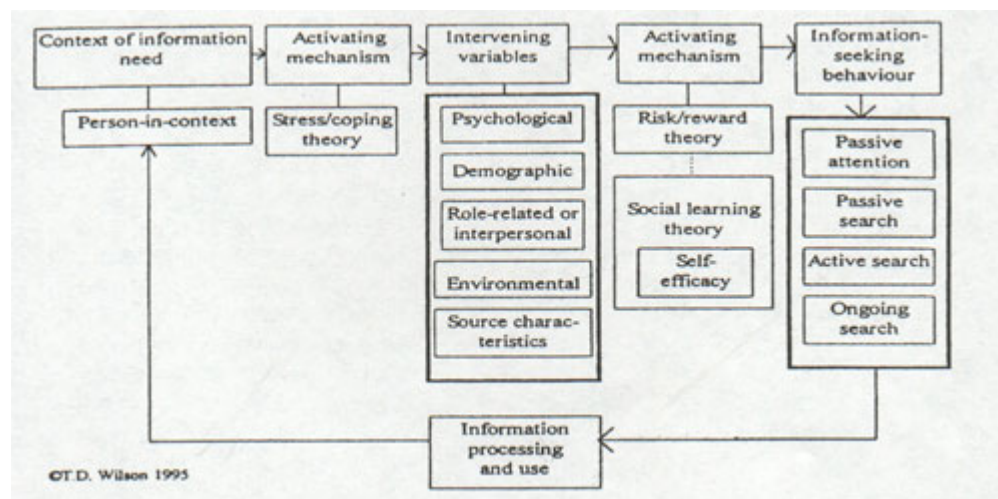


Figure 1. Revised general model of information behavior.

tions of risks and rewards along the way. This model is particularly useful, as it provides a framework for understanding that even simple information requests at the school library circulation desk have behind them a multitude of perceptions, motivations, stress and coping factors, as well as perceptions of risks, rewards, and outcomes—and these play a role in how information needs are met—and levels of satisfaction. In essence, the model suggests that a simple question at the information desk, "I want a book on x," may in reality be a complex need that goes deeper than the typical response of pointing the user to the Dewey numbers that are assigned to the topic.

Another strand of the human information behavior field has focused on theory development. One of the most prominent theories in the field focuses on the concept of sense-making, and has been developed by Brenda Dervin (1992), a noted communications scholar at Ohio State University, USA. According to Dervin, sense-making is "a set of metatheoretic assumptions and propositions about the nature of information, the nature of human use of information, and the nature of human communication" (pp. 61-62). Sense-making is posited as a "constructing" activity, that is, "the successive modifications of internal pictures of reality, a series of constructings and reconstructings" (p. 5), and out of that constructive process, sense is the product. Dervin presents the sense-making metaphor as a triangle of situation-gap-help/use illustrated in Figure 2. She claims that people's daily lives and experiences provide the context for information seeking. Situations arise where people's understanding of many things is incomplete or blocked. Their internal sense has run out, and in order to move on, they need to create new sense. They begin to ask questions and formulate ideas (identifying the gaps) and seek out and gather information formally or informally that provides answers that help them to make sense. Sense-making thus is a constructive process of bridging gaps or discontinuities through information seeking and use. This sense-making theory provides another useful frame-

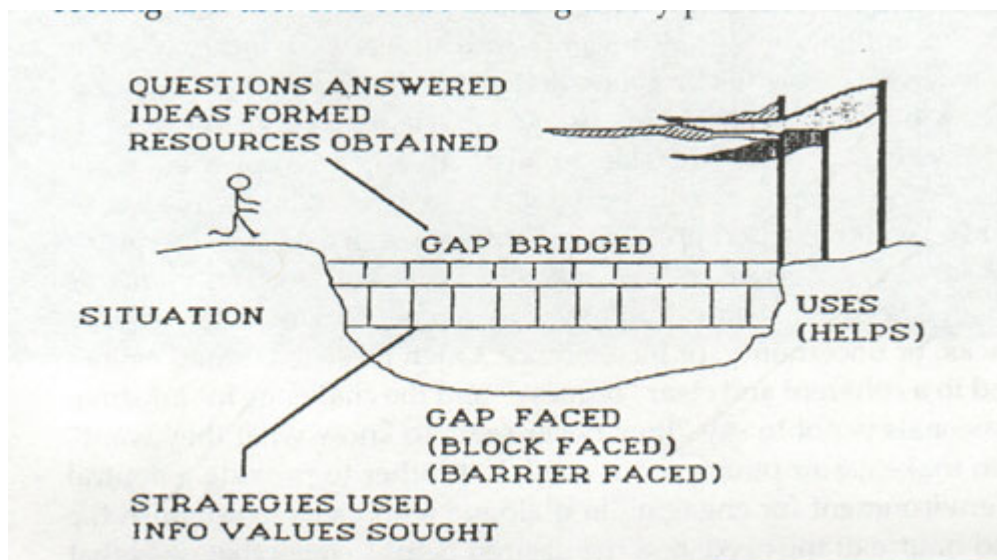


Figure 2. The sense-making metaphor.

work for thinking about the information needs of children and adolescents: understanding their situation, their gaps, their perceptions of helps and uses as a basis for developing a strong user-centered approach to understanding the information needs of young people.

