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ABSTRACT

This report describes a study that examined changes in literacy engagement during one year of Concept-Oriented Reading Instruction (CORI), a new approach to teaching reading, writing, and science. Literacy engagement was defined as the integration of intrinsic motivations, cognitive strategies, and conceptual learning from text. To promote literacy engagement in classrooms, a team designed and implemented CORI in two third-grade and two fifth-grade classrooms in two schools. One hundred forty students participated in an integrated reading/language arts-science program, which emphasized "real world" science observations, student self-direction, strategy instruction, collaborative learning, self-expression, and coherence of literacy learning experiences. Trade books replaced basals and science textbooks. Based on 1-week performance assessments in the fall and spring, students gained in the following higher-order strategies: searching multiple texts, representing knowledge, transferring concepts, comprehending informational texts, representing knowledge, transferring concepts, comprehending informational text, and interpreting narrative. Children's intrinsic motivations for literacy correlated with cognitive strategies at both grade levels. All students who increased in intrinsic motivation also increased their use of higher-order strategies; and a sizeable proportion (50%) of students who were stable or decreased in intrinsic motivation failed to progress in higher-order strategies. Findings suggest that literacy engagement increased during the year. (Contains 62 references and 4 tables of data. The Performance Assessment of Literacy Engagement and 2 rubrics are attached.) (Author/RS)

Growth of Literacy Engagement: Changes in Motivation and Strategies During Concept-Oriented Reading Instruction

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The National Reading Research Center (NRRC) is funded by the Office of Educational Research and Improvement of the U.S. Department of Education to conduct research on reading and reading instruction. The NRRC is operated by a consortium of the University of Georgia and the University of Maryland College Park in collaboration with researchers at several institutions nationwide.

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Abstract. *This study describes changes in literacy engagement during one year of Concept-Oriented Reading Instruction (CORI), a new approach to teaching reading, writing, and science. Literacy engagement was defined as the integration of intrinsic motivations, cognitive strategies, and conceptual learning from text. To promote literacy engagement in classrooms, our team designed and implemented CORI in 2 third-grade and 2 fifth-grade classrooms in two schools. One hundred forty students participated in an integrated reading/language arts-science program, which emphasized "real world" science observations, student self-direction, strategy instruction, collaborative learning, self-expression, and coherence of literacy learning experiences. Trade books replaced basals and science textbooks. Based on 1-week performance assessments in the fall and spring, students gained in the following higher-order strategies: searching multiple texts, representing knowledge, transferring concepts, comprehending informational text, and interpreting narrative. Children's intrinsic motivations for literacy corre-*

lated with cognitive strategies at .8 for grade 5 and .7 for grade 3. All students who increased in intrinsic motivation also increased in their use of higher-order strategies; and a sizable proportion (50%) of students who were stable or decreased in intrinsic motivation failed to progress in higher-order strategies. These findings were discussed in terms of a conceptual framework that embraces motivational, strategic, and conceptual aspects of literacy engagement.

Purposes

The main goal of this report is to describe patterns of change in literacy engagement during conceptually-oriented reading instruction. The first objective is to construct a theoretical framework for understanding the development of literacy engagement. By "engagement" we refer to the integration of motivations and strategies in literacy activities. In constructing the theoretical framework we integrate work from the fields of motivation, literacy, and cognitive strategies. Because these areas have not been well integrated in the reading field, we provide an extended description here.

The second and third objectives are instructional and empirical. The second objective was to create and sustain a classroom context that was designed to promote literacy engagement. Generated collaboratively with teachers over a two-year period, this context has been termed "Concept-Oriented Reading Instruction (CORI)." We induced the essential dimensions of the instructional framework from a variety of observational, interview, and videotape sources.

Our third objective was to describe patterns of change in motivation, strategy use, and conceptual learning capacity for students experiencing CORI. To portray motivational attributes and changes, we used a multi-method, descriptive approach. We have used a grounded theory approach to generate a set of motivational constructs, and then developed quantifiable measures of them. To describe the strategic and conceptual aspects of literacy engagement, we built a coding rubric that characterizes the quality of children's performance in a performance assessment. This rubric enabled us to quantify our grounded categories of strategic and conceptual learning. We have used this multi-method, descriptive approach in order to enhance the explanatory coherence (Thagard, 1989) of our account of changes in literacy engagement. This descriptive study, in other words, is a deliberate combination of qualitative and quantitative methods to address our objectives.

Theoretical Framework for Reading Engagement

Motivations for Reading

Central to our investigation is the construct of reading engagement, which refers to the joint functioning of motivations and strategies during reading (Newman, Wehlage, & Lamborn, 1992). An engaged reader chooses to read for a variety of purposes and comprehends the materials that s/he selected within the context of the situation. Engaged readers are self-determining (Deci, Vallerand, Pelletier, & Ryan, 1991) in the sense that they elect a wide

range of literacy activities for aesthetic enjoyment, gaining knowledge, and interacting with friends. They are motivated to read for its own sake, and these motivations activate the self-regulation of higher-order strategies for learning through literacy (Dole, Duffy, Roehler, & Pearson, 1991).

In our engagement perspective, motivations for reading are seen as internalized goals that lead to literacy choices and comprehension strategies (Pintrich & Schrauben, 1992). In this goal-oriented view, motivations may be regarded as "reasons for reading." Students' goals can be classified as intrinsic or extrinsic. Intrinsic motivation refers to the "performance of activities for their own sake in which pleasure is inherent in the activity itself" (Gottfried, 1985). Students who are intrinsically motivated have an inherent interest in what they are reading and enjoy figuring out the meanings for themselves. When asked the question "Why are you reading this text?", students who are intrinsically motivated to read will answer "to learn how butterflies migrate" (curiosity goal) or "because the mystery was so exciting" (involvement). The motivational goals of curiosity and involvement are intrinsic. Extrinsic motivation refers to motivation that comes from outside the learner. Students who are more extrinsically motivated prefer to please the teacher, perform easier reading tasks, and are dependent on the guidance of others. Thus, when asked the question "Why are you reading this text?", extrinsically motivated students might answer "because the teacher assigned it" (compliance) or "because I wanted to get a sticker" (recognition). Although some researchers (e.g., Harter, Whitesell, & Kowalski, 1992) propose that motivations fall on a continuum from intrinsic to extrinsic implying that they are negatively correlated, other investigators such as Wentzel (1991) report that students may possess multiple motivational goals simultaneously—some of which are intrinsic and some extrinsic. We believe students have multiple goals for reading.

Furthermore, children's motivations appear to be domain-specific (Wigfield & Harold, 1992). Students may be intrinsically motivated to read but not to do math, and vice versa. Gottfried (1985) found that intrinsic motivations for reading predicted students' perceptions of their own competence in reading, but intrinsic motivation in reading did not predict perceptions of competence in math or science. Relationships among motivationally oriented constructs are specific to particular content areas.

Within reading, further distinctions among types of motivations can be made. The diversity of motivations for reading is being explored by Wigfield (1994) with a combination of methods including open-ended interviews, and factor analysis of self-report data from student questionnaires. He reported clear distinctions among several intrinsic motivations including curiosity, aesthetic involvement, importance of reading, challenge, social interaction, and self-efficacy, as well as several relatively more extrinsic motivations such as recognition, grades, competition, compliance, and work-avoidance (Wigfield, 1994). Describing how these different types of motivational goals influence reading strategies is the topic of the next section.

Cognitive Strategies for Reading

Numerous studies have shown how certain cognitive strategies facilitate reading performance (Dole et al., 1991). Although we expect that motivation will influence the large majority of higher-order cognitive reading strategies, we emphasize some but not all of them in this study. Our intrinsic-motivational perspective on reading places an emphasis on students' quest for information that they define as important. Cognitive strategies that are needed for this quest include: problem finding (Collins-Block, 1992), search for information (Armbruster & Armstrong, 1993), applying prior knowledge to text (Anderson & Pearson, 1984), emphasizing the acquisition of main ideas and generating inferences from text (Dole et al., 1991), self-monitoring (Baker & Brown, 1984), and the comprehension of narrative text (Graesser, Golding, & Long, 1991), as well as informational materials. These strategies have been shown to distinguish good from poor readers and to increase with chronological age. The coordination and integration of these strategies into a flexible repertoire is necessary for sustained use of the strategies in classrooms (Collins-Block, 1992; Pressley et al., 1992). As a consequence, we examined the strength of the individual strategies and the extent to which they become more coordinated across time during a year of instruction.

Although in the motivational literature a link between intrinsic motivations and the use of higher-order cognitive strategies has been established (e.g., Pintrich & DeGroot, 1990), the use of a strategy is not the end-point of a literacy activity. The end-point for many literacy activities is conceptual learning. Concepts and ideas within text are the targets for students intentional processes and cognitive strategies. Although strategies are invaluable instruments, students' motivations are directed to the conceptual content, and the substance of text. Thus, we also emphasized conceptual learning in the instructional program.

Motivations for Strategy-Use in Reading

Relationships between motivations and strategies have been explicated by Corno and Kanfer (1993), Covington (1992), and Ford (1992). Corno and Kanfer (1993) assert that motivations consist of goals and intentions. However, Corno and Kanfer (1993) also emphasize the importance of volitional strategies that enable individuals to fulfill their motivational goals. They argue that without volition, individuals' intentions may not be realized in action. Following Kuhl (1985), Corno and Kanfer discuss a number of volitional processes. These include, first, action control processes, which empower the individual to manage cognitive and meta-cognitive resources for goal attainment. Second, goal-related cognitions form the basis for adaptive use of learning strategies, well-timed application of deep processing, self-monitoring, and self-evaluation. Finally, volitional styles such as conscientiousness, independence, and responsibility influence how strategies are used and regulated.

Corno (1993) asserts that volitional strategies are not merely energized by motivations, but more importantly, these strategies are contingent on different kinds of motivations. For example, when motivations possess personal significance, they are intrinsic and will

be associated with higher-level strategies. In contrast, a student who wishes to receive recognition for reading may not necessarily be concerned with understanding or enjoying the content of a book or story. This student will attempt to be perceived as competent and to comply with the demands of the teacher conscientiously. But the student may not read on his/her own, share books with friends, or pursue difficult tasks that are not assigned. Some motivations, such as fear of failure, may lead to strategies of low goal setting, avoidance of risk, and minimal effort. These strategies may help a student fulfill the intention of avoiding failure, but will not foster deep comprehension or extended reading for personal initiative. We expect that students who possess intrinsic motivations for reading will work independently, show responsibility, and conscientiously translate their intentions into actions. Thus motivational and volitional systems work in close association, and exploring their joint functioning during reading was one of the purposes of this study.

