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Evaluating Information: An Information Literacy Challenge

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The new Information Power *contains information literacy standards that emphasize, among other skills, the ability to evaluate information. This skill is difficult and complex. Evaluation consists of a number of component processes, including metacognition, goals, personal disposition, signals (which initialize an evaluative episode), deliberation, and decision. Research shows that specific problems may occur during several of these components. Contextual factors, including environment, problem structure, and processing depth, impact evaluative processing as well. In addition, research shows that a number of factors influence evaluation, including cognitive development, epistemological stance, affect, and level of prior knowledge. Considering all of these factors in relation to K–12 education, this article explores methods for overcoming challenges as school library media specialists strive to implement information literacy programs.*

No one would argue that students need not learn to evaluate information. In today's world of rapidly proliferating information in new electronic forms, individuals must be ready to make decisions about information reliability and credibility. This educational goal is embodied in *Information Power: Building Partnerships for Learning* Information Literacy Standard Two: "The student who is information literate evaluates information critically and competently" (AASL and AECT 1998, 14).

However, evaluation is an immensely difficult and complicated process. Research shows that evaluating information is a complex task usually performed within the context of an even more complex task, such as decision making or arguing (Fitzgerald 1998). Also, the literature teems with examples of people failing to evaluate information well.

What, then, are the specific difficulties involved in evaluating information? What factors may inhibit students from evaluating information well? Equipped with an understanding of these challenges, school library media specialists and teachers can better assist students in learning how to evaluate information. What specific teaching strategies and methods will help students master this skill? What role does the library media specialist play in this process? The purpose of this article is to describe some of the challenges of evaluating information and to propose answers to these questions.

The first section describes and defines the basic process of evaluation, synthesizing ideas from cognitive psychology and critical thinking theory. The second section describes four strong

factors influencing evaluation found in the literature. Finally, in the face of all the challenges, I present recommendations for practice based upon the summarized research.

The Evaluation Process: Core Principles

In this section, I will discuss definitions of evaluation, how the process theoretically works, and important contextual factors. Although gathered from widely dispersed domains of inquiry, these core principles seem noncontroversial for the most part.

Definition of Evaluation

In simplest terms, to evaluate is to judge the quality of an idea, an object, or a person. Naturally, in the library media world, the objects of evaluation are most often various pieces of information.

Evaluation is closely associated with critical thinking. Some writers such as Beyer (1985), D'Angelo (1971), and Yinger (1980) seem to equate "critical thinking" with "evaluation." Most theorists, however, describe critical thinking as including evaluation among several other higher-order thinking processes (Cromwell 1992; Ennis 1989; Paul 1992). Because of these ties between evaluation and critical thinking, much theory and research about critical thinking informs an understanding of evaluation.

Another model of thinking skills is that of Benjamin Bloom and his colleagues, popularly dubbed "Bloom's Taxonomy." It includes, from least to most sophisticated, knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom et al. 1956). In this model, each skill potentially exercises all of the ones below it in the hierarchy:

> Evaluation is defined as the making of judgments about the value, for some purpose, of ideas, works, solutions, methods, material, etc. It involves the use of criteria as well as standards for appraising the extent to which particulars are accurate, effective, economical, or satisfying. The judgments may be either quantitative or qualitative, and the criteria may be either those determined by the student or those which are given to him. (p. 185)

According to this theory, the critical difference between evaluation and skills lower on the hierarchy is the addition of criteria and values. Criteria in an information search context might include aspects of information quality such as objective content, sufficient depth, and clear articulation (Eisenberg and Small 1993; Taylor 1986). Bloom also acknowledges a "link with the affective behaviors" (p. 185), due to the inclusion of values. This affective link is richly born out in empirical literature, and some of these findings appear in a later section.

In summary, evaluation is associated so closely with critical thinking that study of "critical thinking" literature contributes to an understanding of the nature of evaluation. Bloom (Bloom et al. 1956) comes closest to presenting a cohesive, functional, and distinct definition of evaluation itself.

Components of the Evaluation Process

A synthesis of related literature seems to indicate that evaluation involves several components. These components include metacognition, goals, a personal disposition toward evaluation, a signal to begin the process, deliberation, and decision. In this section, I will describe each component in turn and name its origins. I will also provide related findings, which often point to problems in the process.

Metacognition. Although the relationship between metacognition and evaluation may not be readily apparent, effective evaluation may not be possible without at least some thinking about one's own thinking. Flavell defines metacognition as "knowledge or cognition that takes as its object or regulates any aspect of any cognitive endeavor. Its name derives from this 'cognition about cognition' quality" (1981, 37). Brown, Bransford, Ferrara, and Campione (1983) identify two major strands of research usually labeled "metacognition." One concerns knowledge about thinking, whereas the other concerns regulation of thinking and learning. Both strands are of interest here. Procedural knowledge of the evaluation process and memories of successful past thinking episodes form part of prior knowledge, and will be discussed later. Metacognitive regulation is vital because the thinker must often consciously choose strategies that will work in a given evaluative situation. Flavell calls the regulatory type of metacognition "cognitive monitoring."

Goals and motivation. Flavell (1981) contends that a primary aspect of cognitive monitoring is the reader's purpose. Purposes for using information include entertainment, fact collection, simple curiosity, collecting information to inform consumer decisions, and an infinite number of others. The cognitive strategies chosen and level of engagement depend largely upon this goal. In library media literature, Weisburg and Toor (1994) point out that a reader's purpose helps to establish source evaluation and selection criteria. In persuasion literature, Petty and Cacioppo (1986) identify motivation as one of several key factors determining whether or not a person will deliberate upon a problem and to what depth. To illustrate, a person browsing the Web for entertainment will probably be less likely to evaluate displayed information than a consumer searching for car-buying information. Partial support for this idea in another context is provided by accountability research. In accountability studies, subjects are made responsible for the outcomes of their judgments in some way. Judgment accuracy seems to increase as motivation to judge accurately increases, demonstrating that people can critically evaluate information if they choose to do so (Simonson and Nye 1992). Subjects motivated to be accurate through expectation of accountability exhibited decreased susceptibility to certain flawed judgment patterns (Bodenhausen, Kramer, and Susser 1994; Freund, Kruglanski, and Shpitzajzen 1985; Kruglanski and Freund 1983; Tetlock 1983; Kruglanski, Freund, and Bar-Tal 1996). Siegel-Jacobs and Yates (1996) found that accountability improved the efficacy of subjects' selection and evaluation of available information. If motivation increases evaluation accuracy through the deliberate avoidance of flawed thinking patterns, I propose that it is fair to assume that lack of motivation may decrease evaluation accuracy. In sum, Flavell proposes goals as important components of metacognition and thus evaluation; this idea is supported by judgment studies from social psychology and persuasion literature.

Disposition. A precursor or necessary condition for evaluation may be what Ennis (1987) and Glaser (1985) label "disposition." Glaser defines this disposition as the "attitude of being disposed to consider in a thoughtful, perceptive manner the problems and subjects that come

within the range of one's experiences" (p. 25). Bloom et al. (1956) assert that "man is apparently so constituted that he cannot refrain from evaluating, judging, appraising, or valuing almost everything which comes within his purview" (p. 185). However, Siegel and Carey (1989) point out that people cannot evaluate every message they encounter. They advocate sensitivity to "anomalies" (p. 2). Bloom's statement is directly contradicted by much empirical research that vividly describes incidents in which people did not evaluate fraudulent information (e.g., Aycock and Buchignani 1995; Belli 1989; Bird 1996). Thus, the literature expresses three opposing ideas in regards to disposition: that some people by nature are more likely to evaluate; that people criticize most ideas as a matter of course; and, conversely, that people must be selective about the ideas they choose to criticize. It seems most likely that the strength of critical disposition varies among individuals, but also that it varies within the same individual from situation to situation.