This particular approach is also consistent with an outcomes orientation of schooling: the construction of new knowledge, understandings, and meanings. Central to school libraries enabling students to bridge gaps is the instructional intervention role of school librarians in providing "meaningful, authentic activities that help the learner to construct understandings and develop skills relevant to problem solving" (Wilson, 1997, p. 3). The provision of information in a school library does not necessarily mean that learners become informed. Information is the input; through this input, existing knowledge is transformed, and new knowledge—as understanding, meaning, new perspectives, interpretations, innovations—is the outcome. Empowerment, connectivity, engagement, and interactivity define the actions and practices of the school library, and their outcome is knowledge construction: new meanings, new understandings, new perspectives.

Two additional theoretical frameworks are presented here, not simply to illustrate the scope of theoretic approaches emerging in the field of human information behavior, but also to signify the complexities involved in thinking about children and adolescents and their information behaviors from both cognitive and social perspectives. The first is Belkin's (1980) Anomalous State of Knowledge (ASK). Coming from an information retrieval perspective, Belkin contends that a focus on users' states of knowledge and problems, goals and intentions offers key solutions to retrieval system design. Underpinning the ASK is the user's recognition of a problematic situation, a recognition that can be interpreted as the user's model of some aspect of the external world and his or her position in it with respect to some particular situation. The problematic aspect is that the person recognizes that his or her current model is insufficient, and knows that information is needed in order to resolve the problem. Belkin's model is shown in Figure 3.

The user's difficulty in specifying or even explicitly recognizing what is wrong, and what is needed to make things better, is often overlooked in many information services. In this model, the perceived inadequacy, for which users are often blamed or held accountable, is an aspect of the user's anomalous state of knowledge. The user's state is said to be anomalous because inadequacies in a state of knowledge can be of many sorts, such as gaps, or lacks, or uncertainty, or incoherence. Often these anomalies cannot be specified in a coherent and clear "request," and the challenge for information professionals is not to say "they never seem to know what they want" and then to make assumptions about need, but rather to provide a neutral and open environment for engaging in dialogue with users to establish the context and nature of the need, and the desired helps to meet that need that can then be matched to appropriate sources (texts). Belkin (1980) posits the

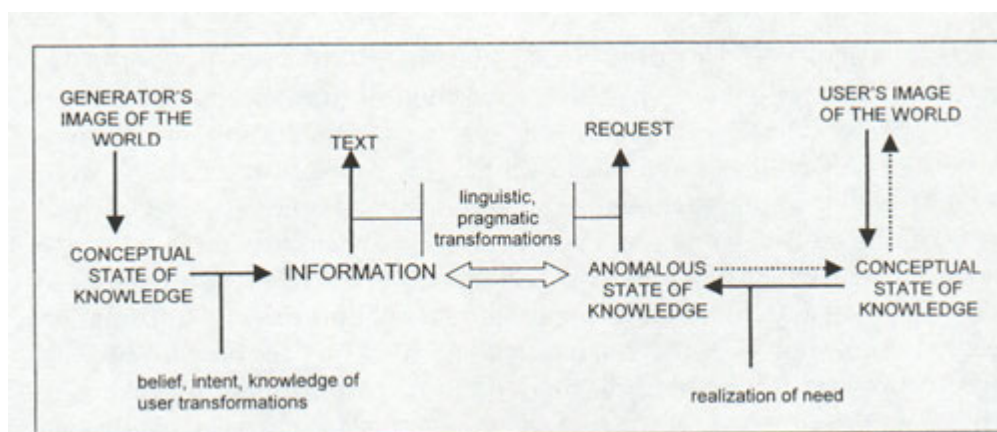


Figure 3. A cognitive communication system for information retrieval.

ASK model as a framework for improving an information system's or agency's performance in meeting users' needs.

One additional model in the field of human information behavior that is gaining considerable attention is Elfreda Chatman's (1996) Theory of Information Poverty. Chatman's theory has been derived from a number of empirical studies of the information behavior of "ordinary people." These studies are primarily of adult groups: janitors, single mothers, and aging women. From a meta-analysis of these studies, Chatman proposed six prepositional statements describing an impoverished information world. The six propositions are:

1. People who are defined as information poor perceive themselves to be devoid of any sources that might help them.
2. Information poverty is partly associated with class distinction. That is, the condition of information poverty is influenced by outsiders who withhold privileged access to information.
3. Information poverty is determined by self-protective behaviors that are used in response to social norms.
4. Both secrecy and deception are self-protecting mechanisms due to a sense of mistrust regarding the interest or ability of others to provide useful information.
5. A decision to risk exposure about our true problems is often not taken due to a perception that negative consequences outweigh benefits.
6. New knowledge will be selectively introduced into the information world of poor people. A condition that influences this process is the relevance of that information in response to everyday problems and concerns, (p. 197)

These prepositional statements also provide a useful framework for examining the factors that shape the information seeking behaviors of a children and adolescents, particularly their information needs centering around life concerns. In particular, they challenge the assumption that adolescents growing up in rich information environments have a world of information at their fingertips and readily make use of it.