Relationships between students' motivations and their use of reading strategies during learning have been examined by several investigators. Pintrich and De Groot (1990) conducted a study of 173 grade-7 students from science and English classrooms. The students responded to a self-report questionnaire assessing student motivation, cognitive strategy use, and the management of effort. The motivations of intrinsic value and self-efficacy strongly predicted students' uses of strategies. Intrinsic value was measured with statements such as the following: "It is important for me to learn what is being taught in this class"; "I like what I am learning in this class"; "I think what I am learning in this class is useful for me to know." Self-efficacy was measured with such statements as: "I expect to do very well in this class"; "I am certain I can understand the ideas taught in this course"; "Compared to other students in this class, I think I know a great deal about the subject." Both intrinsic value and self-efficacy predicted self-regulation of strategies which was measured with such items as: "I ask myself questions to make sure I know the material I have been studying"; "Before I begin studying I think about the things I will need to do to learn"; "When I'm reading I stop once in awhile and go over what I have read." Intrinsic value correlated .73 with self-regulation, and self-efficacy correlated .44 with self-regulation. In addition, intrinsic value and self-efficacy predicted student level of performance on grades, seat work, quizzes, essays, and reports.

Meece, Blumenfeld, and Hoyle (1988) also found that intrinsic motivation predicts students' cognitive strategy-use in science classrooms. They examined students' orientation to task mastery, which referred to interest in learning rather than interest in demonstrating competence to the teacher or other students. They measured task mastery by having the child respond to such statements as "I want to learn something new" and "I felt involved in my work." They asked students to reply to a questionnaire on their use of cognitive strategies, containing such statements as "I asked myself some questions as I went along to make sure the work made sense to me." Students' motivations for task mastery correlated .63 with their use of cognitive strategies when several other motivational constructs were statistically controlled. Finn and Cox (1992)

added generality to the relationship of motivation and strategy-use by reporting that students who were intrinsically motivated in a learning situation were more likely to have high standardized achievement test scores in reading than students who were less intrinsically motivated.

The reciprocity of motivation and cognition during reading includes the effects of strategy learning on motivation levels. Schunk and Rice (1985) reported that learning a strategy for reading increased students' reading self-efficacy. Students who were taught to verbalize a strategy for comprehension increased their beliefs in their personal capabilities for successful performance of a particular task. The authors concluded that "training students to use self-regulated learning strategies such as self-verbalization improves their perception of efficacy, motivation, and learning" (p. 197). Zimmerman, Bandura, and Martinez-Pons (1993) confirmed that possessing strategies for learning increased students' aspirations. They reported that students who had high self-efficacy for the strategies of summarizing, outlining, and taking notes were likely to set higher academic goals than students with lower self-efficacy for these strategies. The basic purposes of strategies have not been addressed in this paper. One purpose that is prevalent from grade 3 to 12 is conceptual learning from informational text, which is considered next.

Conceptual Learning from Text

Concepts can be defined as rule-based mental representations (Holland, Holyoak, Nisbett, & Thagard, 1986). When a student understands a concept, s/he has abstracted critical features from the observable world and constructed sensible relationships among those features. For example, a student who understands the concept that an owl is a predatory bird knows that the owl has structures of the wing and the claw that permit it to fly and capture prey. For young children (Keil, 1987) and adults (Neisser, 1987), concepts expand through the addition of particular features, differentiation of features from each other, and the elaboration of the relations among these features. Holland et al. (1986) expressed conceptual growth in terms of the acquisition of four types of rules (categorical, associative, predictor, and effector rules) for connecting objects and events in the real world. The use of these rules permits transfer of knowledge from one situation to another. Although prior knowledge can occasionally interfere (Chinn & Brewer, 1993), conceptual learning is usually more flexible and adaptable than the learning of isolated facts. Concepts can be elaborated, interconnected and transferred to new situations. Because conceptual learning entails the development of relations that have personal significance, it is reasonable that deep conceptual learning from text will be interwoven with intrinsic motivations for reading (Head & Sutton, 1985; Pintrich, Marx, & Boyle, 1993).

Motivations for Conceptual Learning from Text

When motivations for reading are viewed as goals and commitments toward learning through literacy activities, the relationship of motivation to conceptual learning becomes apparent. Students who have a commitment to understand the content of an instructional unit and find the text inherently intriguing are likely

to acquire a deeper understanding of the content than students who possess different kinds of commitments. Students whose motivations are more extrinsic, such as working just to complete an assignment or gain recognition for good performance, are likely to engage in rote learning and gain verbatim knowledge rather than a fully integrated conceptual understanding (Pintrich et al., 1993). Thus, it can be expected that intrinsic motivations will yield higher levels of conceptual learning than will more extrinsically oriented motivations.

In support of this view, Lee and Anderson (1993) reported exactly this pattern in an in-depth study of grade-12 students in two science classrooms. From field notes of classroom observations, they identified four types of motivation among students in these classrooms: (1) intrinsically motivated; (2) motivated; (3) task-avoidant; and (4) task resistant. Intrinsically motivated students "engaged" in classroom tasks with the goal of achieving better understanding of science in specific situations. As they attempted to understand, these individuals integrated their personal knowledge with science knowledge presented in the classroom and applied their knowledge to describing, explaining, and predicting the world around them. Students who were intrinsically motivated initiated their own learning activities, enjoyed asking conceptual questions, made connections among topics in a variety of lessons, and displayed high scientific interest. Notably, these students gained elaborate, explanatory understandings of the science concepts being taught in the curriculum. A second group of students was motivated to learn, but was not as intrinsically oriented. These students did not initiate their own activities and displayed little interest; although, they did complete tasks and assignments. They gained rudimentary knowledge of the science facts, but did not integrate higher-order relations or gain a grasp of science principles. The task-avoidant students were inattentive, uninvolved, and not inclined to learn. They asked few questions, did not complete tasks fully, and gained relatively little conceptual understanding. Task-resistant students were disruptive, noisy, contrary, showing a dislike for science, and a disinterest in the class and the learning situation. This group gained no conceptual understanding nor did they show any forms of verbatim learning. In this investigation, students who were intrinsically motivated appeared to gain conceptual knowledge of science principles, whereas students who were compliant with the instructional situation gained rudimentary and functional knowledge but not fully elaborated conceptual understandings. The two negatively motivated groups, the task-avoidant and task-resistant, were detached from instruction, did not use learning strategies, and did not learn the structures and functions needed to form higher-order conceptual understandings of the content. This study clearly shows that the motivations that students bring to the text and the classroom are associated with conceptual learning.

In addition to motivational orientations of students, topic-based interests also influence conceptual learning from text (see Alexander, Kulikowich, & Jetton, 1994 for detailed discussion). For instance, Hidi and Anderson (1992) investigated the characteristics of particular texts that affected how interesting they were to students, and that led to increased conceptual

understanding. Fourth and sixth graders read three different types of texts about inventors. The first type of text contained high action, strong character identification, novelty, and real-life themes related to the experiences of students. The second type of text contained additional description and elaboration on the themes, and the third type presented new information that was intended to peak the interest of students. Students showed the highest interest ratings and conceptual recall for the high action, life-theme texts. Students also showed extremely high recall on explicit descriptions of activities or scenes such as how to build an igloo, and how to make a model of a globe from an orange. Although Hidi and Anderson (1992) did not control the variables of background knowledge and intelligence in the relationship of interest and text understanding, Schiefele (1992) did introduce these controls in his study of interest and comprehension in college students. Schiefele (1992) reported that students' ratings of interest for text predicted their level of conceptual understanding of the text only if students experienced feelings of enjoyment, involvement, or personal significance of the topic. This leads us to conclude that text-based interest evoked intrinsic motivations of involvement, enjoyment, and personal significance which then generated increased conceptual understanding of text.

Contextual Influences on Motivations for Reading

Although students come to school with motivational orientations that are developed during the preschool years (Deci, 1980), the different contexts of instruction also greatly influence student motivations as they go through school (Ames, 1992). Previous research suggests that contexts which increase intrinsic motivation will be socially interactive, with freedom for the learner (Blumenfeld, 1992; Turner, in press), providing strategic tools for learning (Guthrie, McGough, Bennett, & Rice, 1996), and "real-world" literacy tasks (Newby, 1991). However, relatively few investigators have attempted to implement and then describe extended, instructional contexts (Stevenson & Carr, 1993) that are designed to enhance intrinsic motivation for literacy. One exception is Covington (1992), who reported that a "global gambit" project enhanced intrinsic motivation of grade-9 students in a social science class. In the project, students studied global warming by observing temperatures and comparing them to temperatures of one century ago and measuring the effects of acid rain on local statues. Students proceeded to read voraciously and monitor their learning as they addressed problems of global warming. In addition, Blumenfeld et al. (1991) proposed the "project-based" approach to instruction, in which students collaborate to create an artifact such as a diorama or a chart to display their learning. Although these approaches hold promise, neither author presented clear evidence on the growth of intrinsic motivation.

One of the objectives of the project described in this report was to design and describe a classroom instructional program that would enable teachers to enhance the development of reading engagement. We expected that CORI would enhance intrinsic motivations for reading through several processes. First, teachers initiated the instruction with concrete observational experiences. As

students interact with concrete objects and events, they activate their senses of seeing, hearing, feeling, and smelling. These sense-perceptions generate a vivid interest in the objects and events. As students become fascinated, they naturally experience a sense of wonder and an urge to know more. Questions spontaneously erupt. Curiosity is ignited. As students express their need to know through asking questions and formulating thoughts aloud, motivation is further enhanced. These questions form the basis for conceptual learning. If students' questions and curiosities can be satisfied through literacy activities of reading books, writing journals, and drawing, the starting point for sustained conceptual learning is reached. From this point, the context must afford students the opportunity to satisfy their motivational goals by providing appropriate materials, time, and social support for participating in a range of literacy activities. As literacy enables students to understand the topic and share their understanding with peers, intrinsic motivation will be extended, refined, and regenerated.

In sum, concept-oriented instruction creates the occasion for growth of literacy engagement, including motivations and strategies. Because the purpose of this investigation was to describe the nature of growth in literacy engagement, we did not compare students who received CORI to a control group.