Several factors may work to increase a person's disposition to think evaluatively in a given situation. Goals and prior knowledge are probably vital to successful cognitive performance. Memories of past experiences and content knowledge about a topic will equip an individual with tools to notice inconsistencies. Another factor may be epistemological orientation (King and Kitchener 1994; Siegel and Carey 1989). Both prior knowledge and epistemology have strong potential for influencing evaluation, and they are addressed individually in later sections.

Signals. A critical early component of effortful cognition is the signal, named by both Flavell (1981) and Markman (1981) as the cognitive event initiating a metacognitive episode. Signals are the specific thoughts that launch the evaluation process, a recognition that something may be wrong with the information. Flavell describes these thoughts as "implicit signals to pay close attention, listen intently, read carefully, store or retrieve information intentionally, try to solve a problem" (p. 43). He also refers to them as "feeling[s]" of "vague puzzlement" (p. 45). Dewey calls them "a state of doubt, hesitation, perplexity, mental difficulty, in which thinking originates" (Dewey 1933, 12). Often, signals indicate miscomprehension. However, the problem could be that the information itself is flawed, and signals notify the reader of this possible flaw. The reader may then take steps to determine the stimulus of the signal, or ignore it. For example, if a student has learned a historically accurate story of Pocahontas, seeing a fictionalized movie on the same subject may cause confusion due to conflicting details. This confusion is a signal to further evaluate the information provided in the movie.

Signals take at least four forms. One form is a sense of surprise (Markman 1981). Readers, if attending carefully to text, build expectations in accordance with events in the text. If an unexpected outcome occurs, the subsequent surprise can be a clue of inconsistency. Sometimes readers become aware of their inability to organize information in a sensible way, or to mentally represent it coherently (Markman 1981). Alternately, readers may notice that text is ambiguous, with more than one possible interpretation. Finally, a sense of puzzlement may serve as a signal (Flavell 1981). These hazy descriptions of the signal event raise questions about the specific source of signals and the mechanisms that generate them.

Deliberation. Deliberation is named differently by various theorists. Siegel and Carey call this stage "reflection" (1989, 2). Dewey describes it as "an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity" (1933, 12). Petty and Cacioppo discuss the process of "elaboration" extensively in their 1986 review, and many of their assertions seem to apply to evaluation in a general sense. Glaser (1985) refers to logic and

reasoning skills. Ennis (1987) meticulously delineates the components of critical thinking, including judgments of analyses, arguments, and credibility. In addition to the discreet skills, metacognition must function also. For example, the thinker must choose skills to apply in specific situations. Thus, the deliberative phase of evaluation includes (but is not limited to) investigation, elaboration, logic, reasoning, judgment, analysis, and a controlling metacognitive component. An integral part of these processes can be conceptualized as strategies, or the small, individual tasks people carry out as part of deliberation. These tasks often take the form of self-questions. For example, a person evaluating a newspaper article might ask a series of questions such as "What is the author's point of view? Is the author fairly presenting alternative points of view? Are there problems with the author's arguments?" Each of these questions can be seen as an individual strategy, entailing a miniature cognitive operation. The overall evaluation is based upon a summation of these results (Fitzgerald 1998).

The bridge between deliberation and decision (the next component of the evaluation process) is a synthesis of partial conclusions. King and Kitchener refer to this event as "balancing one view against another" (1994, 66). Glatthorn and Baron (1985) express an important aspect of this synthesis by adding that competent critical thinkers consider opposing ideas simultaneously, eventually discarding one when evidence is found to support the other. In sum, thinkers combine the products of deliberation subprocesses toward the end of the phase, using a thinly described weighing and balancing or synthesis process.

Decision. At the end of an evaluative episode, a decision or judgment often occurs. One shortcoming of the decision-making process may often be the absence of deliberation, or finalizing decisions before adequate processing has taken place (Craver 1995). Judgments may take the form of an assessment of value or of truth (Braine and Rumain 1983). Critical thinking theorists (e.g., Ennis 1989) and information literacy proponents (e.g., Breivik and Gee 1989) often assert that one overall purpose of critical thinking is to enable the thinker to make a decision in order to choose a course of action. Hernon and Altman (1995) illustrate the importance of critical thinking, evaluation, and information literacy by describing the dangers of implementing decisions based on flawed judgments or misinformation.

A large body of literature describes decision making as a process, independent of evaluation or critical thinking, contributing several important concepts. Once made, judgments become part of memory and the individual need not repeat the process when similar conditions are encountered again (Fiske 1982). Because deciding places heavy demands upon processing resources, people develop strategies for making judgments. These strategies, decision rules, or heuristics often operate efficiently. However, because they are somewhat automatic, they can lead to errors (Gilovich 1991). Much of the psychological literature of decision making concentrates upon these errors (Kahneman 1991; Tversky and Kahneman 1973), identifying a long list of anomalies and flaws in judgment algorithms (Kahneman 1991). Some of these effects are highly relevant to evaluation, such as various types of bias. Several biases and other flawed decision making processes are described later in this paper, grouped by hypothetical cause, in the "Influences to Evaluation" section.

Summary. It appears that evaluation involves a substantial amount of metacognition, due to its high placement upon Bloom's hierarchy and the need to choose between and apply strategies. Besides goals, disposition, signals, deliberation, and decisions, another key component must be prior knowledge, including both domain knowledge and metacognitive knowledge (because prior

knowledge may have wide-ranging effects upon evaluation, it will be discussed as an influence in a separate section later). Table 1 illustrates the different components of the evaluation process and provides school library media specialists with appropriate questions that can help constructively scaffold learners through this complex process.

Table 1. Scaffolding Questions and Activities

Component	Scaffolding question or activity
Metacognition	What are you thinking about?
Goals/motivation	What are your goals for using this information? What are you going to do with it when you're done?
Initialization/signal	Do you see anything in the information that seems confusing or wrong?
Deliberation	Here are some strategies to try (provide one or more concrete operations).
Decision	So, when you add it all up, what do you think about this information now? What are you going to do next?

Contextual Factors

It is clear that context greatly impacts thinking in general, and evaluation in particular. Many variables make up context, including physical environment, social situation, and the contexts surrounding the information itself. We could extend this discussion and claim that the four important influences discussed later (affect, prior knowledge, epistemology, and developmental level) are all part of context. Instead, it seems most sensible to establish the importance of context and discuss two particularly vital contextual factors.

The importance of context. Most scholars agree that the context in which thinking occurs profoundly influences the outcome (Siegel and Carey 1989). In a sense, most variables usually considered in studies of judgment can be considered as contextual factors. A sampling of such variables includes social pressure (Janis 1982), length of message (Petty and Cacioppo 1984), and attractiveness of the speaker (Mills and Aronson 1965). One strand of research asserts that culture strongly influences a person's disposition toward critical thinking (Sanders et al. 1992). Specifically, Western cultures tend to encourage critical thinking and argumentation while Eastern cultures may discourage criticism of other people and their ideas. Another very simple but extremely important contextual factor influencing evaluation is time, which proves to be a significant variable in many studies. It seems logical to predict that less time spent deliberating will lead to lower-quality decisions, and research results support this proposition (e.g., Garbarino and Edell 1997; Kruglanski and Freund 1983). In light of these contextual factors, a major

difficulty with assessing critical thinking has always been the worrisome problem of separating contextual elements from the thinking process itself.

Two additional concepts from the literature apply to the problem of information evaluation. The first of these, problem structure, is discussed by several writers. The second, processing depth, is far more theoretical. Both of these factors seem inherent in the contexts presented by information evaluation problems, and both seem vitally important to the outcome of evaluation.