Information Seeking Behavior of Children and Adolescents

Against this general general picture of the field of human information behavior, considerable attention has been given to understanding the information behavior of children and adolescents. This research too has followed divergent paths. Three streams of research can be identified, and each of these is briefly overviewed here. These are: (a) school students learning through the school library, which examines various aspects of the relationship between student learning and their engagement with school libraries and information literacy/information skills; (b) children and adolescents and the World Wide Web, which focuses on understanding their patterns of information seeking in electronic environments; (c) children and adolescents and everyday information seeking, focusing on their engagement with information to address everyday life concerns, such as growing up, identity, relationships, careers, and life-style choices. Each of these themes is described briefly.

School Students Learning Through the School Library

Characteristically, this area of research seeks to understand more precisely and specifically how targeted groups of students across a wide range of age groups, curriculum settings, and instructional designs seek and use varied information sources. How this can be best enabled, the specific effects of the development of information scaffolds, and the range of behavioral, affective, and cognitive dimensions that shape the information behaviors of students are also examined. From a number of landmark research studies, and national and international reviews of the research literature, a range of generalizations can be articulated that focus on students' learning patterns and outcomes.

Kuhlthau's (1991,1993,1994,1999) research centering on the Information Search Process is among the most internally cited work in the human information behavior field and has played an important part in shaping subsequent research that has explored the cognitive, behavioral, and affective dimensions of adolescent information seeking and use. Figure 4 shows the Information Search Process.

Through Kuhlthau's longitudinal studies from adolescents to adults, the Information Search Process (ISP) has been found to occur in seven stages: Initiation, Selection, Exploration, Formulation, Collection, Presentation, and Assessment. These stages are named for the primary task to be accomplished at each point in the process.

- Initiation* Students are given invitation to research an engaging question. Their task 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.

The Information Search Process

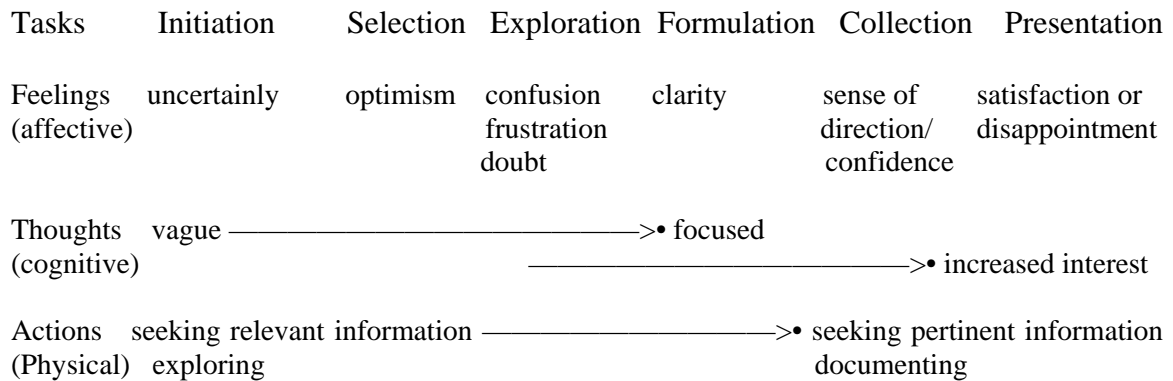


Figure 3. Kuhlthau: The information search process.

Exploration Students explore the initiating question and develop questions of their own that arise as they begin to learn about the subject. Students commonly encounter information that is inconsistent and incompatible with what they already know and what they expect to find.

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

Collection Students gather information that defines, extends, and supports the focus they have formed; their interest and confidence commonly increase as they gain a sense of ownership and expertise in the subject.

Presentation Students prepare to share what they have learned with the others in their learning community.

Assessment Students reflect on what they have learned to discover what went well and what might be improved.

The model describes the thoughts, actions, and feelings commonly experienced by students as they engage in an inquiry process. Their feelings reveal much about the learning process and their ownership of it, as well as the supporting interventions that will help them through it. The inquiry process is 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. Unfortunately, in school assignments, the early stages of the search process are often hurried, and the middle stages are frequently passed over, as students are urged to collect and complete their work. At completion, when assessing the inquiry process, students often find that they missed the critical stages of learning by not allowing time for reflecting and formulating while they were exploring and collecting information. And all too often, students present evidence that they have not engaged with the information to build new understandings and perspectives.³⁵

The Information Search Process provides our field with a strong quantitative and qualitative research base for developing inquiry-centered information literacy approaches to instructional intervention through the school library. The ISP highlights the complexity and importance of these early stages of the research process, particularly the stages of Selection, Exploration, and Formulation. These stages are often overlooked in many of the models of information skills presented in schools, in library policy statements, and indeed in many documents of library associations that espouse the value of information literacy development. These stages are also weakly articulated in numerous listings of information literacy competences developed by various library associations to support the collaborative instructional role of the school librarian. Furthermore, they are weakly addressed in any of the manuals on information literacy pedagogy that present a range of instructional strategies for the development of information literacy skills. Yet the research shows that these stages are critical to the process of personal knowledge construction rather than students just merely manipulating and transporting available information to their final products. The outcome is that students fail to build background knowledge that promotes seeking and formulating a focus during a search; fail to establish a clear focus that guides the collection of, and interaction with, highly pertinent information rather than vaguely relevant information; fail to stay focused and not be distracted from the learning task; and fail to move beyond perceiving the task of searching as primarily one of information gathering to a task of forming a focused perspective from the information encountered.