Questions for this Study

Several authors (e.g., Blumenfeld, 1992; Graham & Golan, 1991; Zimmerman & Martinez-Ponz, 1992) have pointed to the need for studies that explore how intrinsic motivations and strategies for learning influence each other across time in actual classroom settings. For instance, Blumenfeld (1992) suggested that we need to examine how qualities of a task such as variety and challenge, relate to motivational processes across time. Graham and Golan (1991) said that "we think that a systematic mapping of distinct motivational states unto particular sets of cognitive processes is a useful and needed step toward the goal of greater conceptual clarity in motivation research." Zimmerman & Martinez-Ponz (1992) noted that "researchers need to undertake microanalysis of the role of self-efficacy at numerous points before, during, and after various strategic efforts to learn" (p. 201). Jagacinski (1992) concluded that "research is needed that examines how differences in achieving orientations interact with situational demands" (p. 321). In keeping with these recommendations, we have used the following questions as guides for the present study:

1. Which aspects of literacy engagement increase during Concept-Oriented Reading Instruction?

2. Were the increases in literacy engagement educationally significant?

3. How highly correlated were intrinsic motivation and engagement in the spring?

4. How do changes in intrinsic motivation relate to changes in literacy engagement?

5. How do changes in intrinsic motivation, amount and breadth of reading, and volitional strategies relate to each other?

Method

To address these questions, we implemented an instructional program that was designed to enhance literacy engagement, charting the growth of students from fall to spring as they participated. Our description of growth was both quantitative and qualitative. The qualitative cases are selected for typicality (Erickson, 1986) to exemplify group trends; and the quantitative analyses are performed to assure that the conclusion about the growth of literacy engagement were warranted for the population of students, as well as individuals within the populations (see a fuller rationale for this approach in Brown, 1992).

Concept-Oriented Reading Instruction: An Overview

The Concept-Oriented Reading Instruction program was a yearlong instructional design that was implemented in four classrooms in two elementary schools. A major purpose of the program was to increase students' engagement in literacy and science. The program was designed in collaboration with teachers and reading specialists in two elementary schools. The instructional framework contained four phases: observe and personalize, search and retrieve, comprehend and integrate, and communicate to others. Examples of the activities are given for third grade only, due to limitations of space.

Observe and personalize. Our first step in engaging students in literacy was to provide opportunities to observe concrete objects and events in their natural world. Observing natural objects such as a tree, flower, cricket, caterpillar, bird nest, or feather was intriguing. After experiencing an initial fascination with tangible, concrete objects students began to wonder, and to ask questions that lead to conceptual interests. Students brainstormed and explicitly stated the questions they wanted to explore with additional observations, data collecting, reading, writing, and discussion. Observing the "real world" was a point of departure for extended literacy, and it provided a frame of reference that enabled students to select reading and writing activities, and to self-monitor their pursuits.

Grade-3 classrooms studied the adaptation of animals to their environments beginning with a 12-week unit on birds. By observing bird nests, attempting to build a bird nest, drawing feathers, recording behavior at feeding stations, simulating the crop of a bird in a classroom experiment, and visiting a display of stuffed birds, students gained a long-lived curiosity, according to teacher reports. Students kept journals of their observations and one student reported that:

> "We built our nest with leaves, grass sticks and twigs. Mud too. But first we looked for each of these things at the playground. Clay was to stick our nest together because if we didn't have clay our nest would break. We called the clay mud. I learned that its hard to make a nest unless you really try to. I learned that birds have a hard time making nests but we read a book that helped us learn and I found out that if you try with a group it might be easy. And you might make a lot of friends."

Students personalized their interest in learning about birds and their environments by writing questions both as teams and individuals. Questions were placed on the classroom walls, forming the cornerstone of a coherent sequence of learning activities that connected science with language arts activities. Students were excited and gratified by having their questions legitimated and publicly displayed. Grade-3 science goals included: observing, gathering, and recording data; recognizing patterns; comparing; and understanding that science knowledge is explanatory. Science content in grade-3 emphasized structural characteristics of birds such as beaks and feathers, and functional characteristics such as flying and feeding that aid survival.

Search and retrieve. Teaching students how to search was fundamental to enabling them to pursue their interests and answer the questions they generated from observational activities. Students were encouraged to choose subtopics for learning, and to search for books, resources, references, pictures, and explanations of the topics they chose. Initial searches began with a question formulated by each student after first-hand observations triggered new ideas. Students began to wonder about new concepts they had not previously considered. They found their answers in the classroom books. Students were taught how to: search for books in the school library; locate books in the classroom; and use the table of content, index, headings, and pictures as guides. Strategies for searching were taught explicitly through teacher modeling, peer modeling, teacher scaffolding, guided practice, and teamwork. Typically, teachers presented a directed lesson using a class set of one book for all students, emphasizing book organization, relevance of information, appropriateness of detail, extensiveness of the search, and distinguishing between facts, explanations, and opinions. Teams of students then explored their group sets of information books and exchanged ideas about how to search for ideas in them.

Third- and fifth-grade students were taught four fundamental search processes that have been identified by previous investigators (Armbruster & Armstrong 1993; Guthrie, Weber, & Kimmerly, 1993) including: (1) *forming goals*, which refers to knowing what you want to find or having an objective for the search activity; (2) *categorizing*, which refers to understanding how things are organized; (3) *extracting*, which refers to finding critical details, note taking, paraphrasing, and summarizing within a book or resource; and (4) *abstracting*, which refers to synthesizing or putting ideas together and forming a general understanding. For 3–4 weeks in the middle of each unit, teachers addressed at least one aspect of search daily for 15–30 min. Teachers modeled each of these stages, students discussed them in groups, and students recorded progress toward each of them in their journals.

Comprehend and integrate. As students followed the interests they had generated from their observational activities, they identified a wide range of texts and resources that were relevant. The phase of "search and retrieve" yielded a rich reserve of interesting material, but the students faced the challenge of comprehending and integrating. To help students in fully comprehending and integrating the texts with their own previous knowledge, teachers emphasized: determining the topic of a text selection, detecting

critical details, summarizing the text, making comparisons between texts, relating illustrations to text, developing criteria for evaluating a book, and critically reflecting on the organization of information and the author's point of view. Students also learned that a novel or short story may address the same topic as an information book, and will provide a different experience of the theme.

Trade books were used exclusively. Basal readers were not used for any purpose; and science textbooks were used rarely for reference. Grade-3 students began the year by reading *Owl Moon* by Yolen. At later points in the unit, they read the novels *White Bird* by Bulla and Wingman by Pinkwater, as well as poetry on birds. Within these books teachers emphasized imagery, aesthetics of language, and characterization, as well as the traditional constituents of setting, plot, conflict, and resolution.

Third-graders were taught to use information books to pursue the interests they formulated during the observing and personalizing phase of instruction. Searches were first conducted using teacher-generated questions. Later, students formulated their own questions and found appropriate informational texts. To help students comprehend books, teachers provided explicit instruction in identifying topic, details, and writing summaries. Through teacher modeling, peer modeling, and small group discussion, students were provided instruction in "fix-up" strategies, enabling students to: (1) use pictures, illustrations, diagrams, and graphs; (2) refer back to their own questions; (3) look up vocabulary in an index glossary or dictionary; (4) break text into parts and put it back together; (5) ask peers and teams; (6) form images about what they know; (7) reread the text in a new way; (8) slow down or speed up; and (9) consult their own background knowledge. In addition to comprehension strategies, students were taught note taking and critical reflection on information from expository books. Students learned to critique books using their own questions, interests, and topical knowledge as criteria for judgement.

Communicate to others. In CORI, students become experts on the topic they have chosen to learn about. As they gained knowledge, students wanted to express their understandings to others. To foster this self-expression, teachers provided instruction that enabled students to present their understanding in many forms, including a written report, a class-authored book, dioramas, charts, and informational stories. Teachers coached students in identifying their audience, organizing their message to the audience, identifying critical details, and elaborating their writing. Students were encouraged to express their understandings in a variety of coherent, persuasive, and accurate communications to classmates or other audiences of their choosing.

Grade-3 teachers invited students to make charts about their observations about birds. One class created wall displays of the materials found in bird nests. Another class created charts of adaptive features such as beaks and feet. Students wrote journals which were shared with other students, and small classroom teams composed books on their favorite bird which were illustrated, covered, and shared with other teams.

Students in grade 5 composed imaginative, knowledge-rich tales about a day gecko, pray-

ing mantis, wild horse, squirrel, and other creatures. To support their writing, students were exposed to descriptive and figurative language through books, such as *Tuck Everlasting*, *Moon of the Chickapee*, and poetry. They were encouraged to apply these writing styles in their books. Informational stories were a popular art form for expressing interests and exchanging expertise.

Participants. One grade-3 and one grade-5 teacher in one elementary school and one grade-3 and one grade-5 teacher in another elementary school in a diverse suburban school district in the mid-Atlantic region volunteered to embark on this venture, accompanied by one reading specialist in each school. Students were 140 boys and girls who were a lower income, ethnically diverse population. These 140 students were all of the students in the four classrooms; because the project was school-based all children participated. The students were African American, Hispanic, Asian American, and Caucasian. A substantial portion of the students (35–60%) qualified for a free or reduced-fee lunch.

Design of the CORI Program. Preparation for teaching CORI consisted of a summer workshop of 8 half days held at the schools with the four teachers, two reading specialists, one university faculty member, and one graduate student. The university faculty member coordinated the summer workshop, guiding each teacher toward her own classroom design. He also supervised the graduate students in collecting data from the children. All of the instruction was provided by the teachers who had 10 or more years of experience in the profession.

Performance Assessment of Engaged Reading

We conducted an assessment that was designed to reflect a wide spectrum of motivational and strategic literacy processes that appeared in CORI. The assessment was intended to generate data for addressing questions 1 through 3. Our performance assessments were designed to enable students to perform seven distinct but connected tasks: (1) *statement of prior knowledge*, stating what they know about the topic; (2) *searching*, finding resources and ideas about the topic; (3) *drawing*, expressing what they have learned through drawing; (4) *writing*, communicating their learning through composition; (5) *conceptual transfer*, addressing a related problem using conceptual knowledge learned during the unit; (6) *informational text comprehension*, understanding an expository text related to the theme; and (7) *narrative interpretation*, understanding and responding to a literary text on the theme of the unit (see Appendix A).

Performance on these tasks reflects the use of cognitive strategies. The assessment is also responsive to motivations, because the tasks are open-ended and unspeeded, thus rewarding effort, persistence, and elaboration. For example, in the search task, students were given packets. Each packet was a 2–4 page text with illustrations and there were 12 (3rd grade) to 14 (5th grade) packets in each booklet. A question was presented to the student within the booklet. Students were free to use the table of contents, index, headings, and illustrations to locate information relevant to the question. The log of the search described which resources were selected, the reasons for selecting them, and the information they learned from

reading. In addition, tasks are integrated into a theme, permitting students who are inclined to be curious and involved to find an opportunity to fulfill these motivations. To reflect these motivations, the coding rubrics recognize elaboration, extended work, and relevant expressions of affect. The interest-value of the assessment was apparent as students in most classes asked to take the assessment home to show their parents.