Problem structure. An important aspect of the evaluation process is the type of problem involved. When a reader encounters new information, the information presents a problem in the form of a question: is this information credible and useful for the reader's purpose? According to the nature of the information, it can be evaluated by internal characteristics, external criteria, or both (Bloom et al. 1956). In other words, the information may have internal characteristics enabling a sound evaluative judgment. Bloom et al. list "logical accuracy, consistency" and "exactness of statement, documentation" as indicators enabling internal evaluation (pp. 188–89). On the other hand, the information may not have these internal characteristics and appear sound only until compared to outside sources. External judgments are based upon "selected or remembered criteria" (p. 190) or comparison to other related material (Osman and Hannafin 1992). Bloom's distinction between these two types of evaluation corresponds directly to King and Kitchener's differentiation between types of problems as "well-structured" or "ill-structured" (King and Kitchener 1994, 11). According to King and Kitchener, well-structured problems are complete within themselves and even when extremely complex can be solved with a "high degree of certainty" (p. 11). Ill-structured problems, conversely, cannot be solved with certainty and experts often disagree about their solutions. In real life, ill-structured problems often appear as dilemmas or difficult social issues. In the information context, the user must decide consciously or unconsciously what kind of problem is under study before evaluation can proceed. If the user chooses incorrectly, the evaluation may be flawed.

Processing depth. People do not always perform at the highest level of their abilities across a wide range of activities, lacking sufficient energy to invest every activity with maximum effort. When it comes to thinking, the difference between sufficient and maximum effort translates into depth of processing or level of engagement. Originating in Fischer's (1980) skill development research, this theory proposes that people have both "functional" and "optimal" levels of skills. "Functional" refers to how they operate normally. "Optimal" refers to their highest intellectual capability at their current stage of development (p. 485). Functional processing is usually rapid, familiar, and perhaps shallow. Optimal processing takes more time, requires more effort, and implies deep engagement with a problem. Bloom et al. (1956) translate the functional/optimal difference into evaluation terminology by stating that an individual's "customary" evaluations are "quick decisions not preceded by very careful consideration." They prefer to call these judgments "opinions" and save the term "evaluation" for "fully conscious" decisions made with "distinct criteria in mind." They admit that such deliberate processing may be "far from the normal state of affairs" (p. 186).

Fischer describes how environmental situations can provoke optimal processing, and how the occasional necessity of deep engagement with a difficult problem is a key mechanism in skill development. A closely related theory is Vygotsky's "zone of proximal development" (1934/1962), a similarity noticed by Hofer and Pintrich (1997). According to Vygotsky, children tend to use the lowest level of skill required, but can perform at cognitive skill levels beyond

their normal operational level when helped (Hand 1981). The difference between the skill level achieved with assistance and that achieved without is the so-called "zone." Instruction can elicit this performance and perhaps encourage and hasten development if the child is developmentally ready and if relevance of the skill to the individual child can be demonstrated.

Factors provoking optimal processing, called "support" by King and Kitchener (1994, 35) can be artificially imposed. Fischer (1980) identifies three kinds of supports empirically proven to be successful in provoking optimal processing: instruction, practice, and cues. Cues have proven successful in situations where the subjects know what to do but would not necessarily use the skill under normal circumstances (Brenner, Koehler, and Tversky 1996; Hand 1981; Watson and Fischer 1980). King and Kitchener (1994) extend the idea of supports in the context of college-age adults to include difficult tasks, high-quality feedback, external motivation or pressure, prior experiences, and the allowance of ample time for reflection.

The final important idea about processing level differences comes from Petty and Cacioppo (1986), from the domain of persuasion literature. In their theory, messages not deeply elaborated are prone to the influences of affect, heuristics, or social pressure, any of which may lead to flawed judgments. Specific persuasive factors proven influential with no rational basis include speaker attractiveness (Eagly and Chaiken 1975; Mills and Aronson 1965), speaker confidence (London, Meldman, and Lanckton 1970), message length (Petty and Cacioppo 1984), personal identification with the speaker (Stoneman and Brody 1981), racial prejudice (Aronson and Golden 1962), peer group confidence (Hinsz 1990; Zalesny 1990), and audience enthusiasm (Axsom, Yates, and Chaiken 1987). In a more recent study, Riggle, Miller, Shields, and Johnson (1997) found that gender stereotypes influenced political decision making under low cognitive demand, but not high.

Summary of contextual factors. In this section, several factors inherent in evaluation contexts are presented. Time is one such contextual factor. Information problem type, whether ill-structured or well-structured, is an often overlooked but crucially important aspect of all evaluation situations. It is also helpful to understand the natural differences between processing levels, because the importance of this idea relates to most areas of teaching. In K–12 schooling, the overwhelming tendency is to concentrate upon well-structured problems, for a number of educational and institutional reasons. It is also likely that most students spend most of their school day operating at a functional level. Standardized tests—even those designed to measure critical thinking—are likely to present only well-structured problems and elicit only functional performance.

While it is unreasonable to expect students to operate at optimal levels at all times, higher processing should be more regularly encouraged. The supports suggested by Fischer (1980), Vygotsky (1934/1962), and King and Kitchener (1994) provide valuable tools that school library media specialists can use in promoting deeper processing levels.

Influences to Evaluation

Although evaluation ideally occurs according to the imperfectly understood process outlined above, ample evidence suggests that often it does not. For example, Belli (1989) and Highhouse and Bottrill (1995) found that individuals in their studies accepted misinformation without question. Students unsure of the correct answer on a true-false examination are more likely to

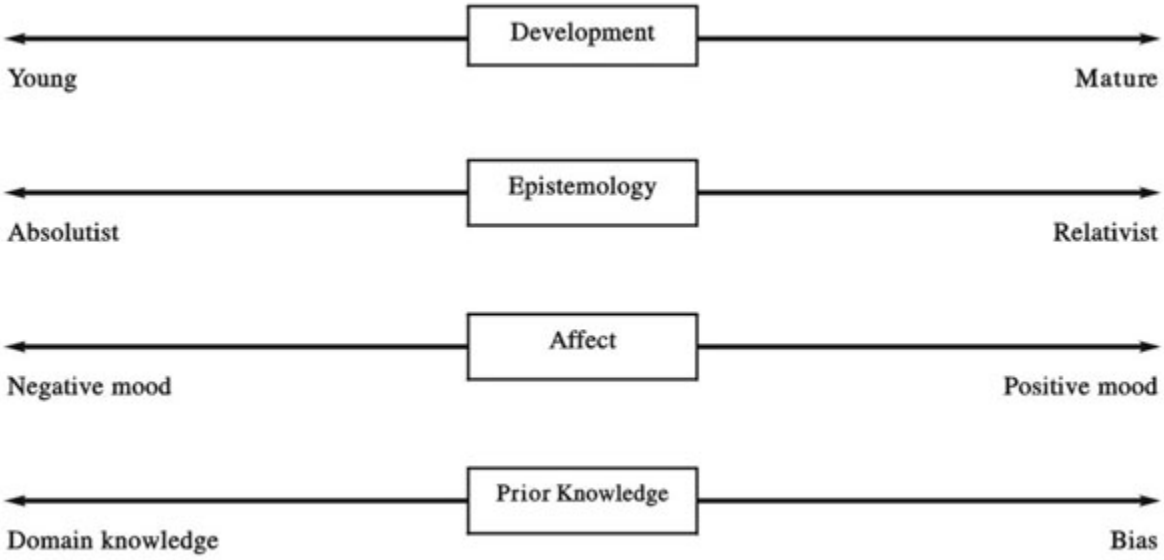
mark a false item as true than they are to mark a true item as false (Toppino and Brochin 1989). Gilbert, Krull, and Malone (1990) found that comprehension provides sufficient rehearsal in many cases for subjects to remember a false message as valid. Aycock and Buchignani (1995) and Viehland (1993) describe unconditional acceptance incidents involving fraudulent email. Scholars and editorial boards have also become victims of deliberately falsified empirical data (Kochan and Budd 1992; Stewart and Feder 1987). Participants exposed to obviously incomplete or one-sided information often fail to compensate for its shortcomings, judging solely on the basis of available information (Brenner, Koehler, and Tversky 1996; Sanbonmatsu et al. 1997). Additional serious examples of failure to question information spontaneously include widely-believed media hoaxes (Bird 1996; Fedler 1989; Tamarkin 1993).