Although not directly involving students as the primary sample and primary voice, the research undertaken by Lance (2001) and colleagues of statewide studies of school libraries has involved over 3,000 schools with school libraries serving over three million students. These researchers have undertaken substantial statewide studies over 10 years, involving hundreds of primary and secondary schools and include Colorado, Alaska, Pennsylvania, New Mexico, Oregon, and Texas. A similar study has been undertaken by Baughman (2000) in Massachusetts. These studies show that school library predictors of academic achievement, as measured by standardized test scores, include: credentialed staff and support staff engaged in a curriculum-centered library program; school librarians' involvement in collaborative information literacy instruction; provision of quality collections and an information technology infrastructure for information access and use; and motivating students to read.

A series of literature reviews in recent years further provide a strong basis for developing school library educational and informational services underpinned by an understanding of children's and adolescents' information behaviors. The most recent are an Australian review by Lonsdale (2003) and a Canadian review by Haycock (2003). These draw together studies that establish a positive relationship between school librarians and school libraries and

many dimensions of student achievement. The tenor of these studies is not so much to directly understand adolescent information behaviors per se and to explore implications for the development of responsive information services (although they provide important insights here), but to "prove the self-evident benefits of a library, one of human civilization's greatest and most enduring institutions" (Haycock, p. 11) and to provide strong cases for the ongoing support of school libraries and the professional role of school librarians by educational systems at local, state, and national levels. Emphasis tends to be given to understanding system rather than user dimensions: dimensions of the library system and infrastructure that foster student achievement. These include staffing, resources, computer networks, quality collections, collaborative relationships, information literacy instruction, and professional development. However, embedded in these reviews, and in reviews such as Loertscher and Woolls (2001), are a considerable number of research studies that focus on identifying patterns of information behavior related to students' abilities to connect with, interact with, and use information to construct personal understanding (Gordon, 2000; Grant, 1998; Hawkes, 1997; Jones, 1996; Lewis, 1999; Maxwell, 2000; Moore, 1996; Moore & Pouloupoulos, 1999; Todd, 1995; Todd, Lamb, & McNicholas, 1993).

Williams and Wavell's (2001) study of the effects of Scottish school libraries on student learning, based on focus group studies with students and secondary teachers, identified a range of collective perceptions of the effects of school library programs. Their study shows that significant learning is fostered by the school library, encompassing behavioral, cognitive, attitudinal, and affective dimensions. These included: acquisition of information and wider general knowledge; skills development in the areas of finding and using information, information technology skills, and reading skills; higher achievement in school work; developing a study and reading habit encouraging independent working; motivation of learning and enjoyment of learning; the ability to use these skills confidently and independently and the ability to transfer these skills across the curriculum and beyond school; and the development of interpersonal and social skills, including working collaboratively.

A major statewide study undertaken by Todd and Kuhlthau (2004) involving 39 schools and 13,123 students in Ohio provides substantive evidence of how school students from grades 3 to 12 benefit from the school library: what help they get and how they perceive this affects their learning. The study sought to understand how students benefit from school libraries through elaborating student-centered conceptions of help and providing some measure of the extent of these helps as perceived by students. The strongest helps center around the school library being a resource agent and a technical agent, with targeted, contextualized instructional intervention integral to successful learning with information.

Searching or Surfing the World Wide Web

A second stream of research focuses on the characteristics of children and adolescents' information seeking behavior in electronic environments. Since the late 1990s, a substantial number of research studies have been published that focus on young people's use of the World Wide Web. Studies of children's use of search engines and Web sites (Akin, 1998; Bilal, 2000,2001,2003; Bilal & Kirby, 2002; Fidel et al., 1999; Hirsh, 1997,1999; Kafai & Bates, 1997; Large, Beheshti, & Rahman, 2002; Lazonder, Biemans, & Wopereis, 2000; McNicholas & Todd, 1996) show that although young people enjoy searching for information on the Web and are motivated to use it as a communication and entertainment tool, they exhibit interaction patterns that suggest a number of barriers to effective information seeking and use. These studies show dilemmas related to: low or extremely high hit counts; information overload and inability to manage and reduce large volumes of information; constructing appropriate and effective search strings to retrieve highly pertinent sources; navigating complex subject hierarchies; understanding and using Boolean logic; tendency to conduct simple searches. Grafting poor searches; considerable guessing of appropriate search terms; considerable insecurity and uncertainty when searching; preference for browsing techniques to systematic, absence of analytic-based strategies; superficial assessment of Web sites for quality and relevance; demonstrating a range of coping strategies such as filtering, simplification, accepting errors, delegating searches to someone else; often inappropriately favoring visual cues, such as looking at pictures rather than textual information as signs of relevance; pasting chunks of text without regard for and understanding of ethical practices of information use; willing to construct answers on limited information; and being satisfied with somewhat relevant hits rather than the best hits.