These assessments were conducted in the grade-3 and grade-5 classrooms as instructional units lasting 4 to 6 days. Half of the students took one topic (owls for grade-3) and the other half took a different topic (ponds for grade-3) in September 1993; and the topics were reversed in March 1994. Student responses were coded according to the rubric in Appendix B. To determine the level of interrater agreement, two raters examined the responses of six grade-3 students and six grade-5 students. Each rater gave a numerical rating to each section of the assessment for each student. Across all students and sections, the two raters had 93% agreement. To chart growth, we compared the performance of all students on the seven measures on the counterbalanced topics, which permitted us to see generalized gains in literacy engagement.

Appraisal of Motivations for Literacy

To determine the nature of the students' motivations for literacy, we interviewed 24 students, 6 students from each classroom. These appraisals were intended to generate data for addressing questions 3–5. Each teacher selected students to represent 2 highly engaged, 2 moderately engaged, and 2 less engaged readers. Each student was interviewed in October 1993 and March 1994. The interviewer followed a semi-structured, student-responsive guideline and tape-recorded the dialogue. Transcripts were coded using an inductive analytic procedure (LeCompte, Priessle, & Tesch, 1993). Following Corno's (1993) framework of motivations and volitions, we formed a coding rubric. Motivations were characterized as goals for participating in literacy events; strategies were the students actions or procedures to attain the motivational goals; and styles were characteristic modes of participating in events (see Appendix C). Each of the motivations, volitional strategies, and styles was given a strength rating of 1 (low) to 3 (high). High ratings reflected motivational processes that were highly important, frequent, detailed, and occurring across contexts. To examine interrater agreement, one of the authors and another independent person rated two randomly selected transcripts on all of the categories in the rubric. Agreement was 82% for exact coding, and 89% for adjacent coding, in which rating within one number was accepted.

Findings

Question 1: Which Aspects of Literacy Engagement Increased During Concept-Oriented Reading Instruction?

The performance assessment of Reading Language-Arts was administered to all grade-3 and grade-5 students in the fall and spring. Because each student took the assessment on different topics in the fall and spring, the differences in student performance during the

Table 1. Increases in Literacy Engagement during the year for fifth- and third-grade students.

	Fifth Grade		Third Grade	
	Fall	Spring	Fall	Spring
Prior Knowledge	1.84	1.97	2.33	2.61
Search	2.10_f	2.66_f	2.74_a	3.63_a
Drawing	2.52_j	3.09_j	2.33	2.42
Writing	2.46_g	2.84_g	2.50_b	3.18_b
Transfer	2.40	2.78	2.56_c	3.09_c
Informational	1.64_h	2.36_h	1.67_d	2.25_d
Narrative	3.56_i	4.19_i	2.88_e	4.04_e

Note. Cells sharing the same subscripted letter differ significantly.
Possible score is 5.

two time periods represent changes in the processes of literacy engagement across different topics. As indicated in the Method section, the assessment contained tasks that required cognitive strategies in a situation that was sensitive to motivations. Table 1 presents the results of the performance assessment. Preliminary analyses showed very few differences across topics in each grade; therefore, we collapsed across topics, and present the results that way.

Prior knowledge. There were no differences in prior knowledge at either grade level.

Search. As described in the Method section, this part of the assessment provided a substantial, realistic opportunity for students to search for ideas in a collection of packets. Table 1 shows the gain in performances from fall to spring, summed across both topics for the two age groups. Although Table 1 contains means and the statistical analyses were computed on means, we use medians to discuss the findings because medians can be directly related to the rubric levels.

Grade-5 students began the year with a median of 2 on this measure. As the rubric shows, a median of 2 indicated that these students could locate at least two relevant packets as well as some irrelevant ones. They gave at least one clearly stated reason for the selection of a relevant packet and they wrote simple, clear notes illustrating what they had learned from one of the selections. In the spring, the typical student progressed to a level of 3 on the rubric which indicated that s/he could identify three relevant packets and may have found several irrelevant ones. Appropriate reasons for selecting at least two of the resources were given. The increase reflects not only a greater number of relevant packets that

Bird Sample

Packet	*Why did you choose this packet?*	*What did you learn from this packet?*
D	To see how they hunt silent.	I learned that and owl can turn his head all the way round. It can eat a skunk.
I	I want to know how they kill.	I learn that only small claws can kill snakes.
G	I want to know what kind of bird eats fish.	I learn that a flamingo eats fish.
K	I want to know how they talk to each other.	I learned that . . .
B	I want to know if a male hawk is big.	I learned that a female hawk is bigger.

were selected, but also improvements in the notes that were taken. Most prominently, students' notes showed an accumulation of information gained during the search process, illustrating metacognitive awareness in a conceptually-driven search activity. Change over time from fall to spring was analyzed quantitatively with a paired samples *t*-test. The spring scores were significantly higher than the fall scores, $t(48) = 3.84, p < .001$.

Grade-3 students made comparable progress during the year of instruction. The typical learner gained one level moving from a score of 3 to 4, which was statistically significant according to a paired samples *t*-test, $t(45) = 4.56$, $p < .001$. In the fall, grade-3 students performed at a level of 3, indicating that they could locate two relevant packets of information and very few irrelevant ones, giving an appropriate reason for at least one of their selections and sensible notes on one of the packets. Progressing one level forward in the rubric meant that these students were capable in the spring of locating at least three relevant packets, irrelevant packets, and giving appropriate reasons for at least two of their selections. Clear and detailed notes for at least two selections were provided and irrelevant notes did not contradict the other information in the search log. Again, these increased scores demonstrate that more packets were read and the quality of notes improved. Note that the scores of grade 3 and grade 5 cannot be compared because the rubric levels are referenced within-grade and not across grades. A sample of spring search logs for both *owls* and *ponds* is shown here.

This shows grade-3 strategies for search in the spring (level 3).

Drawing. This was a measure of ability to represent conceptual understanding through drawing. Grade-5 students began the fall at a median of 2, which indicated that they generally included appropriate objects or parts of a system in their drawing. However, the functions of these elements and their relations to each other were absent or vaguely described at best. Students typically progressed to a median of 3, which showed an understanding not only of the objects, parts, and elements, but the relationships among them. The relationship, however, was vague and undefined. Students at a median of 3 in the tide task showed the scientifically correct objects such as moon, earth, sun, and water, with no scientifically incorrect objects such as beach chairs and blankets. A vague depiction of relationships was included. Level-3 drawings also showed several parts and connections between two functions represented in a vague and undefined form. Students increased significantly during the year according to a paired samples *t*-test, $t(49) = 2.13, p < .038$.

Grade-3 students progressed in the drawing section of the performance assessment in terms of the mean change. The change, however, was not significant statistically and the median was a level of 2 for both fall and spring. Performance at the level of 2 illustrates that students included appropriate parts of birds with a vague or scientifically correct connection to their function.

Writing. The writing task provided students an opportunity to display their conceptual understanding of their assessment topic including new ideas they had gained from the search activity. The drawing they had completed was available for their inspection during the writing activity. In the fall, grade-5 students performed at a level of 2, which indicated that they were capable of describing a few parts or objects, but that any comparisons or functions were vaguely described or absent. The typical fifth-grade student progressed to a level of 3, which indicated that s/he was capable of showing an understanding of relationships among relevant objects. Although the relations were not presented in a high amount of detail, they were scientifically correct. Student gain from the fall to spring on the writing task was statistically significant, $t(49) = 1.96, p < .05$.

A typical grade-5 student in the spring who performed at level 3 on the *trees* assessment stated that:

> "Leaves can help the plant turn light into food and roots help the plant suck up water. The trunk holds the tree together and leaves change color in the fall; trees don't only depend on roots but their leaves too, they help give off gas oxygen and help the tree get food. A plant has to have roots to grow roots help the tree stay in the ground."

Typical grade-3 students began the fall at the level of 2 on the writing task. They listed some parts of the topic and possibly a vague function for one of the parts, but fewer relationships or other functions were included. Students moved to a level of 3 in the spring. Not only did they include several parts of their object, but functional connections were made between at least two of the parts. Elements of the object were connected to the total system in a general, vague fashion. Gains from fall to

spring for grade-3 students were statistically significant, $t(45) = 4.09, p < .001$.

This example shows grade 3 writing in the spring. A student who wrote about birds stated:

> "The beak lets it eat and his feet help him catch food. His legs so he can walk his claws to catch food and his mouth to eat food and his big yellow eyes to see with. The wings help it fly and the horns help it to know if it is another barn owl. Its' claws help it catch food and its' eyes help it to see. The heart helps the owl to live and the food helps the owl live too. The claws help the owl catch his prey."

Conceptual transfer. The conceptual transfer activity required an extension and application of concepts learned during the search activity. The problem consisted of a novel situation in which students were expected to use the conceptual knowledge and science principles previously learned. Grade-5 students began the year at level 2 in the rubric, which indicated that they were capable of very little. They showed a scientifically incorrect solution to the problem or a solution that was not relevant to the question. Fifth graders progressed to a level of 3 in the spring. The application of elements to the problem was vague and unclear although the solution was scientifically correct. The advance from 2 to 3 was not statistically significant, due to relatively large variances within the groups.

Grade-3 students progressed significantly in conceptual transfer from the fall to the spring, $t(45) = 2.36, p < .023$. In the fall, the typical third grader had a median of 2, which indicated that s/he gave an incorrect, illogical, or nonscientific solution. S/he progressed to a level of 3. S/he was able to present the problem and some of the requirements for the solution, but s/he could not apply knowledge completely.

An example of grade-3 conceptual transfer in the spring is shown for a student who took the *owl* version of the assessment. This version asked what an owl would be like if it was blind but was surviving successfully in the wild. A student who answered at a level of 3 stated that:

> "These owls will have good hearing be very good at catching. Their beaks will help them eat. Their wings help them fly. Their nose will help them dig. They will have to feel what they pick up and will have to be good at catching mice."

Informational text comprehension. For both grades and all assessment topics, students were given an illustrated informational text that was relevant to the topic. A question was presented that required the student to synthesize information from the text and illustration, and to write an answer. Grade-5 students began the fall at the level of 1, which indicated that they relied heavily on prior knowledge or on information from only one portion of the text. Separate sections were not integrated, and some incorrect information may have been included. Fifth graders moved to a level of 2 in which their answers integrated information from two or more parts of the text and references the text appropriately. However, significant portions of text were omitted and the information was not elaborated. Gain for fifth graders was statistically significant, $t(42) = 4.99, p < .001$.