Shor's study of adult perceptions of the Gulf War (1993) illustrates the frequently missing disposition toward critical thinking. In open-ended opinion surveys, Shor discovered a high degree of correspondence between the language of subject responses and television news scripts. Shor hypothesizes that viewers adopted with little reflection the positions propounded by television news agencies and parroted these positions on the surveys. This study presents evidence that "reliance on television news" (p. 227) may suppress critical thinking.

"That human beings are, in fact, more gullible than they are suspicious" should probably be considered an innate human characteristic (Gilbert, Krull, and Malone 1990, 612). This human characteristic is probably protective and adaptive in origin, because it usually effectively results in a quick response time (Gilbert, Krull, and Malone 1990; Gilovich 1991; Petty and Cacioppo 1986). However, the evidence sampled above suggests that people often do not respond to substantial environmental cues signaling evaluation to be necessary. In Shor's example, participants accepted the television news version of the Gulf War, despite a strong popular tendency to discredit the media establishment.

The following four sections suggest factors that may contribute to an understanding of gullibility and simultaneously demonstrate some common problems with the evaluation process. These influences include development, epistemology, affect, and prior knowledge. However, these factors are not dichotomously positive or negative in effect. Instead, they can be conceptualized as continua comprising a range from negative through neutral to positive influence (see figure 1). Moving in a direction from negative to positive, development ranges from young to mature with accompanying differences in skill levels; epistemology ranges from absolutist to relativist; and affect varies from negative to positive mood. The effect of prior knowledge ranges from the positive effects of domain and metacognitive knowledge through the negative effects of bias.

Figure 1. Influences to evaluation



The Development Continuum

Generally, the ability to evaluate increases with age. This observation is made with the caution that negative influences may also increase with age, an idea to be explored in later sections. Unfortunately, it is difficult to distinguish between the effects of education and the effects of maturation (Pascarella 1985), although most studies attempt to control for the education variable. In this section, I will relate the findings of studies detailing conclusions about the effects of education, the child's evaluative ability, and the adult's evaluative ability.

Education. Critical-thinking scores, as measured by standardized instruments, correlate positively with academic achievement (Garett and Wulf 1978; Mackinnon 1987). Upperclassmen in college display significantly improved critical thinking skills over freshmen, even when controls are present for aptitude (Keeley, Browne, and Kreutzer 1982). King and Kitchener (1994) likewise found a positive relationship in their reflective judgment scale between higher performance and educational level. Although standardized tests of critical thinking are limited by their reliance on well-structured problems and their likely elicitation of only functional level processing, it seems reasonable to expect that education affects critical thinking ability to some degree.

Evaluation in children. At least two studies show that children of elementary school age can detect inconsistencies and some types of falsehoods, especially if forewarned (Baker 1984; Markman and Gorin 1981). However, Markman (1979) found that elementary school-aged children do not find inconsistencies well if they are not primed to seek them. Unprimed children are particularly unlikely to evaluate spontaneously (Markman 1979). Further, McGregor (1994) noticed in her qualitative study that gifted high school students made no attempt to analyze or evaluate information except during the brief phase of focus-forming. Even in this phase students analyzed information content rather than quality. Pitts (1994) likewise found that students did not question the information found in the course of their research projects.

Despite evidence describing shortcomings in children's evaluative thinking, at least one theorist asserts that these shortcomings represent a lack of domain and interdomain knowledge rather than an immature way of thinking. Carey (1985) emphasizes that certain types of domain knowledge "might be so basic and have such far-reaching consequences that developmental differences in these might qualify as fundamental differences in thinking or learning" (p. 487). Further, she asserts that "considered judgment dictates that young children and sophisticated adults think alike" (p. 514). Closely related to this lack of domain knowledge is the fact that children are "universal novices" and lack knowledge about their abilities, task requirements, and strategies (Brown and DeLoache 1978, 14). In Brown and DeLoache's view, the child's lack of knowledge extends to metacognitive skills. Carey (1985) and Brown and DeLoache (1978) present a sound argument for the overriding importance of domain knowledge, an argument strengthened by the empirical evidence linking critical thinking with education. However, other authors suggest additional differences.

In their discussions of metacognition, Flavell (1981) and Markman (1981) speculate that children may differ from adults concerning specific cognitive monitoring components. Flavell postulates that a major difference between children and mature thinkers involves goals. Children may be less aware of the necessity of goals or be unable to articulate them mentally. While adults probably pursue simultaneous goals more often than not, children may multi-task only with difficulty. In addition, they may be unable to set reasonable goals, but also to pursue goals that are not self-selected. Finally, they may not easily switch processing strategies for different types of goals (Markman 1981). This inability to use goals as an anchor for cognitive activity may prohibit evaluation because of the importance of goals established earlier.

Theorists and researchers have identified four additional characteristics of children's thinking that may affect evaluation initialization. First, Flavell (1981) suggests that children have a "tendency not to treat messages as analyzable cognitive objects" (p. 36) and that children do not assess different aspects of messages with equal attention. In other words, they may focus on a specific puzzling or interesting aspect and ignore others. Another problem for children is that they trust authority (King and Kitchener 1994). They learn not only to obey but also to believe the information provided by adults. Empirical bias presents a third problem. According to King and Kitchener, pre-adolescents tend to believe "that there is an absolute correspondence between what is seen or perceived and what is" (p. 47–48). This theory is supported by certain Piagetian task studies in which children chose perceived evidence over reasoned conclusions (Miller and Lipps 1973; Osherson and Markman 1974–1975). Markman (1979) suggests that children may fail to detect inconsistencies because they are searching for perceptually false statements. In a pure textual or verbal context, young children are therefore at a disadvantage. Finally, while normally achieving children have problems concerning cognitive goals, prior knowledge, message analysis, authority dependence, and empirical bias, the evaluative difficulties of poor readers are compounded by comprehension difficulties. Paris and Myers (1981) noted that poor fourth-grade readers use few metacognitive strategies in reading comprehension, and Garner (1980) concluded that poor junior high school-age readers, unlike good readers, fail to detect inconsistencies. In text passages containing inconsistencies, good readers noticed the problems while the poor readers did not.

Development beyond childhood. Fischer (1980) asserts that environment is essential to cognitive skill development throughout the lifespan. In his theory, challenges must occur that stretch current skills by demonstrating inadequacies. When a person possesses a fixed opinion on

an issue and encounters conflicting opinions or cultural perspectives, the person must resolve these anomalies into a new system of meaning. This new system of meaning will likely involve a revision of assumptions (Brookfield 1987; King and Kitchener 1994). Brookfield, in his theory of how people become reflective and skeptical, agrees that the development process is triggered by an external, usually negative, event.

Fischer and his colleagues theorize that spurts in cognitive performance occur between the ages of 14 and 15, 18 and 20, and 23 and 25 (Fischer, Hand, and Russell 1984; Fischer, Pipp, and Bullock 1984). King and Kitchener (1994) corroborated these spurts in terms of reflective judgment for the age groups of 18 to 20 and 23 to 25 or 26. However, these results may be confounded by the level of education variable (Hofer and Pintrich 1997), a problem admitted by the researchers. In fact, King and Kitchener qualify their findings by saying that reflective judgment "evolves slowly and steadily over time among individuals engaged in educational programs" (p. 132). Epistemological development, most of which occurs after adolescence, has strong implications for development of evaluative ability. It is discussed in the next section.