A consistent theme emerging from all these studies is the need to develop learners' information and critical literacies: developing the intellectual scaffolds to appropriately engage with this information, to successfully access, interrogate, and critique the information to meet their learning needs and desired knowledge outcomes; to question and challenge the ambiguous world of ideas made available through the Web; to understand and analyze how Web information works to empower some and exclude others; and to have the capability of managing and effectively using the quantities of information they confront in their quest for new knowledge and understanding. The development of information and critical literacies is viewed as fundamental to assisting learners in making decisions about, for example, what information to believe, what to doubt, what to pay attention to, what to be concerned with, and what to reject. At a more specific level, these literacies enable students to make evaluations of Web sites and to ask important questions such as: What is this site trying to do? What is this site trying to do to me? Whose interests are being served here? What is the text trying to say?

What are the possible meanings of this text? What do I already know about this information, and how does this relate to it? How does this relate to other sites on the World Wide Web, and sources of information other than the World Wide Web? What are some alternative or opposing views, and where might I find them? How does this site help me construct an alternative position? What do I do with this site now? Whom can I talk to about this site? Which voices are silent here? What actions can/should/will I take? (modified from Freebody & Luke, 1990).

Everyday Information Seeking

Considerably less attention has been given to children's and adolescents' information behavior in daily life contexts, and even less in relation to their life concerns. Although considerable research relates to leisure reading and mass media use, fewer studies deal with information about concerns such as drug use, health, careers, and unemployment, as well as evaluating the effects of information provision programs on behaviors related to these. (Anderson, 1993, 1996; Buysse, 1996; Edwards & Poston-Makkai & McAllister, 1990; Julien, 1999; Mayton, Nagel, & Parker, 1990; Mirzaee, Kingery, & Puitt, 1999; Newell-Withrow, 1986; Poston-Anderson & Edwards, 1993). With some exceptions, these studies have not been from the perspective of adolescents themselves, and have tended to use quantitative structured data collection methods. One of the key assumptions underpinning this research is the notion that school and public libraries can be a powerful catalyst in a young person's life, providing both an environment and access to sources of information that can shape choices and decisions about life and lifestyle matters.

Poston-Anderson and Edwards' (1993) study of 13- and 14-year-old girls found that although adolescents have no difficulty expressing their information needs, few actively sought information from libraries and other information agencies. The school library was perceived as a mechanism for control, as a source of only socially sanctioned material, and as dealing with subjects for curricular use only. In a later study focusing on concerns about future jobs and future education, Edwards and Poston-Anderson (1996) found that adolescents engaged in little or no formal information seeking and tended not to approach friends, teachers, career advisers, and librarians. Julien's (1999) analysis of adolescents' information seeking for career decision-making found that many adolescents did not know where to go to get help to make their decisions, and a similar number found that there were too many places to go for help in their information seeking. The study also showed that the lack of clarity of appropriate processes for career decision-making led many to feel anxious and overwhelmed, and when offered assistance, they did not know what questions to ask. Todd's study (1999a) of how adolescents use information about heroin identified five types of cognitive information use: get a complete picture, get a verified picture, get a changed picture,

get a clearer picture, and get a position in a picture. These types of cognitive information use can be conceptualized as information intents, that is, information, deliberately and intentionally selected from what is available, and its use enables people to adapt and create pictures of their world. In the process of doing something cognitively with this information, people are able to move on: to get complete, changed, verified, or clearer pictures, and form opinions and state viewpoints. These intents represent cognitive goals that shaped the process of information use. The study showed that adolescents in this study were not passive, robot-like processors of information; rather, they were active creators of new knowledge, manipulating information selectively, intentionally, and creatively to build opinions, viewpoints, arguments, and explanations and to change and/or verify facts.

In a meta-analysis of data from Australian research undertaken by Edwards and Poston-Anderson (1996) and Todd (1999a, 1999b), and using the analytical framework based on the propositional statements of Chatman's (1996) Theory of Information Poverty, Todd (in press) showed that the interplay of several factors, particularly notions of insiders and outsiders, judgments about risks, costs and benefits, and social norms appears to have created an information world rich in potential sources, but in reality for these adolescents, it is a world that is devoid of sources of information that they can use in relation to their needs about drugs. Making information available does not necessarily mean it is taken up and used, and considerable future research and development needs to focus on how libraries and information agencies might be constructed as safe spaces for children and adolescents to meet their personal information needs.

School Librarians and Professional Action

The human information behavior research on children and adolescents provides a rich foundation for designing and implementing instructional and information services through school libraries. The sheer complexity of the interacting dynamics that shape effective information seeking and use by children and adolescents is often overlooked in many of the models of information skills presented in schools, in library policy statements, and indeed in many documents of library associations that espouse the value of information literacy development. Yet understanding this complexity, and providing for it in collaborative pedagogical intervention, is critical to students being enabled and empowered to construct personal knowledge rather than just merely manipulating and transporting available information to their final products. The outcome of superficial approaches to information seeking and its pedagogy is that students fail to build background knowledge that promotes seeking and formulating a focus during a search; fail to establish a clear focus that guides the collection of, and interaction with, highly pertinent information rather than vaguely relevant information; fail to stay focused and not be distracted from the learning task; and fail to move

beyond perceiving the task of searching as primarily one of information gathering to a task of forming a focused perspective from the information encountered.