Third graders began the fall at the level of 1, which indicated that they provided answers that came from only one part of the text with no integration and may have included incorrect or irrelevant information. They moved to a level of 2, indicating that they were capable of integrating information from two or more parts of the text, but the integrations were not elaborate or detailed. Third graders' change from fall to spring was statistically significant, $t(47) = 4.16, p < .001$.

Narrative interpretation. In this portion of the performance assessment, students were given one integrated episode of approximately 1,000 words from a narrative book. Students were first asked to read the text and then answer three different questions. The first question requested a low-level reproduction of one portion of the narrative. The second question requested students to make inferences and generalizations about the character in the story. The third question asked children to reflect on their own experience in relation to one of the characters. Answers to all of the questions were coded in terms of whether they were consistent with the text and whether they were elaborated. Grade-5 students began the year with a median of 3. They had two answers to two of the questions that were consistent with the text, but none of the answers were elaborated. Fifth graders progressed to a level of 4, indicating that they had three answers consistent with the texts but relatively little elaboration. This increase from fall to spring was statistically significant, $t(44) = 3.42, p < .001$. Grade-3 students in the fall performed at a level of 3, indicating that they gave text-consistent answers to two of the questions. Third graders progressed to the level of 4 in the spring showing three text-consistent answers but little elaboration. Third grade progress was statistically significant, $t(47) = 6.25, p < .001$.

Learning to learn. Within the performance assessment, we had an opportunity to observe learning. The first stage of the assessment is a measure of prior knowledge about the topic being addressed in the assessment. The writing stage of the assessment requests students to compose a statement of their conceptual understanding on the same topic. During the search activity, which falls between the prior knowledge and the writing activity, students are given a chance to learn about the topic. The difference between the writing level and the prior knowledge level during the test is an indicator of learning within the assessment activity.

If learning-during-the-assessment in the spring is higher than comparable performance in the fall, it can be concluded that students have "learned how to learn." Their capability to form concepts from text has been increased. The assessment permits documentation of the amount of this learning-capacity increase.

For grade-5 students, the fall prior-knowledge mean was 1.84 and the fall writing mean was 2.52, which was a statistically significant difference, $t(43) = 4.26, p < .001$. In the spring, the prior-knowledge score of the students was 1.97 and the writing score was 3.09. This was a statistically significant difference, $t(43) = 6.0, p < .001$. These findings indicate that grade-5 students were learning during the assessment at both the fall and spring administrations.

For grade-3 students in the fall, the mean score on the prior knowledge task was 2.33

and the mean score on the writing task was 2.50. This difference was not statistically significant. In the spring, the mean score of third graders on the prior knowledge task was 2.61 and the mean score on the writing task was 3.18, which was statistically significant, $t(43) = 3.27$, $p < .002$. This indicates that while learning did not occur during the assessment in the fall, learning did occur during the assessment in the spring. In other words, grade-3 students' capacity for new learning through literacy was enhanced during the course of the year.

Question 2: Were these Increases in Literacy Engagement Educationally Significant?

The previous results may not reveal whether the gains in literacy engagement were educationally and practically significant. We did not compare the gains in literacy engagement to standardized reading test scores or grades, because standardized scores may not reflect higher-order learning, and grades are too normative within one classroom. However, to describe the magnitude of the impact of the CORI on students' literacy engagement, we compared the third graders in the spring, after receiving a year of CORI, to the fifth graders in the fall before the year began, and before they had received any CORI. Of course, the fifth graders in the fall were more than 1 year older, with 1 year more of schooling than the third graders in the spring.

To make the comparison, we selected two typical cases (Erickson, 1986). Typicality was defined in the following manner. Averages were obtained for the search, drawing, writing, and conceptual transfer tasks for both the grade 3 spring performance on the *owl* assessment and the grade-5 fall performance on the *trees* assessment. All scores were then inspected for each of these stages to identify "typical" performances at each stage (i.e., those performances that were equal to the average group score). Two third-graders and 3 fifth-graders fit these descriptions of typical performance across each of the four stages inspected. Scores for stages 6 (expository text comprehension) and 7 (narrative text comprehension) were then used as tie breakers. The two students selected were thus typical of their grade levels. Comparisons were then made regarding the quality of the performances at each stage. Quality was defined in a manner consistent with the scoring rubrics.

Prior knowledge. On the prior knowledge task, third graders responded to a question about owls: "Tell how the parts of an owl help it to live." The third grader wrote:

> The owl's ear help him to know wind a hunter is here. The owl's feet help him to grab its food in the air.

The fifth grader responded to the question: "What are the parts of a tree? How do these parts help it to live?"

> I selected the branch because you could swing on it and stuff. how does it live well some people put water at the bottom of the tree that pushes the water up in the branch and keep it alive.

These answers are nearly indistinguishable although several points of distinction favor the grade-3 student. This third grader included two systems of adaptation (i.e.,

protection and body parts related to hunting), while the grade-5 answer included only one system (i.e., water helping the tree branch to survive). Quality of writing also favored the third grader who used complete sentences and punctuation.

Search. Performances in the search stage were roughly equivalent. The grade-5 student selected four packets, including two relevant to the topic of tree parts and adaptation. Notes taken on these packets were vague (e.g., I learned that plant can be different and same because some don't grow flowers or leaves and some do). The grade-3 student selected three packets, including two relevant ones. The third grader was slightly more efficient, selecting 67% relevant packets, compared to 50% relevant packets for the fifth grader. The third grader's notes were more specific, containing structures and functions (e.g., Their feet are usually bare and scaly—unfeathered feet are much easier to clean). Both sets of notes were nonspecific and incomplete in relation to the abundance of information that was available in the respective packets of text.

Conceptual learning (drawing and writing). Drawings showed a clear advantage for the grade-3 spring performance over the grade-5 fall performance. Each student included two drawings, an overview with labels for major structures, and a "close-up." The third grader's "close-up" showed an extension of her overview, depicting the method of hunting and a nest with eggs. Close-up drawings of the fifth grader, however, were irrelevant to the question asked, simply listing the labeled structures and adding flowers to the scene.

When grade-5 students were asked to write what they had learned about the parts of the tree and how the parts help it to live, our case wrote:

> What I know about trees. They have different parts like the Roots The trunk and the branch. Some trees live millions of years ago and that they lived in different time. Some trees you have to water under roots or they will die.

In this answer, the only portion of the tree connected to a survival function was the roots, which were part of this student's background knowledge. The only other reference to tree parts involved a listing of the trunk and branch. Again, information irrelevant to the question was included in the statement that some trees lived millions of years ago. This answer included only one adaptive system with a number of plant structures.

The third grader responded to the question of "Tell how the parts of an owl help it to live" by stating:

> The owl uses its feet to get a mouse or a rat and eat it a live. Some owls hunt at night. Owls take birds nest and live in it.

Although this grade-3 student included a portion of background (e.g., hunting), she added that the kind of prey can be a mouse or a rat. She also added a new adaptation, nesting. The third grader included two systems of adaptation, hunting and nesting, while the fifth-grade answer included only one relevant system, the trees' need for water at the roots.

Conceptual transfer. The grade-5 student was asked to solve the problem of how a tree could live in 1,000 feet of snow ten months a year. This student wrote:

> I don't think the trees will live. because if we had that much snow the tree will keep falling off branch by branch because too much pressure is going on to it. because when the snow balls drop it is just too much pressure.

No solution was forwarded; and adaptations for survival were not presented.

The grade-3 student was asked how a species of blind owls could survive. She wrote:

> The owl would have to be a good smeller, hunter, Mother or Father, fast thinker and able to use his feet, head, wings. The owl would need to be a good hinter. The would need to teach his or her child to use its wings, feet and head.

This was a viable solution to the survival problem. Two new adaptations were introduced, smelling and teaching. Not only would an owl have to be a good hunter, using its sense of smell as well as its feet and wings, it would also have to be a good parent to teach the child how to survive without sight. The principle that structures and their functions are modified by the conditions of the environment was evident.

In sum, comparison of a grade-3 spring performance and grade-5 fall performance suggests that the third graders at the end of the year were equivalent to, or higher than, the fifth graders at the beginning of the year. Third graders showed a more integrated knowledge representation using a greater variety of adaptive systems and they used this knowledge to solve problems more effectively than fifth graders. While both groups brought equivalent prior knowledge to this text-based learning situation, the grade-3 student built on this knowledge and extended it to solve a novel problem, while the grade-5 student did not.

This comparison suggests that, by the end of the school year, the grade-3 student had reached a beginning grade-5 level of performance. It should be noted that the fifth graders read a set of materials which were more complex and higher in quantity than the materials read by the third graders. This could disadvantage the fifth graders because they had "harder" texts. On the other hand, both groups had materials suitable to their grade levels; and the fifth graders had a larger number of texts that contained more information, affording more opportunity to select and write about relevant information. Therefore, it is unlikely that the third graders had an advantage. The coding rubrics in this study were constructed to be appropriate for the two grade levels separately; therefore, a simple rubric-level comparison was not possible. However, similarities between these assessments were that each involved texts that were at the students' grade level, as well as slightly easier text, for reading materials. In addition, questions were equated by focusing on the same characteristics of the studied topic (i.e., "Tell how the different parts of an owl help it to live," "What are the parts of a tree? How do these parts help the tree to live?"). These similarities increase comparability of the tasks.

Question 3: How Highly Correlated were Intrinsic Motivation and Engagement in the Spring?

The performance assessment was designed to be sensitive to intrinsic motivations as well

Table 2. Changes in Literacy Engagement and Intrinsic Motivation During One Year of Concept-Oriented Reading Instruction

		Literacy Engagement	
		Increase	Decrease
Intrinsic Motivation			
	Increase	13	0
	Decrease	3	3

Note. This table contains an *N* of 19 because the spring Literacy Engagement score was missing for one student.

as strategies for literacy. Our view of engagement is that motivations are integral to the learning and use of strategies. If this is true, motivations should be correlated with the levels of engagement observed in the performance assessment. To examine this question, we compared the results of the motivation interview with the engagement assessment. From the motivation interview, we constructed a composite measure of intrinsic motivation. The composite was formed by summing the scores of involvement, curiosity, social, emotional tuning, and self-efficacy for each of 20 students. We also constructed a composite measure of engagement by summing the scores on search, drawing, writing, and conceptual transfer for each student.