Summary. The research discussed in this section supports the conclusion that children are more vulnerable to evaluation problems than adults. Reasons for this vulnerability almost certainly include lack of education and prior knowledge and a natural tendency to believe what they see and what they are told by authority figures. More theoretically, researchers propose and show some evidence that children lack development in the areas of metacognition, goal-setting, and analysis. The most extensive research in this area, that of King and Kitchener (1994), suggests that progress toward evaluative proficiency begins in adolescence and remains incomplete in college graduates. Their research also suggests a strong influence of education, an idea corroborated by standardized test data that positively correlates educational level with critical-thinking ability. However, King and Kitchener found that many educated adults do not score highly on their scale. Therefore, although development accounts for an unknown percentage of evaluative ability, other factors must also contribute.

In the school library media context, these theories and findings apply in several ways. First, it is important for school library media specialists to be aware of the limitations in children's thinking due to immature development. Primarily, young children may need cues to help them understand when evaluation is appropriate. Gradually, their dependence upon cues should decrease. Also, the educational environment should include frequent challenges to encourage children to operate beyond their functional norm. It is constructive to remember that adults also continue developing cognitively throughout their lifespan. If we assume that all adults are on a progressive developmental path, then our leadership role becomes one of seeking ways to enhance the development of colleagues. In professional interactions as teaching partners, school library media specialists can assume a mentoring role that encourages further development. Finally, school library media specialists should remember their own continuing development and make constant efforts to nurture it.

The Epistemology Continuum

Another continuum that likely affects the evaluation process is epistemology. Epistemology is a branch of philosophy dealing with the nature of knowledge and the sources of knowledge. Belenky, Clinchy, Goldberger, and Tarule's (1986) phrase "ways of knowing," aptly defines epistemology as the beliefs that people hold about how we come to know what we know.

Epistemology research offers at least two contributions to our understanding of how school library media specialists can help students evaluate information. It also provides understanding of some of the problems and issues in each of these two areas. First, epistemologists have sketched a developmental model that increases our understanding of reasoning changes that occur during the lifespan, particularly concerning several critical changes that take place during adolescence. Second, there are several direct links between epistemological reasoning and evaluative reasoning.

Epistemological development. Epistemologists believe that our assumptions about how we gain knowledge change over the course of our lives, and that there is a pattern to these changes across individuals. One set of epistemic assumptions falls under the "absolutism" label, characterized by a belief in a single, definitive, and fixed reality. Another set falls under the "relativism" label, characterized by a belief in socially negotiated and multiple realities. The definition of relativism most appropriate here is Stake's (1995): "the value of interpretations vary—relative to their credibility and utility" and "Some interpretations are better than others" (p. 102). These two sets of assumptions occupy opposite ends of a continuum, and there are many intermediate positions.

According to epistemology theory (Baxter Magolda 1992; Belenky et al. 1986; Broughton 1978; Hofer and Pintrich 1997; King and Kitchener 1994; Perry 1970), individuals ideally follow a pattern of development characterized as a gradual shift from absolutism to relativism. Improved ability to justify and evaluate positions accompanies this shift (King and Kitchener 1994). Thus, most epistemology theorists consider absolutists to be less highly developed in an epistemological sense than relativists (Hofer and Pintrich 1997). Naturally, this principle is controversial on several fronts, including religious and philosophical ones.

Epistemological development is marked by several key milestones. First, many developmental researchers describe a shift away from absolutism during adolescence (King and Kitchener 1994). Kroll (1992) describes this shift as an abandonment of absolute certainty in exchange for an acknowledgement of increasing complexity. Second, individuals recognize that alternatives usually exist in problematical situations. Third, individuals realize that knowing requires effort on the part of the knower. Finally, and most important, individuals realize that knowledge is in a constant state of flux and judgments must be based upon the best available information.

Links between epistemology and evaluation. Kuhn (1991) asserts that judgment and argument skills depend upon contemplation, evaluation, and choosing between alternative theories based upon evidence. These processes, especially deciding exactly what constitutes valid evidence, are intrinsically epistemological (Hofer and Pintrich 1997). King and Kitchener forge another link between critical thinking initiation and epistemic assumptions when they assert that reflective judgment "cannot be applied if the individual fails to recognize that a problem exists and that this recognition itself is predicated on other assumptions about knowledge" (p. 9). Finally, they echo the Bloomian idea that evaluation in some situations requires external criteria chosen by some standard: "an individual's epistemological assumptions directly affect which criteria he or she will consider when evaluating two or more systems" (King and Kitchener 1994, 200). For example, an absolutist will tend to choose authoritarian, traditional criteria.

Fister (1991) links epistemology to evaluation in the information process context, using Perry's scheme (1970) and Belenky's model (Belenky et al. 1986). In the absolutist phase, individuals believe in authority, assuming that every question has a single, certain answer. The task is simply

to find that answer. In the multiplist stance, individuals assume there are several answers to every question. The best answer should be chosen from alternatives based on which one feels right intuitively or seems most plausible. In the relativist position, individuals read the opinions and findings of others and construct a personal position based upon a synthesis of gathered ideas with new, original ideas. Relating epistemological positions to information use in this manner provides valuable insights into how children conduct research projects.

Summary. The ideas a person holds about the origin of knowledge may greatly affect the way in which that person approaches new information. A person who believes some knowledge to be unquestionable may neither criticize new information about that knowledge nor consider new information that contradicts it. On the other hand, the person who believes in the fluidity of all or most knowledge may be more likely to consider new information in an evaluative light and judge how it may change knowledge already in memory. There is tremendous space between these two extremes for people who hold varying amounts of certain and uncertain knowledge on different topics.

School library media specialists can use an understanding of epistemological theory to help students in several ways. For one, learning activities can be adapted to support epistemological development to a greater degree. For children under the age of adolescence, educators must question whether teaching them to challenge authority and other givens is beneficial. However, during adolescence, this questioning begins naturally, providing the basis for many of the common behavioral problems and personality quirks of adolescence. Perhaps an approach that encourages critical thinking rather than represses rebelliousness would yield better results during this difficult period. For example, adolescents need to know the reasons why rules exist and how knowledge is established. Fister (1991) provides a clear way of employing epistemology in information search projects. While this model or any other is unlikely to produce teenage relativists, open-ended research projects may help lay groundwork for later development.

The Affect Continuum

Damasio (1994) theorizes that humans normally employ affect to assist and enhance complex decision making. He builds this theory upon extensive work exploring the effect of mood and emotions on thinking in the areas of impression formation, judgment, and reasoning. Because it is a similar cognitive process, information evaluation can benefit from research about the effects of mood. Research in this area groups affective states into the extremes of happy (positive) or sad (negative) mood. While the reader may wonder how researchers induce these states, they usually explain their procedures and include manipulation checks to establish the effectiveness of their mood induction process.

Several studies indicate that under tightly controlled, narrowly defined conditions, negative moods promote better reasoning than positive moods. Negative-mood subjects appear more careful and analytic (Bless and Fiedler 1995), more consistent (Fiedler 1988), and have better recall (Bless and Fiedler 1995). However, negative affect has at least one detrimental effect on evaluation. Garbarino and Edell (1997) found that difficult evaluative problems cause negative affect, and that participants may choose a less difficult alternative if given a choice. On the other hand, happy-mood people do not differentiate well between strong and weak arguments (Bless, Mackie, and Schwarz 1992), tend towards positive judgments, and recall positive material from memory more readily (Isen et al. 1978). They also tend to use heuristics more often (Clore,

Schwarz, and Conway 1994), especially stereotypical judgments (Bodenhausen, Kramer, and Susser 1994).