The research also identifies the holistic nature of information seeking and use. In other words, it is more than an intellectual activity, but one of a complex interplay of thoughts, actions, and feelings. On the basis of her research, Kuhlthau (1993) has established the Uncertainty Principle, common in the early stages of any constructive process, and defines it thus:

Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and lack of confidence. Uncertainty and anxiety can be expected in the early stages of the ISP. The affective symptoms of uncertainty, confusion and frustration are associated with vague, unclear thoughts about a topic or question. As knowledge states shift to more clearly focused thoughts, a parallel shift occurs in feelings of increased confidence. Uncertainty due to a lack of understanding, a gap in meaning or a limited construction initiates the process of information seeking, (p. III)

Kuhlthau argues that affective dimensions such as uncertainty have not been adequately addressed in the systems and services designed for information seeking. She argues that user's uncertainty is traditionally considered a negative to be reduced as quickly as possible. Affective dimensions of the search process such as uncertainty have yet to be strongly represented in the articulation of information literacy competences and continua across grade levels in schools. In the context of this research-practice discussion, the challenge for practitioners is to ensure that both the articulation of an information literacy framework, and the pedagogy of its integration into the curriculum, actually reflect the current research-based understanding of information searching and use. This calls for greater researcher-reflective practitioner collaboration.

The information behavior theory and research on adolescents points to pedagogy that has knowledge construction and inquiry learning at its heart, where through access to multiple sources, and formats of information, and information technology, learners acquire the intellectual scaffolds to engage with multiple perspectives, sources, and formats of information to be able to construct their own understanding. The research shows that no matter how compelling or authoritative information might be in the minds of others, no matter how useful someone else might think the information is, these qualities do not guarantee its receptivity and use by children and adolescents. In this context, the role of the school librarian goes beyond developing a range of information literacy competences; rather, he or she is responsible for making available all the information and knowledge that a school possesses or can access so that students can construct their own understanding and richly develop their ideas.

The adolescent information behavior research also suggests that in the process of constructing understanding, adolescents do not always require

facts and more facts. School library collections tend to be facts-oriented. Although specific facts play an important role in constructing knowledge, adolescents want more than facts when accessing information. Constructing understanding is a process of interrogating multiple ideas, perspectives, and interpretations, and philosophical frameworks; confronting the ideational challenges to their own world views, attitudes, and values; and shaping new perspectives and understandings. As Todd's research (1999a) shows, adolescents also want to confirm doubts, establish certainty of ideas, and test their beliefs in particular ideas. They want to form opinions and develop conclusions. The implication is not that adolescents should be immediately swamped with facts. Rather, the implication is the need for school librarians to focus on understanding the desired cognitive, behavioral, and affective outcome, the new understandings, and sense that each adolescent wants to create through accessing information, and to understand how this outcome is best met for each person, and to have available the appropriate information to achieve the desired effect.

It is clear that school librarians have an important role to play in the information exchange process. Research shows that when the context of adolescents' information needs is understood, together with some of the factors that shape their search processes and the desired outcomes they are hoping to achieve, information needs can be met in real and satisfying ways. All too often the dialogue between student and school librarian is about using catalogues, databases, locational aids, indexes, and search terms, and playing "windmill": "It's over there in the 900s." This emphasizes finding as the outcome rather than understanding. And all too often, questions primarily focus on identifying content, and then matching content to specific sources. The information behavior research suggests the value of taking a constructivist stance, seeking to ascertain how students want to move on cognitively from where they are with a particular content area, and seeking to establish the connections and links that already exist between ideas. The outcome for the school librarian would be a sharper understanding of the needs of adolescents from the adolescent's perspective. This could play an important role in preventing premature diagnosis of the information need, as well as ensuring greater satisfaction.

A Concluding Remark

The emerging literature on adolescents' information behaviors is rapidly growing and changing, and it is important that school librarians read this literature, keep up to date with it, and integrate it into professional practice. Research evidence here suggests that librarians' use of research is low (McClure & Bishop, 1989; Turner, 2002). Busy school librarians sometimes say that they do not have time to read the research literature, sometimes dismissing it as being "out there" in a world "removed from practical reality." If we want school librarianship to be a thinking and informed profession, we

cannot take actions that cut us off from advances in knowledge that shape sound practice. A profession without reflective practitioners willing to learn about the advances in research in the field is disconnected from best practice and best thinking and, by default, often resorts to advocacy and position as a bid for survival.