We rank ordered all students on the motivation composite and the engagement composite. For grade 5, the correlation of the rank orders was .81, which was statistically significant at $p < .01$. For grade 3, the rank order correlation was .70, which was statistically significant at $p < .05$. These correlations show that students who were intrinsically motivated by involvement, curiosity, social interchange, emotional tuning, and self-efficacy were highly engaged in literacy as evidenced by their high performance in text-based search, drawing, writing, and conceptual transfer in the assessment. Students with lower intrinsic motivations were lower in literacy engagement. This confirmed our expectation that intrinsic motivations and strategy learning were highly associated; and that the assessments were sensitive to individual differences in motivations for literacy.

Question 4: How did Changes in Intrinsic Motivation Relate to Changes in Literacy Engagement?

To address this question, we used the composite of literacy engagement consisting of the combination of search, drawing, writing, and conceptual transfer. We classified each student as either increasing, not changing, or decreasing from fall to spring in this composite. We also used the intrinsic motivation composite, which was the sum of involvement, curiosity, social, emotional tuning, and self-efficacy for each student. Each student was classified as increasing, not changing, or decreasing in intrinsic motivation. We related the changes in literacy engagement to the changes in intrinsic motivation for both third and fifth graders combined as shown in Table 2. Students were placed in the quadrant of increase/

increase if both engagement and motivation increased or if one increased and the other did not change. Students were placed in decrease/decrease quadrant if both decreased or if one decreased and the other was unchanged. Students were placed in the increase/decrease quadrant only if the motivation increased and the engagement decreased; and they were placed in the decrease/increase quadrant if the motivation decreased and the engagement increased.

A pronounced relationship can be observed between change in intrinsic motivation and change in literacy engagement. Thirteen students of the 19 increased in both motivation and engagement. At the same time none of the students increased in intrinsic motivation and decreased in literacy engagement. In other words, 100% of the students who increased in intrinsic motivation from fall to spring, increased in literacy engagement as well. Students who decreased in intrinsic motivation were equally likely to increase and decrease in literacy engagement. Fifty percent of those who decreased in motivation decreased in literacy engagement. These frequencies showed a statistically significant association according to the chi-square statistic, $X^2(1, N = 20) = 4.57, p < .05$. This association supports the theoretical expectation that increasing the strength and breadth of intrinsic motivations will be associated with the enhancement of strategy-based literacy engagements.

To exemplify these changes in motivation and literacy engagement, we report some of the interview results with one grade-5 student. Joy, a 10-year-old Asian-American student exhibited the pattern of noticeable gains in intrinsic motivation during the year. According to her school's reading specialist, Joy had completed the fourth grade basal text and had consumed the first quarter of the grade-5 reader prior to entering grade 5. Although Joy showed an understanding of the material covered in class through her finished products, she was not quick to volunteer her thoughts when the teacher called for participation from the students.

Recalling the characters in the *Sweet Valley* books, Joy reflected her involvement by saying:

> Well um, the girls are about sixth graders, so they're about my age so, they well, it's about their every day life, how they get in trouble and stuff. Well, I, sometimes it's like a mystery, who takes something, so I always um, want to finish it so I could find out who took it or something. Like um, there was this really um, Jessica's friend um, Lila, she's really rich and um, once um, lots of um, their stuff was missing so they—it turned out in Jessica's locker—so they think she took it, but she was framed.

From fall to spring, Joy exhibited growth in the strength of her self-efficacy for reading (from "medium" to "high") by volunteering that reading was an activity in which she was competent to participate, and that she knew how to pursue her classroom-based interests by retrieving related books in their classroom library. For example, she explained that:

> We have three book shelves and one that's really big it has um, the topics that we um, pasted up there so we know

Table 3. Changes in Volume of Reading and Intrinsic Motivation

		Volume of Reading	
		Increase	Decrease
Intrinsic Motivation			
	Increase	11	2
	Decrease	2	5

> where to look for the books about the moon. There was these—table of contents and I looked for a specific topic and then, then I skimmed through the book and I got, I just read the whole thing . . .

Joy's intrinsic reasons for reading of involvement, curiosity, and self-efficacy were complemented in the fall by the more extrinsic motivation of recognition. In the spring, however, Joy did not mention any reading for recognition. Instead, she reported a new, social motivation for reading.

Her 11-year-old female cousin became a companion and a discussant for their shared interest in series books like the new, highly sought-after *Sweet Valley University* books. This new interaction was formed not only out of family ties, but of a desire to share opinions of a text.

> . . . When my cousin gave it to me, she said it was really good, cause she read one and she bought it in the bookstore . . . If I read a new book for her I always tell her what happens so, she always has to read it first. And she takes a long time to read a book. So I have to wait for a long time, I have to beg her to read her books.

Question 5: How did Changes in Intrinsic Motivation, Amount and Breadth of Reading, and Volitional Strategies Relate to Each Other?

Intrinsic motivation with amount and breadth of reading. Enabling students to read widely and frequently is one of the aims of CORI. Our theoretical expectation is that intrinsic motivation should be related to frequency and breadth of reading. Furthermore, changes in intrinsic motivation should be related to changes in volume of reading. To examine this expectation, we used portions of the interview in which students were asked how frequently they read: fiction, sports, nature/animals, romance, biography, directions, science, stories, and history. A score of 0–3 was given to each student on each topic. The sum reflects both the breadth and frequency of reading interests and preferences. For grades 3 and 5 combined, we classified each student as increasing, not changing, or decreasing in volume (which includes both frequency and breadth) of reading. These classifications were related to students' changes in intrinsic motivations as reported in the previous paragraph.

The association of changes in intrinsic motivation from with the changes in volume of reading was substantial. As Table 3 indicates,

11 students increased in both intrinsic motivation and volume of reading. Eighty-five percent of the students who increased in intrinsic motivation also increased in frequency and breadth of reading. Of the 7 students who decreased in intrinsic motivation, 5 of them (70%) decreased in volume of reading. This association was found to be statistically significant according to a chi-square test, $X^2(1, N = 20) = 4.06, p < .05$.

One 11-year-old African-American student in grade 5, Mariah, increased in her intrinsic reasons for reading, and also increased in the variety of books that she chose to read. Mariah was described by her CORI teacher as being painfully shy and not a visibly enthusiastic reader. The reading specialist indicated she was reading on grade level at the time of the interviews.

Mariah read for the purpose of involvement in the spring, reporting the elements of mystery novels which captured her attention:

> In interesting mysteries, they like, they leave follow-up clues to the mysteries so it takes more to figure it out. And in boring ones, it's just easier to figure out what it is, and you don't need any clue.

Mariah read a more diverse selection of books in the spring than in the fall. She maintained a strong preference for fiction novels, including series of mysteries by a particular author. A new interest in biographies of favorite stars emerged in reading that she did outside of school. Mariah showed increased curiosity about nature, referring to the most recent book about animals that she had read:

> It was about this lady, who was, um, in college and she wanted to see if she could get instead a chimpanzee to communicate with her. They communicated with sign language. She'd teach them that sometimes. They lived in a trailer together. And then, when she got a new—she got another gorilla, so that the other one wouldn't be lonely . . .

Amount and breadth of reading with volitional strategies. Breadth and frequency of reading were expected to be related to volitional strategies as well as intrinsic motivations. Volitional strategies are deliberate procedures used to fulfill motivational goals, such as managing resources of time and materials (Corno & Kanfer, 1993). Managing time was evidenced by students who had a time of the day they preserved for reading. From the interviews, we combined the volitional strategies related to time and the volitional strategies related to finding, keeping, and organizing books. We classified students as increasing, unchanging, or decreasing in volitional strategies and related this classification to their volumes of reading.

There was a substantial association of the students changes in volume of reading with the changes in their volitional strategies which was statistically significant, $X^2(1, N = 20) = 11.43, p < .01$). As indicated in Table 4, 14 students increased in both volitional strategies and reading volume. One hundred percent of those who increased in frequency and breadth of reading also increased in volitional strategies. At the same time, 5 students decreased in both volume of reading and volitional strategies. These few students were choosing to read

Table 4. Changes in Volume of Reading and Volitional Strategies

		Volume of Reading	
		Increase	Decrease
Volitional Strategies			
	Increase	14	1
	Decrease	0	5

less widely and frequently; and they were also using fewer volitional strategies. In sum, volitional strategies for reading were correlated with volume of reading activity.

These trends for the whole group were illustrated by Mariah. Her increased breadth of reading was accompanied by her expanded volitional strategies. Volitional strategies of interest to the investigators were for making time to read, and finding interesting, appropriate materials to invest in. In the fall, Mariah cited the public library as her main source for texts to read. In the spring, she reported frequent visits to the public library where she could use the computer to search for book titles. She also talked of receiving books as gifts. In the spring, Mariah found a new source for fiction books to read for her own enjoyment:

> Well, we have TAP day—it's trade-a-paperback day. And we all bring in paperback books, and I got one new. And I've had that one in my desk, so when I leave it in the desk, I know I have at least two books in my desk.

Mariah commented on the ways that she coordinates reading around other activities in her daily life. At home, she stated that she tried to read a little bit before she would go outside to play with friends, and then continue her reading afterwards. At school, Mariah explained what she did with her free time:

> Sometimes our teacher gives us time in the morning. You can either read a book, or you can make up work that you have to do. I usually read.

We also related changes in intrinsic motivation to changes in extrinsic motivation. The analysis of intrinsic motivations was based on the sum of involvement, curiosity, social, emotional tuning, and self-efficacy; extrinsic motivations were the sum of compliance, utility, and investment. There was no significant association between shifts in intrinsic and extrinsic motivations.

Discussion

What were the Main Findings of this Study?

Growth of literacy engagement. Our basic conclusion from this investigation is that literacy engagement of third and fifth graders

increased during their yearlong experience in CORI. Not only did teachers observe these increases in literacy engagement through students' portfolios and classroom participation, but our performance assessment also documented statistically significant increases. Specifically, third graders appeared to increase to the level of beginning fifth graders.

Students' enhanced literacy engagement was evident in their success on tasks that reflect both cognitive strategies and intrinsic motivations. We documented the growth of literacy engagement related to: (1) searching for information in multiple texts; (2) representing ideas through drawing and writing; and (3) transferring conceptual knowledge to new situations. Success in these authentic literacy activities permits us to infer the successful use of strategies. Although many investigators use self-report as a measure of strategies (Collins-Block, 1992; Pintrich & DeGroot, 1990), we believe that successful performance on authentic literacy activities in the classroom is a more secure ground for inferring the learning, use, and growth of literacy strategies for literacy.