The most popular explanatory theory for the detrimental effects of positive mood, voiced by Schwarz (1990), speculates that happy people reason less carefully because they feel no need to be wary. This hypothesis, called the effort conservation (or reduction) hypothesis, is supported by the research of Bless, Mackie, and Schwarz (1992) and Bodenhausen, Kramer, and Susser (1994). Isen et al. (1982) summarize the empirical findings concerning positive affect on cognition:

> A person who is feeling happy will be more likely than at other times to reduce the load on working memory: to reduce the complexity of decision situations and the difficulty of tasks, by adopting the simplest strategy possible, considering the fewest number of alternatives possible, and doing little or no checking of information, hypotheses, and tentative conclusions. (p. 258)

Finally, people have a tendency to judge positively or negatively in accordance with their mood, a phenomenon called "assimilation" (Ottati and Isbell 1996). However, people with expertise in the domain of judgment are less affected by mood. In fact, they may overcompensate. For example, consider the case of a supervisor judging the job performance of an employee in a business well-known by the judge. The supervisor happens to be in a negative mood, leading to a natural tendency to judge the employee harshly. However, noticing through domain expertise that the judgment is less than fair, the supervisor may generate an evaluation that is overly *favorable.*

Thus, the research on affective states demonstrates that emotion affects reasoning and judgment, although the exact nature of this effect is confusing. Because of the similarity of cognitive tasks, it is reasonable to predict that affective states will on occasion significantly influence evaluative ability. The connections between the research on affect and school library media practice are less clear than in some of the other areas discussed in this paper. I predict from my informal observations of children that they may often tend to choose and assess based upon affective like or dislike, which is often based on some affective component of the item being assessed. School library media specialists need to point this tendency out to children and counteract it when possible. They should also consider how emotion may influence critical thinking, and not underestimate its importance.

The Prior Knowledge Continuum

Absorbing new information is difficult when no related constructs exist in memory (Gilovich 1991). Therefore, people depend upon their prior knowledge when new information appears. Domain knowledge provides structure and corroboration and may point out inconsistencies. If new information agrees with prior knowledge, confidence in its reliability can justifiably increase (Stripling and Pitts 1988). Paradoxically, prior knowledge may hamper the evaluation process, as when people ignore new information conflicting with belief (Abelson 1986; Ross, Lepper, and Hubbard 1975; Svenson 1981). This paradox introduces the continuum that ranges between the enhancement domain knowledge lends to judgment to its suppression exhibited by people with strong biases in a domain area.

The positive effects of prior knowledge. Researchers consider the effects of prior knowledge on reasoning to be so strong that they tend to control for it in their reasoning experiments (Craver 1989; King and Kitchener 1994; Norris 1988). In direct studies of prior knowledge, results have shown that it positively affects cognitive processes, including learning (Brown and Smiley 1978), strategic processing (Alexander and Judy 1988), questioning (Schumm et al. 1992), and memory (Garner et al. 1991; Recht and Leslie 1988). Prior knowledge also appears to enhance interest (Garner and Gillingham 1991) and attitudes (Tyler and Voss 1982), both of which may positively affect cognition (Petty and Cacioppo 1986). However, at least one study of the effect of prior knowledge upon comprehension show no relationship (Schiefele 1992). King and Kitchener (1994) found in their longitudinal study that subjects did not score differently on old reasoning problems than new ones, indicating that familiarity with a problem did not necessarily enhance reasoning about it. In sum, although negative results cloud the issue, it is clear that prior knowledge affects some reasoning processes. Thus, it is reasonable to seek its effect upon evaluation.

Prior knowledge provides at least four specific advantages that assist reasoning. Petty and Cacioppo (1986) describe one role of prior knowledge as providing "relevant associations, images, and experiences," (p. 128). Another important advantage of prior knowledge in a problem area is that old information can be accessed from memory and compared to new information for consistency (Flavell 1981; Osman and Hannafin 1992). If old and new information agree, the old information is confirmed while the new information can be considered trustworthy. Pitts (1994) found that high school students actively accessed prior knowledge in this way to help them solve their information search problems. If the individual finds an inconsistency between old and new information, or expectations based on prior knowledge are violated, further processing or investigation seems necessary. Baker (1979) found that subjects performed this prior knowledge consultation when text confused them. Moskowitz and Stroh (1996) found that political candidates who violate expectations based on political party and other factors are penalized by voters. A third advantage is described by McGregor (1994), who noted that the information search process of high school students included an assessment of prior knowledge in order to decide what new information needed to be found.

A fourth advantage of prior knowledge is procedural information, which provides a recipe for how to tackle problems. Many of these procedures are automatic (Ashcraft 1994). When such automatic knowledge is missing or incomplete, cognitive demands are higher, possibly resulting in cognitive overload. Unfamiliar or difficult problems may require metacognitive intervention, in which people actively and consciously consider how they should think about a problem. As Flavell (1981) describes metacognitive knowledge, memory may contain procedural prescriptions, including memories of successful attacks upon similar problems in the past. Brown et al. describe knowledge and regulation of cognition as "incestuously related" (1983, 107), further illustrating the difficulty of separating prior knowledge from reasoning. In addition to procedural metacognitive knowledge, people hold in memory knowledge about which environmental signals herald the necessity of paying close attention and evaluating incoming information. For example, if a telemarketer begins a call by saying "Congratulations! You have won a cruise," many people take this phrase as a cue to hang up the phone based upon memories or knowledge that scams often begin this way.

Due to the advantages listed above, prior knowledge is probably a necessary but insufficient condition for effective critical thinking (Ennis 1989). However, Ennis asserts that prior

knowledge both helps and hampers critical thinking. One problem is that knowledge easily becomes confused with belief or assumes the negative aspect of bias. People may become so convinced of their own expertise in a particular area that contradictory incoming information is dismissed without consideration. This problem links critical thinking to epistemology, and illustrates the uncertain demarcation between prior knowledge, beliefs, and bias.

The negative effects of bias. In everyday usage, "prior knowledge" implies facts, and "bias" and "beliefs" imply subjective value. In psychological parlance, prior knowledge is often synonymous with "bias" and "beliefs." Bias and beliefs can also be considered a subset of prior knowledge. Thus, the difference between bias and belief is subtle, and writers often blur it. In the context of information evaluation, bias is the application of existing mental constructs to new information in such a way that the resulting judgment contains flawed reasoning. These reasoning flaws can be infinitesimally slight or gross. Several cognitive phenomena help to explain how these problems occur. Underlying all of them is a phenomenon called belief perseverance, which I will discuss first.

Abelson (1986) theorizes that "beliefs are like possessions" and that people protect them to an unreasonable degree. Belief perseverance is a person's refusal or inability to relinquish a belief despite new information discrediting it. In studies that lead subjects to accept given information and then discredit the given information, discredited information continues to bias reasoning (Wyer and Budesheim 1987; Ross, Lepper, and Hubbard 1975; Wilkes and Leatherbarrow 1988; Wyer and Unverzagt 1985). Two studies found that subjects displayed biased reasoning even when told initially that the information would be false (Wegner, Coulton, and Wenzlaff 1985; Gilbert, Krull, and Malone 1990). Carretta and Moreland (1983) found that jurors in a mock trial used inadmissible evidence in their verdict judgment, although deliberation somewhat mediated this effect. It is interesting to note that all of these studies found strong evidence for belief perseverance in situations involving no strong personal conviction, which leads to speculation about the increased strength of belief perseverance for firm personal beliefs. While the preponderance of research seems to support belief perseverance, at least two studies do not (Golding et al. 1990; Highhouse and Bottrill 1995).