The articles presented in this theme section highlight the multidimensional nature of the information behaviors of children and adolescents from ages 5 to 18, typically from grades 1 to 12. They highlight the importance of understanding this behavior in the design and development of effective information services, and in engaging with these young people in helping them in their information endeavors and knowledge quests. The articles also illustrate the three themes that pervade the information behaviors of children and adolescents. Jennifer Branch explores information seeking processes of junior high school students, particularly in electronic information environments, and highlights both the value and importance of targeted and contextualized instructional intervention to enable students to become more effective searchers, and to deal with the information problems of ineffective searching such as information overload and organizational and time management dilemmas. Jennifer Burek Pierce focuses on the print environment, and through a collections assessment analytical process of unused and underused materials, provides insight into patterns of adolescent information seeking, and develops the provocative notion that non-use may in fact reflect a form of use. Judah Hamer and Jamie Jones focus on adolescents in a social context, yet highlighting implications for the provision of information services in schools. Their work is challenging, potentially confronting, and thought-provoking. From a social constructionist perspective, Hamer examines gay young men's information seeking about coming-out to identify patterns of information needs, information seeking activities and barriers to and enablers of information seeking, and reflects on these findings in relations to Chatman's Theory of Information Poverty. Jones focuses on the concept of resiliency and explores theories of resiliency, assets, and developmental tasks in order to position school librarians more effectively as change agents in their communities and schools by strengthening the environment in which children and adolescents learn.

References

- Akin, L. (1998). Information overload and children: A survey of Texas elementary school students. *School Library Media Quarterly Online*, 1. Available: <http://www.ala.org/aasl/SLMQ/overload.html>
- Baran, S., & Davis, D. (1995). *Mass communication theory: Foundations, ferment, and future*. Los Angeles, CA: Wadsworth.
- Baughman, J.C. (2000, October). *School libraries and MCAS scores*. Paper presented at a symposium sponsored by the Graduate School of Library and Information Science, Simmons College, Boston, Massachusetts. Available: <http://artemis.simmons.edu/~baughman/mcas-school-libraries/Baughman%20Paper.pdf>

- Belkin, N. (1980). Anomalous state of knowledge as a basis for information retrieval. *Canadian Journal of Information Science*, 5,133-143.
- Bilal, D. (2000). Children's use of Yahoo!igans! Web search engine: I. Cognitive, physical and affective behaviors on fact-based search tasks. *Journal of the American Society for Information Science and Technology*, 51(7), 646-665.
- Bilal, D. (2001). Children's use of the Yahoo!igans! Web search engine: II. Cognitive and physical behaviors on research tasks. *Journal of the American Society for Information Science and Technology*, 52(2), 118-136.
- Bilal, D. (2003). Draw and tell: Children as designers of Web interfaces. In R. Todd (Ed.), *Humanizing information technology: From ideas to bits and back. Proceedings of the 66th ASIST Annual Meeting. Vol 40. Information Today*, 135-142.
- Bilal, D., & Kirby, J. (2002). Differences and similarities in information seeking: Children and adults as Web users. *Information Processing and Management*, 38,649-670.
- Buysse, A. (1996). Adolescents, young adults and AIDS: A study of actual knowledge vs. perceived need for additional information. *Journal of Youth and Adolescence*, 25(2), 259-271.
- Chatman, E.A. (1996). The impoverished life-world of outsiders. *Journal of the American Society for Information Science*, 47(3), 193-206.
- Dervin, B. (1992). From the mind's eye of the user: The sense-making qualitative-quantitative methodology. In J. Glazier & R. Powell (Eds.), *Qualitative research in information management* (pp. 61-84). Englewood, CO: Libraries Unlimited.
- Dervin, B., & Nilan, M. (1986). Information needs and uses. *Annual Review of Information Science and Technology*, 21,3-33.
- Edwards, S., & Poston-Anderson, B. (1993). The dinkum oil: Information needs and life concerns of Australian adolescent girls. *Youth Studies Australia*, 12(2), 34-37.
- Edwards, S., & Poston-Anderson, B. (1996). Information, future time perspectives, and young adolescent girls: Concerns about education and jobs. *LISR*, 18,207-223.
- Fidel, R., Davies, R.K., Douglass, M.H., Holder, J.K., Hopkins, C. J., Kushner, E.J., Miyagishima, B.K., & Toney, C.D. (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.
- Freebody, P., & Luke, A. (1991). Literacies programs: Debates and demands in cultural context. *Prospect: Australian Journal of TESOL*, 5(7), 7-16.
- Gordon, C.A. (2000). Putting the learner in charge: Are information literacy skills enough? *Scan*, 19(1), 32-39.
- Grant, V. (1998). Information skills and their impact on learning: a New Zealand study. *Scan*, 17(2), 50-54.
- Hawkes, J.C. (1997). Views from the top: The information skills process and senior students. *Scan*, 16(3), 47-52.
- Haycock, K. (2003). *The crisis in Canada's school libraries: The case for reform and reinvestment*. Toronto, ON: Association of Canadian Publishers. Available: <http://www.peopleforeducation.com/librarycoalition/Report03.pdf>
- Hirsh, S. (1997). How do children find information on different types of tasks? Children's use of the science library catalog. *Library Trends*, 45(4), 725-745.
- Hirsh, S. (1999). Children's relevance criteria and information seeking on electronic resources. *Journal of the American Society for Information Science*, 50(14), 1265-1283.
- Jones, E. (1996). The value of research assignments. *Scan*, 15(3), 45-48. Julien, H. (1999). Barriers to adolescents' information seeking for career decision making. *Journal of the American Society for Information Science*, 50(1), 38-48.
- Kafai, Y., & Bates, M. (1997). Internet Web-searching instruction in the elementary classroom: Building a foundation for information literacy. *School Library Media Quarterly*, 25(2), 103-111.
- Kuhlthau, C.C. (1991). Inside the search process: Information seeking from the user's perspective. *Journal of the American Society of Information Science*, 42(5), 361-371.