Our notion of literacy engagement combines the construct of self-regulation with intrinsic motivation. For both the third and fifth graders in this study, intrinsic motivation was highly correlated with literacy engagement during the performance assessments. This finding is consistent with the results observed by Pintrich and DeGroot (1990) that self-reported intrinsic-interest and strategy-use were highly associated. Successful learners were distinguished from the less successful learners in their ability to combine complex higher-order strategies with intrinsic motivations of involvement, curiosity, and self-efficacy. With this integration, they learned ideas from multiple texts and used these ideas in solving novel problems.

These results confirm that literacy engagement increased during the year for these groups of students. Although the amount of increase was not compared to the changes in a control group because this was not a comparative, experimental study, the magnitude of the increase was noteworthy. Across time during elementary school, intrinsic motivation usually declines (Harter, 1981; Wigfield, 1994), leading us to suppose that literacy engagement might decline during the year. However, literacy engagement combines cognitive strategies with intrinsic motivation, and strategies usually increase during a year of schooling. It seems significant, therefore, that the increase in literacy engagement for grade-3 students appeared to exceed the increase that would be associated with change in chronological age. Grade-3 students in the spring, after participating in CORI for 6 months, surpassed the level of literacy engagement observed in grade-5 students in the fall, before they received any CORI. After documenting these increases in literacy engagement for the groups, we next addressed our primary purpose of describing the nature of the growth.

Intrinsic motivation and literacy engagement increased concurrently. The second finding is that increases in literacy engagement during the year were tied to increases in intrinsic motivation. Despite the general trend for intrinsic motivations to decrease during the elementary school years (Harter, 1981;

Wigfield, 1994), we observed that 68% of the students in our CORI classrooms increased in their overall levels of intrinsic motivation for literacy. Among the students who increased in intrinsic motivation, 100% increased markedly in literacy engagement. Among students who did not increase in intrinsic motivation (e.g., who stayed the same or who decreased), 50% increased in literacy engagement, and 50% decreased. These findings suggest that instruction that increases in intrinsic motivations for literacy may improve the higher-order cognitive competence and use of strategies for an extremely large proportion of learners. Of course, strategies may also increase for some of the learners who do not become more intrinsically motivated due to the power of extrinsic incentives such as in recognition and rewards, or to general cognitive maturation. Our data does not permit us to determine which comes first, motivation or engagement. We expect they are reciprocal and mutually supportive during long-term literacy learning. These findings are consistent with conclusions from correlational studies reviewed by Ames (1992) and Blumenfeld (1992) that point to high associations between student interest in subject matter and development of cognitive competencies. Our findings contribute to the knowledge base by documenting that long-term increases in motivational and cognitive aspects of literacy are interdependent.

Intrinsic motivations enhanced breadth of reading activity. The third finding of this investigation was that increases in intrinsic motivation were tied to amount and breadth of reading. Students who became more involved, curious, and social in their literacy activities read a broader range of topics and reported higher frequencies of reading activities than less motivated students. This linkage was particularly important because literacy is vital for many aspects of development. Amount and breadth of reading are related to reading achievement, general knowledge, and societal participation (Guthrie & Greaney, 1991; Stanovich & Cunningham, 1993). Therefore, it is valuable to know that students expanded their reading activities as their intrinsic motivation increased. Also contributing to amount and breadth of reading were volitional strategies (Corno & Kanfer, 1993), such as finding time to read every day, keeping a private place for personal books, and knowing how to get to the library. In sum, amount and breadth of reading increased when it was energized by intrinsic motivations, and enabled by volitional strategies.

Classroom Contexts that Enhance Literacy Engagement

Literacy engagement in grades 3 and 5 was associated with distinctive qualities of the classroom context. Although space does not permit an elaborate description, we identified several aspects of the classroom context that we regard as vitally important based on classroom observation, discussion with teachers, and analysis of videotapes. Consistent with the motivational literature, our observations of CORI suggested that engaging classroom contexts were: (1) *observational*, encouraging students to initiate learning by generating their own questions from "real-world" observation (Lepper, 1988; Newby, 1991); (2) *conceptual*, with a focus on substantive topics rather than reading skills or rewards (Maher & Fyans,

1989); (3) *self-directing*, supporting student autonomy and choice of topics, books, and peers (Skinner & Belmont, 1993); (4) *metacognitive*, with explicit teaching of reading strategies, problem solving, and composing (Collins-Block, 1992); (5) *collaborative*, emphasizing social construction of meaning and communities of learners (Almasi & Gambrell, 1994); (6) *expressive*, creating opportunities for self-expression through writing, debating, and group interaction (Oldfather & Dahl, 1994); and (7) *coherent*, containing connections between classroom activities and tasks across the day, week, and month (Gamoran & Nystrand, 1992). Our theoretical perspective is that these classroom qualities accelerate the development of literacy engagement.

Several of these dimensions of classroom context have been examined in other investigations. For example, our conceptual focus is shared by Brown (1992) in her studies of how communities of learners pursue topics in environmental science. Our reliance on writing and problem solving is consistent with Calfee's (1994) program for critical literacy in which children read and write extensively. Our emphasis on metacognitive strategies of searching for information, representing ideas graphically, planning, evaluating, and integrating is similar to the thinking guidelines of Collins-Block (1992). Although each instructional theme is important, we expect that it is the integration of all seven dimensions within one instructional unit that enhanced the development of literacy engagement of the students in this study, as well as students in other schools where these classroom contexts are constructed and maintained for substantial periods of time.

Limitations

This investigation was intended to initiate our study of how classroom contexts can be designed to enhance the development of literacy engagement. There were several limits to our purposes and accomplishments. We did not attempt to compare the patterns of change in engagement of students in CORI classrooms to change in engagement in other types of classrooms. We did not seek to identify which dimensions of the complex classroom environment were more or less influential in promoting engagement. This was not a componential analysis. We did not attempt to compare whether the patterns of change in literacy engagement varied for different demographic groups, such as age and gender. Finally, we did not attempt to describe all aspects of literacy engagement that we believe are important. For example, we have not measured word-level fluency nor social dispositions for sharing literacy. Despite the breadth of our descriptive account, there are many aspects of engagement that call for careful research. We plan to undertake many of these tasks in future research.

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APPENDIX A

Performance of Assessment of Literacy Engagement

Task: Prior Knowledge

Purpose:	Determines the amount of conceptual knowledge about the topice before the start of the assessment.
Question:	Open-ended question with one or two parts. Example for third grade: What are the body parts of an Owl; and how do these body parts help it to live?
Material:	One sheet of paper is provided to answer the question.
Response Format:	Students write their response in essay.
Conditions:	Students are given approximately 10 minutes to complete, but all students are expected to finish.

Task: Search

Purpose:	This task measures the strategies involved in searching for information from multiple texts. Cognitive strategies include: maintaining focus on the question, understanding the organization of information texts using access routes (table of contents, index, headings), sequencing to generate new information, extracting appropriate ideas from selected texts, and taking coherent notes. Motivational attributes measured in this task include: effort and persistence in selecting multiple sources, elaboration of reasons for choosing selections, topic interest as reflected in extended notes about the topic of the search.
Question:	Use these packets of information to help you answer the question of: What are the body parts of an owl; and how do these body parts help it to live? Keep a log of your work showing your packet letter, reasons for choosing the packet, and your notes on your reading.

Material:	Students are given a set of 12–14 packets of 2–4 pages each of informational texts. Half are directly relevant to the question; and half are about animals or birds other than owls. Table of contents, index, page numbers, headings, and illustrations are provided. Difficulty of the texts range from one grade below to two grades below.
Response Format:	Students are given a response log, with columns for packet letter, reasons for choosing a packet, and notes on what they learned.
Conditions:	Students are encouraged to find all of the relevant information and are given sufficient time for all students to fill in at least one packet selection with a reason and notes, or about 30–60 minutes. Students are encouraged to keep working until they have found all of the useful ideas. Students who finish early are asked to wait quietly for 5 minutes and are then permitted to read.

Task: Drawing

Purpose:	This task measures the ability to represent conceptual knowledge about birds and their survival through drawing—visual illustration. Drawing may include ideas gained in the search combined with prior knowledge. Motivational attributes of task involvement and interest are reflected by attention to detail, breadth of information, and labeling.
Question:	Students are asked to make a picture that shows what they know about the topic (e.g., what are the body parts of an owl; and how do these body parts help it to live?).
Material:	One page of paper is provided, the top half of which is blank, with brief directions.
Response Format:	Students draw with pencil and label the picture.
Conditions:	Time is provided for all students to finish, about 15 minutes. Coloring is not permitted. The search materials and logs are not available.

Task: Writing

Purpose:	Students represent their conceptual knowledge about the topic of the task (e.g., the body parts of owls and how they help survival) through writing. Ideas from the search activity and prior experience may be included. Motivational attributes include the effort and persistence in writing elaborate, coherent paragraphs, the expression of fascination about some aspect of the topic, and self-efficacy in the acquisition of conceptual understanding.
Question:	Students are asked to write what they know about the topic (e.g., the body parts of owls and how these body parts help the owl to survive). Students are encouraged to write everything they know.
Material:	Students are given one-half page of lined paper, which is the bottom half of the paper on which they drew their understanding in the previous task.
Response Format:	Students write or print in the space provided.
Conditions:	Ample time is provided for all students to complete the task, about 20 minutes. The packets and their search logs are not available.

Task: Conceptual Transfer

Purpose:	This task measures whether the concepts and principles that were learned during search were learned in a form that permits problem solving. Motivational attributes include the enjoyment of challenge, and the satisfaction of encountering novelty.
Question:	A question is asked that invites multiple approaches and answers, using the conceptual knowledge that was represented during the drawing and writing tasks. For example, the third-grade owls question was: "Suppose you saw a type of owl that was blind but it was living a good life. What would its body parts be like; and how would these parts help it to survive?"

Material: Students are given a line piece of paper with the question at the top. Previous materials are not available.

Response Format: Students write and/or draw their answer to the question.

Conditions: Time is provided for all students to finish, about 20 minutes. They are encouraged to compose any answer they think might be appropriate.

Task: Informational Text Comprehension

Purpose: This task measures the extent to which students can comprehend the main ideas in an illustrated text of about 200 words in 8 paragraphs. The optimal answer will integrate information from both the illustration and several parts of the text.

Question: The question is a two-part item of the same complexity as the question in the prior knowledge task.

Material: The student is presented the text and illustration with the question following on the next page.

Response Format: Students write answers to the question on one page of lined paper provided.

Conditions: Time is given for all students who are permitted to finish, about 15 minutes. Previous materials are not available. The text is on the same general topic (e.g., birds), but specific information from previous tasks will not be useful.

Task: Narrative Interpretation

Purpose: This task measures basic text comprehension, literary interpretive processes, and response to narrative.