There are at least two strong explanations for belief perseverance. The availability effect in cognitive psychology causes people to prefer an idea simply because it has been consciously used recently (Anderson, New, and Speer 1985). Theoretically, a thought or concept remains "available" for a set period of time after its conscious use (Tversky and Kahneman 1973). "Denial transparency" provides an alternate explanation: "denied information and the denial may contribute independently to subsequent impressions" (Wegner, Coulton, and Wenzlaff 1985, 338). In other words, a denial tag attaches to the original memory and must accompany it if reasoning is to be sound. Often, the denial tag becomes lost or misplaced. If this theory is partially or wholly responsible for belief perseverance, it implies that a flaw in the way memories are stored rather than lack of judgment accounts for at least some unreasonable belief perseverance. Whatever the reason for order effects, evidence overwhelmingly supports Ross, Lepper, and Hubbard's conclusion that a simple disclaimer is insufficient to correct erroneous memories.

Another cognitive phenomenon possibly leading to bias is the order effect. In cognition, the primacy effect refers to the common phenomenon where people tend to remember and believe the first item in a series more than subsequent items in the series (Anderson 1965). These initial

impressions, especially those formed about other people, then become biases that affect subsequent judgments (Ross, Lepper, and Hubbard 1975). At times, however, the opposite effect, called recency, occurs. For example, recency is more likely to occur in complex tasks of short duration (Highhouse and Gallo 1997). See Highhouse and Gallo for a matrix reflecting the results of varying these factors.

A final but important type of bias is confirmatory bias, considered and supported by numerous studies. In this process, people seek information to support their beliefs while ignoring information supporting opposing beliefs. The sum of research suggests that confirmatory bias is a natural tendency and occurs at a level difficult to detect through metacognition. In their review, Klayman and Ha (1987) summarize that people tend to gather information from sources likely to support their opinions for efficiency reasons, testing their hypotheses against information likely to support their beliefs. Kunda (1990) found that only deliberate, enforced consideration of contradictory information counteracted this tendency.

Several interesting studies provide strong evidence for confirmatory bias. Lord, Ross, and Lepper (1979) found that subjects significantly rated research articles consistent with their bias as superior. Sachs (1995) described a tendency among electronic discussion list subscribers to believe information consistent with their personal political biases. Mahoney (1977), in a study of journal referees, found that reviewers downgraded papers reporting results contradictory to their own theoretical perspective. Edwards and Smith found evidence for "disconfirmatory bias," in which participants scrutinized contradictory information longer and more extensively than belief-confirming information (1996, 5). The presence of "strong emotional conviction" increased the effect.

Summary. The sum of research about beliefs presents a confused picture consisting of a hodgepodge of memory malfunctions and flawed processes. In addition, beliefs surely have an epistemological component profoundly affected by values, culture, religion, and personal experience. This confused picture of the negative effects of bias contrasts sharply with the positive outlook provided by prior knowledge research. Perhaps the reluctance to shed old beliefs somehow mediates the passive acceptance of new information discussed earlier. Also, people gather knowledge as they age. It is reasonable to assume that they may collect biases also, with a resulting cumulative effect upon evaluative ability. This domain of how prior knowledge affects judgment is particularly ripe for naturalistic, holistic exploration.

Children, as "universal novices," are at a particular disadvantage in terms of prior knowledge (Brown and DeLoache 1978, 14). Due to its vital role in higher thinking processes, school library media specialists must encourage students to build prior knowledge by reading deeply into important topics (Stripling and Pitts 1988). It is also important to help students realize that they may lack necessary prior knowledge, a fact that they will often overlook. The problems with bias listed above point out the importance of having students explore their beliefs about a topic, and possibly write them down. School library media specialists should encourage the habit of deliberately seeking information that opposes students' belief in the interest of being fair.

Summary: Influences to Evaluation

In this section I listed four factors, each representing a separate body of literature, which may influence evaluation along continua ranging from negative to positive effects. These four factors,

in addition to the contextual factors described earlier, are the only ones found to date that are supported by empirical evidence. There may be others. Altogether, these findings indicate that evaluation is a complex process subject to numerous detrimental influences. How, then, may school library media specialists and teachers intervene and help students learn this difficult skill? The next section provides some helpful strategies.

Application

The new *Information Power* charges school library media specialists with the responsibility to build information literacy skills, including evaluation, in students. As discussed earlier, children may have special problems with information evaluation when compared to adults. To review, their goals for information use may be different in type and they have considerably less content knowledge. They tend not to analyze messages objectively. Instead, they tend to accept information on the virtue of authority alone, and to prefer perceptual information over abstract. King and Kitchener (1994) imply that evaluative ability does not begin to develop until the adolescent years. Further, ample research indicates that evaluation continues to be a challenge in adulthood, providing additional arguments supporting the importance of the *Information Power* standards. As they prepare to implement programs designed to build evaluation skills, school library media specialists face several challenges. Considerations include philosophical dilemmas, library media program planning, and teaching strategies.

Philosophical Issues

Educators, including school library media specialists, are often tempted to solve information quality problems by eliminating, labeling, or filtering it. The connection of K–12 environments to the Internet resulted in the widespread application of filtering software meant to limit children's exposure to inappropriate materials. Naturally, the idea of such censorship can hardly be entertained as a viable solution to information quality problems in this forum for school library media specialists. However, challenges will continue to arise, especially from parents hoping to protect their children in light of many of the problems listed above. Space will not permit a full discussion of the censorship problem here, but I propose that school library media specialists will best help their students by concentrating on building information literacy, avoiding the restriction of information access as much as possible.

Another philosophical issue to be addressed is age appropriateness. Teaching students that they must evaluate information assumes that some people lie under some circumstances. At what age is it appropriate to teach children this disappointing fact? Many parents and teachers believe that children should learn to trust adults and obey authority and that discussions about lying will undermine this teaching. On the other hand, children witness untruths, fiction, and fantasy every day in many different media. More ominously, people eager to exploit the naïve and the young through commercial and criminal means stalk the Internet. This troubling issue is an excellent one for debate and study, but also beyond the scope of this article. For now, school library media specialists must consider it in the context of individual school communities before implementing a program to develop evaluation skills.

Information Literacy Program Development

Assuming that the philosophical dilemmas have been addressed in the local context, *Information Power* empowers school library media specialists with the necessary arguments to begin an information literacy program. Evaluation skills are easily integrated into curricula. It is vitally important that information literacy skills in general and these strategies in particular be taught in the context of subject matter material (Callison 1993). Few topics could be more boring or incomprehensible to children than critical thinking or argumentation taught out of context. The best approach is to choose a subject area of current, controversial interest to the students in a given class and integrate the suggested strategies into a unit about that topic. For example, social studies teachers often ask students to clip newspaper articles on current events. The sharing of these articles presents an ideal opportunity to discuss the possible biases often represented in newspapers. A better assignment would be to find two articles, each from an opposing point of view. Another example concerns safety issues. Recently, local news described the case of a man, posing as a teenage boy in Internet communications, who lured a young girl to a motel room. Luckily, the girl escaped unharmed and the man was apprehended. Such stories should be discussed in school, including an analysis of the deceptions involved and how students can protect themselves from them.

Most major information search models (Eisenberg and Berkowitz 1988; Irving 1985; Joyce and Tallman 1997; Kuhlthau 1994; McKenzie 1995; Pappas 1997; Stripling 1995; Stripling and Pitts 1988; Yucht 1997) include a step for evaluating information. Several provide specific, concrete strategies for doing so. Young children, especially, need such detailed guidance in order to evaluate information effectively. Several sources capably describe the nuts and bolts skills of information evaluation (Fitzgerald 1997; Schrock 1999; Tate and Alexander 1996). Table 2 provides a sampling of relevant skills, along with the grade level predicted to be appropriate. The library media specialist, in collaboration with the classroom teacher, is the best judge of when and how to assist students in applying these skills. Most of the strategies should be taught over a span of years.