- Kuhlthau, C.C. (1993). *Seeking meaning: A process approach to library and information services*. Norwood, NJ: Ablex.
- Kuhlthau, C.C. (1994). *Teaching the library research process*. Metuchen, NJ: Scarecrow Press.
- Kuhlthau, C.C. (1999). Student learning in the library: What Library Power librarians say. *School Libraries Worldwide*, 5(2), 80-96.
- Lance, K. (2001). Proof of the power: Recent research on the impact of school library media programs on the academic achievement of US public school students. *ERIC Digest*. EDO-IR-2001-05
- Large, A., Beheshti, J., & Rahman, R. (2002). Design criteria for children's Web portals: The users speak out. *Journal of the American Society for Information Science and Technology*, 53, 79-94.
- Lazonder, A.W., Biemans, H.J., & Wopereis, I. (2000). Differences between novice and experienced users in searching information on the World Wide Web. *Journal of the American Society for Information Science*, 52(6), 576-581.
- Lewis, E. (1999). Science instruction and information literacy: Information is power. *Scan*, 18(1), 49-53.
- Lonsdale, M. (2003). *Impact of school libraries on student achievement: A review of the research*. Report for the Australian School Library Association. Melbourne: Australian Council of Educational Research. Available: <http://www.asla.org.au/research/index.htm>
- Loertscher, D., & Woolls, B. (2001). *Information literacy research: a review of the research: A guide for practitioners and researchers*. San Jose, CA: Hi Willow Research and Publishing.
- Makkai & McAllister, I. (1990). Knowledge and information about drugs in Australia. *Journal of Drug Education*, 20, 337-352.
- Maxwell, E. (2000). Integrating information skills and exposition texts into the Year 7 science program. *Scan*, 19(2), 27-31.
- Mayton, D., Nagel, E., & Parker, R. (1990). The perceived effects of drug messages on use patterns in adolescents. *Journal of Drug Education*, 20(4), 305-318.
- McClure, C., & Bishop, A. (1998). The status of research in Library and Information Science. *College and Research Libraries*, 40, 127-143.
- McNicholas, C., & Todd, R.J. (1996). New kids on the box: Is it worth the investment? *Scan*, 15(4), 40-42.
- Mirzaee, E., Kingery, P., & Puitt, B. (1999). Sources of drug information among adolescent students. *Journal of Drug Education*, 21, 95-106.
- Moore, P. (1996). Information literacy: The importance of questions. *Scan*, 35(1), 43-46.
- Moore, P., & Pouloupoulos, N. (1999). Butterflies and elephants in the classroom: Teachers researching information literacy. *Scan*, 18(4), 49-53.
- Newell-Withrow, C. (1989). Identifying health-seeking behaviors: A study of adolescents. *Adolescence*, 21, 641-658.
- Poston-Anderson, B., & Edwards, S. (1993). The role of information in helping adolescent girls with their life concerns. *School Library Media Quarterly*, 22(1), 1-6.
- Todd, R.J. (1995). Integrated information skills instruction: Does it make a difference? *School Library Media Quarterly*, 23(2), 133-139.
- Todd, R.J. (1999a). Utilization of heroin information by adolescent girls in Australia: A cognitive analysis. *Journal of the American Society for Information Science*, 50(1), 10-23.
- Todd, R.J. (1999b). Back to our beginnings: Information utilization, Bertram Brookes and the Fundamental Equation of Information Science. *Information Processing and Management*, 35, 851-870.
- Todd, R.J. (in press). Adolescent information behaviors. In Mary Manning & Susan La Marca (Eds.), *Reality bytes: Information literacy for independent learning*. Carlton, Vic: School Library Association of Victoria.
- Todd, R.J., & Kuhlthau, C. (2004). *Student learning through Ohio school libraries: Background, methodology and report of findings*. Columbus, OH: OELMA. Available: <http://www.oelma.org/documents/OELMARreportofFindings.pdf>

- Todd, R.J., Lamb, L., & McNicholas, C. (1993). Information skills and learning: Some research findings. *Access*, 7(1), 14-16.
- Turner, K. (2002, August). *Do information professionals use research published in US journals?* Paper presented at the 68th IFLA Council and General Conference. Available: <http://www.ifla.org/IV/ina68/papers/009-118e.pdf>
- Walsh, C., & Wilson, T.D. (1995). *Information behavior: An interdisciplinary perspective* (BLRDD Report No. 10) London: British Library Research and Development Department.
- Williams, D., & Wavell, C. (2001). *The impact of the school library resource centre on learning*. Library and Information Commission Research Report 112. Aberdeen, UK: Robert Gordon University.
- Wilson, B. (1997). The postmodern paradigm. In C.R. Dills & A. Romiszowski (Eds.), *Instructional development paradigms* (pp. 63-80). Englewood Cliffs, NJ: Educational Technology Publications. Available: <http://www.cudenver.edu/~bwilson/postmodern.html>

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