Question: Three questions are presented to be answered in order. The first question requests a simple recall (i.e., reproduction of a portion of the text). The second question requests the student to describe the specific motive of one

	specified character, using text-based information and inference. The third question requests the student to write a personal response about whether a character's action was right or wrong and to describe their own belief about the situation.
Material:	A brief narrative (i.e., a folktale) or episode from a story is provided, with an illustration.
Response Format:	Students write answers to the three questions on lined paper provided.
Conditions:	Time is provided for all students to answer at least some of the questions, about 20 minutes.

APPENDIX B

Rubric for Coding Engagement in Aerformance Assessment

Prior Knowledge

1. *No Conception*—Student writes nothing at all or the answer does not contain information relevant to the question.

2. *Preconception*—Student may list objects or parts and their functions may be vaguely described; the answer is scientifically incorrect but demonstrates an understanding that there are relationships among objects or events relevant to the concept.

3. *Partial Conception*—Student answer is scientifically correct and shows a limited understanding of some of the relationships among a few of the relevant objects or events but the statements are vague.

4. *Incomplete Conception*—Student answer is scientifically correct, shows an understanding of relationships among many but not all of the relevant objects or events, and the relationships are clear but incomplete.

5. *Full Conception*—Student answer is scientifically correct, shows an understanding of relationships among all important objects or events, and the relationships are depicted in clear and complete form.

Search

1. *No search*—No evidence of search or selection of materials.

2. *Minimum*—Students chose at least two relevant packets as well as some irrelevant ones, took good notes from one packet and gave one clear reason for choosing one of the packets.

3. *Moderate*—Students chose at least three relevant packets and very few irrelevant ones, with appropriate reasons for their selections and good notes on two packets.

4. *Adequate*—Students chose at least four relevant packets with few or no irrelevant ones, giving clear reasons for all their selections and clear notes.

5. *Proficient*—Students selected all of the relevant packets with no irrelevant ones, and all of their notes were related to the theme. Their reasons for choosing packets were diverse, and their notes showed that they learned during the course of the reading and note-taking activity.

Drawing

Same Coding Categories as Prior Knowledge

Writing

Same Coding Categories as Prior Knowledge

Conceptual Transfer

1. *No solution*—No answer given.

2. *Presolution*—Solution is scientifically incorrect or the solution is not relevant to the problem; some conceptual knowledge of the topic is evident.

3. *Partial Solution*—Some objects are present but the concepts are not applied to solving the problem; solution is scientifically correct, but the answer is vague or incomplete.

4. *Incomplete Solution*—All objects and/or events are present and the concepts are related to solving the problem, but the answer is incomplete or vague.

5. *Full Solution*—All objects and events are present; the concepts are fully applied and the answer is complete.

Informational Text Comprehension

1. *No Answer*—No answer; answer relies on prior knowledge not related to the text; or information is incorrect, nonspecific, or verbatim copy.

2. *Accurate*—Response accurately integrates information from two or more parts of the text.

3. *Elaborated*—Response connects an integrated statement with additional information in the text that elaborates, explains, or contextualizes the statement.

Narrative Text Comprehension

Quality of narrative comprehension was judged with a rubric based on responses to all of the questions. Student responses to the reproductive, explanatory, and open-extension questions were rated as appropriate (accurate and text-based) or elaborated (embellished with details and characterizations). The scoring scheme was: 1 = no appropriate responses; 2 = 1 appropriate response; 3 = 2 appropriate responses; 4 = 3 appropriate responses; 5 = 3 appropriate responses and at least 2 elaborated responses.

APPENDIX C

Rubric for Motivations, Strategies, and Styles of Reading

Motivations

1. *Involvement*—Reading to get lost in a story, for the enjoyment of the plot, character development, the language/prose, or format of the story. Showing a "genuine interest" or a "passion" for a type of reading. Experiencing a positive feeling from being engrossed in what they are reading, talking about the good qualities of the book, why they like reading it (e.g., fast-moving, sweeps them into story, interesting characters, etc.).

2. *Curiosity*—Reading to explore a new topic or to build upon previous knowledge of a topic or personality/character that is interesting to them. Reading to answer a question, or to compare competing answers or theories.

3. *Social*—Engaging in interactions with others that promote literacy, such as sharing reading interests with another person, sharing or discussing reading materials, or participating in the reading process with another person by reading to or with them. May also include using reading as a means for spending time with someone.

4. *Investment*—Reading to build experience that will culminate in achieving a long-term goal, such as attending college or becoming a member in a certain type of profession (e.g., "I read a lot of books because I want to be smart and become a science teacher . . .").

5. *Challenge*—Being willing to undertake or persist in a reading activity despite the perceived difficulty level of the text. Choosing to read a particular text because it appears to be more difficult or stimulating than other choices.

6. *Emotional Tuning*—Reading to change an existing mood or feeling, such as alleviating sadness or loneliness, beating boredom (very common), or extinguishing a fear. Reading to unwind mentally, release tension, or relax after hard work. Reading jokes, riddles, and brainteasers or funny comics for the purpose of being amused.

7. *Compliance*—Reading to meet a goal or expectation set by someone else. Completing assignments set by the teacher. Reading to conform to the behavior of classmates/peers, reading to finish a task without extension or exploration beyond the original limits of the task.

8. *Recognition*—Reading to be known as a competent or avid reader. Reading to increase status among teachers, peers, and others, reading to be a successful participant in a drive or contest geared toward consuming books.

9. *Grades*—Reading to achieve a certain score on an exam, to receive a desired letter grade. Reading to attain a prestigious level of academic achievement or honor roll status.

10. *Rewards*—Reading to gain desirable privileges in the classroom or at home. Rewards for reading can be tangible like books, gold stars, stickers, and treats or intangible like praise, "free choice" time, or attention from a teacher/family member.

11. *Competition*—Reading to be a "better" reader than other people. Reading to amass more information or resources than others.

12. *Utilitarian*—Reading to learn a procedure or rules for a game, hobby, or craft, including manuals and directions. The "how-to" is the important aspect of this reading.

13. *Work Avoidance*—Reading to avoid prevent (more) work. Using reading as a buffer to avoid punishment or unpleasant consequences. Combining reading assignments/activities to minimize reading commitments.

14. *Reading Efficacy*—Feeling that their reading behaviors are completely within their own control (e.g., I choose what I read, when, where, and how). Perceiving that there are choices about when, where, and how to read. Believing that they can read independently, confident in their own abilities.

Volitional Strategies

1. *Spending/Managing Time*—Investing in reading as an activity in lieu of other choices at home, choosing to read during free time at school (other than DEAR time) when there are other possibilities (like drawing or computer time). Seemingly scheduling a time for reading that fits around the other activities of daily life at home, and at school. Having a particular place where literacy activities occur, such as a room or specific area of a home or classroom. Having a "system" to go about their reading, with a time, place, and situational factors (listens to music while reading, etc.). Some children give responses with several situational components. Give credit to more defined answers with the strength ratings.

2. *Finding/Keeping Materials*—Having knowledge of where to obtain reading materials, borrowing from a library, trading with peers, buying from a store or ordering books from a club, subscribing to magazines, and so forth. Also, includes knowledge of how to retain materials such as renewing a book that they are not finished with, or keeping a collection of their own reading materials.

3. *Coping with Distractions*—Maintaining a comfort level for engaging in reading, asking for quiet, tuning others out, changing the place to read if necessary, getting the help of an adult to enforce quiet, and so forth.

4. *Interpreting Text*—Trying to decipher the form and content of the reading by "clue reading" in context, using imagery or illustrations, sounding out difficult words, re-reading texts, or asking another person for help. (Note: This differs from the social motivation for reading at the point of using a person that they read with as more of a human dictionary/resource or tutor. The social motivation would be coded in situations where the literacy activity is being shared aside from the child asking for help.)

5. *Browsing for Books*—Deciding what to read and what not read by perusing the shelves, scanning book jackets for reviews, comparing titles, replacing a book that is too hard or unavailable with another selection. Showing a keen knowledge of the organizational system or labeling of a classroom bookshelf or library/bookstore layout.

6. *Communicating to Others*—Having successful methods for telling other people about their experiences with literacy, discussing plot turns, characters, and so forth. Sharing these experiences may be through words or writing.

7. *Finishing Text*—Indicating that they have an expectation to complete the materials they are reading, or that they usually finish what they decide to read. Code as H when this is the focus of the inquiry. It is usually coded in response to a specific question about finishing a text.

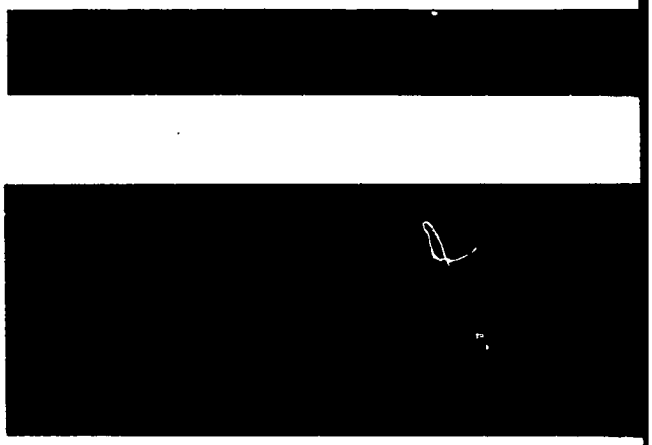
8. *Succumbing to Obstacles*—Describing something that prevents literacy from happening (e.g., my parents can't take me to the library, homework takes up all my free time for reading). Not overcoming this obstacle. (Note: The strength rating for the obstacle is similar to the other categories: a 3 represents a formidable obstacle, where a 2 and 1 are weaker.)

Styles

1. *Appropriateness*—Showing that they differentiate between materials that they have previously read, and new reading materials. Indicating that they perceive information that is not up-to-date in some texts. Showing that they differentiate between books that have thorough, pertinent information for their purpose, and others that do not provide useful knowledge.

2. *Levels*—Understanding the level of reading materials that matches their reading abilities, recognizing that some books are simple and others are difficult in terms of the language used (e.g., the presence or absence of "hard words"). Revealing that they differentiate between books of various lengths, numbers of pages, or chapters. Indicating that they perceive some texts to be for children and some to be for adult consumption.

3. *Preferences*—Indicating that they have a clear preference or dislike for a genre of books, such as fiction, nonfiction, romance, poetry, sports, and so forth. Identifying certain reading materials as "boring," or as ones they never read. Indicating that they perceive a difference between books that contain pictures and those that do not. Showing that they have a clear preference or dislike for a particular type of book within a genre, such as romantic poetry, sport biographies, and so forth.



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