Table 2. Sample Library Media Center Activities to Build Evaluative Skills

Skill	Gr.	Sample Media Application or Activity
Sift and scan	3	Allow plenty of browsing time. Promote shelf, multimedia, magazine, and Web browsing.
	3	Model sifting for relevance
	3	Teach keyword searching for all kinds of search engines. Encourage students to “keyword search” print also: index, table of contents, advance organizers, and text (in that order).
Identify feelings expressed in texts	2	Identify expressed feelings in stories
	5	Look at expository writing for emotional intrusions

	6	Look for emotionally manipulative language
Evaluate inferences	2	Use stories such as *Amelia Bedelia* (Parish 1963) and others that contain mistaken inferences
	5	List inferences in newspaper editorials, newsgroups
	8	Study conspiracy theory Web sites for examples of flawed inferences
Generate expectations	1	In stories and historical accounts, predict outcomes
Build critical consciousness.	5	Show examples of innocuous misinformation and discuss implications
	6	Have students find misinformation that applies to their topic
	6	Help students construct Web pages and show how easy it is to misinform. Discuss ethical implications.
Recognize metacognitive signals.	3	Ask students: “What is wrong here?”
	3	Encourage action in response to doubt
	4	Teach mini-lessons on this skill with regular research skills
Gather relevant evidence.	K	With youngest kids, start with pictorial evidence
	3	Use Web as one of a variety of sources
Distinguish between fact and opinion	3	For any topic, find facts and opinions on the Web, magazines, and newspapers. Label accordingly in finished products.
Evaluate arguments	5	Look for logical fallacies
	7	Sponsor live or virtual debates
Evaluate authority and reliability of sources	4	Look for stated credentials
	4	E-mail the author with tough questions

	5	Compare information across sources
Detect and identify point of view and bias	K	In fiction, ask about feelings and thoughts of individual characters
	5	Ask: "What is the author's purpose?"
Evaluate sources holistically	6	Think like an editor. What needs to be changed?
	6	Weigh positive characteristics against negative ones
Use a checklist	2	See Web source evaluation checklists (Schrock 1999; Wilkinson, Bennett, and Oliver 1997)

Because of the importance of prior knowledge, students should be encouraged to read as widely as possible within subject areas (Weisburg and Toor 1994). Students should be brought to the understanding that while it is impossible to have domain knowledge about all topics, it is important to build knowledge in selected areas to help with important decisions and projects.

Metacognitive awareness is another valuable skill for students to learn. Generally, it will not harm children to make them aware of their own mental operations. Specifically, children can be taught that feelings of confusion, disagreement, and surprise should not be ignored because of their role in comprehension (Markman 1981) as well as evaluation. The key is to identify the origin of these feelings.

Teaching Strategies

Finally, the following eight suggestions provide concrete teaching strategies that may begin to help students think evaluatively. Obviously, these will be most effective if collaboratively implemented by both school library media specialists and teachers.

1. Teach evaluation strategies one or several at a time over a span of years. Evaluation is much too difficult a process to be taught in one unit. The library media specialist may be the only professional in the school who can assure that this ability is developed in all students over the course of their schooling.
2. It is not possible to evaluate *all* information. Teach students to respond to signals and doubts that occur as they read. Also, provide examples of specific situations that often involve misinformation, such as fake Web sites.
3. When a skill is introduced, or when students seem to be having inordinate difficulty, teachers and school library media specialists can reduce cognitive load by breaking the skill down into smaller parts (Markman 1981), and by beginning new skills in familiar contexts (Flavell 1981). For example, in distinguishing between fact and opinion, students can first seek cue words like "I think . . ." and "I feel . . ."

4. In a daily 15-minute exercise, children should find problems such as inconsistency or exaggeration in a short piece of curriculum-relevant text (Markman 1981). These exercises should represent well-structured problems at first and progress to ill-structured problems as students become more skillful. School library media specialists can extend these classroom exercises when students perform research.
5. Ensure that *cause* is clear. Research shows that people evaluate more effectively if causes are revealed, where available (Anderson 1982).
6. Students should practice formal argumentation, which involves the evaluation of evidence (Kuhn 1991). They should also switch sides and argue opposite positions. Debates (Paul 1992), mock trials, and mock or genuine editorials present excellent opportunities for this skill.
7. There is no better way to practice evaluation than to perform research regularly and intensely. Research should stem from either an authentic problem affecting the student or from personal interest because only motivated students exercise their optimal capabilities.
8. Research projects should culminate in the production of different types of media. Many schools today have video and television studios, multimedia authoring capabilities, traditional art facilities, and Internet access, and using such resources to present research is particularly valuable in relation to evaluative skill. Further, the use of media as public displays of learning benefits both the producers and viewers.

Implications for Future Research and Conclusion

Almost daily, the media reports incidents of scams and hoaxes. Why do people continue to fall victim to these deceptions despite numerous public warnings? Why do tabloid publications, notorious for printing inaccurate, unsubstantiated, and sensational information, continue to sell issues? Why do e-mail hoaxes, some of them almost as old as the Internet, continue to circulate? These incidents are fairly mild in import. However, they raise the question of whether an entire society could be fooled on matters of importance. Successful, although small, deceptions reflect the possibility that wholesale and tragic deceptions can occur.

Frick (1991) argues that information evaluation is important to the individual, to the educational establishment, and to society. For individuals, evaluation is a crucial life skill and a basis for lifelong learning. It is required in decision making and imparts a feeling of self-esteem through control. Evaluation is important to the educational establishment, because critical thinking is arguably one of the most important of all educational outcomes for students (Engeldinger 1991). Finally, society must critically evaluate information to establish a public demand for high information quality.

Thus, it makes sense for educators to understand the evaluation process. As evidence shows, people do not always apply evaluative strategies in situations that seem to require evaluation. It is unlikely that psychological and social sciences have yet completely explained the causes of evaluation failure, but the present body of literature provides a solid foundation for future investigations. The questions are provocative: how are signals generated, and what forms do they take? What elements of critical disposition increase and decrease the likelihood of signal generation? How strong must motivation be to drive the critical thinking process forward? Will the plethora of electronic misinformation increase the frequency of signal generation? What other influences may affect the process?

Although research is important, the most crucial task belongs to educators. Greater access to information enhances school library media programs and their ability to support learning. However, as we harness the power of information for educational purposes, we must consider the dangers that accompany it. School library media specialists may be the professionals best positioned to ensure that evaluation becomes a cognitive tool for every student.

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Appendix: Related Links

1. Kathy Schrock has assembled a host of practical links related to evaluating information—both on and off the Web. You can find her list at www.discoveryschool.com/schrockguide/eval.html.
2. The Center for Critical Thinking (www.sonoma.edu/Cthink) has extensive resources for encouraging critical thinking at all levels of education. AskERIC also has a 1997 InfoGuide on critical thinking and the HOTS (higher order thinking skills) program that can be found at http://ericir.syr.edu/Virtual/InfoGuides/alpha_list/Critthink12_97.html.
3. A useful and extensive overview of metacognition (including information about Flavell's work) can be found at http://faculty-staff.ou.edu/O/Jason.W.Osborne-1/Metahome.html.
4. An interesting paper on assessing critical thinking at the high school level using King and Kitchener's concept of reflective judgment can be found at www.coled.umn.edu/CAREIwww/. You will find the article under Research Practice, Spring 1994.
5. The article "Role of Reflection in the Renewal of Teaching" from SUNY-Buffalo's Teaching and Learning Resources division offers guides to help teachers think about their teaching. It can be found at http://ublib.buffalo.edu/libraries/projects/tlr/reflect.html.

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