THE EFFECTS OF CHOICE AND INTEREST AS MOTIVATORS OF TEXT SEARCH PERFORMANCE

by

PATRICIA LEE REYNOLDS

B.Ed., B.Sp.Ed., Memorial University of Newfoundland, 1989, 1992

B.Sc., Dalhousie University, 1997

Thesis
submitted in partial fulfillment of the requirements for
the Degree of Master of Science (Psychology)

Acadia University
Fall Convocation 1999

Table of Contents

List of Tables

List of Figures

Abstract

This study investigated the effects of the motivational variables of choice and situational interest on children's search of informational text. Eighty-four grade three children were randomly assigned to one of four conditions: 1) choice – game-like format, 2) choice – standard format, 3) no-choice – game-like format, and 4) no-choice – standard format. In addition, the study measured and attempted to tease apart potential contributions of prior knowledge and topic interest by including them as covariates. Choice of topic facilitated children's text search performance and process measures while format aided process measures only. Prior knowledge emerged as a significant contributor to accuracy and time to locate answers to search questions. Topic interest had no significant effects on text search strategies, but was related to post-search interest ratings. Results suggest that text search researchers should integrate affective and motivational factors along with cognitive aspects in studies of information-seeking skills.

Acknowledgments

I would like to thank Dr. Sonya Symons for her guidance, encouragement, and particularly her patience in keeping me on track these past two years. Thanks to my classmates who were always there to listen. I would also like to thank my family, Christopher and Sammy for their independence and the weekend *do not disturb* sign, and Ruaridh who helped me to smile at the end of each day.

I am grateful to the teachers and grade three children from the Chignecto School Board in Truro for their participation in this study. These students really know about motivation. Special thanks are given to Heather O'Brien for her creativity in designing the appealing theme posters.

The Effects of Choice and Interest as Motivators of Text Search Performance

Reading to Locate Information

Being literate in today's society demands the ability to cope with the ever-increasing availability of information. Estimates indicate that information is doubling every five years (Wurman, 1989), thus the necessity of developing effective information-seeking strategies is rising (Dreher, 1993). Tasks that involve locating information are prevalent both in the workplace (Mikulecky, 1982) and in school (Armbruster & Armstrong, 1993; Kobasigawa, Lacasse, & MacDonald, 1988). In fact, adults in the workplace spend more time reading to locate information than reading for any other purpose (Kirsch & Guthrie, 1984; Mikulecky, 1982). In school, children are expected, for example, to search for answers to text and teacher-based questions and to seek information to complete research papers. In addition, reading to locate information has been included in literacy surveys (e.g. Statistics Canada, 1995) as an important skill within the broader areas of prose and document literacy.

The last decade has seen a growing body of research investigating how people search for or locate information in a variety of materials ranging from documents to textbooks. Locating information has been defined as "the performance of learners who have the goal of detecting a specific subset of information within a relatively wide array of information that is displayed for visual inspection" (Guthrie & Mosenthal, 1987, p. 283). Thus, in search tasks, the purpose is not to recall or understand all the material, but to locate only the information that is needed (Dreher, 1992). This is in contrast to reading

comprehension tasks that typically require the reading and understanding of the entire contents of a document or text. Further, locating information through search tasks has been described as a form of strategic reading that involves cognitive processes that are distinct from traditional reading comprehension tasks (Guthrie & Kirsch, 1987; Guthrie & Mosenthal, 1987). Empirical research has provided confirmation of this distinction and the need to study reading to locate information in its own right is warranted.

Guthrie and Mosenthal (1987) proposed a cognitive processing model to account for performance on locating information tasks. Five components comprise the model: 1) goal formation - a specific objective is formulated, 2) category selection - categories (e.g. index, table of contents) or sections of text are selected for inspection, 3) extraction of information – the reader detects and extracts relevant information from each category, 4) integration – extracted information is stored in memory and integrated with previously obtained information and the goal, and 5) recycling – the reader recycles through the first four components until the goal of the search is achieved.

Guthrie (1988) examined the relative contribution of the five components to document search performance. Results indicated that components 2-5 combined accounted for 68% of the variance in time required to search a plane schedule to answer a complex question. Category selection and extraction of information accounted for 30% and 9%, respectively, of unique variance in time taken to complete the task. Further empirical support for the model can be found in Guthrie and Dreher (1990). In this later study, high school students searched for answers to simple and complex questions in a

textbook chapter. The components of the model accounted for 40% of the variance in the time it took to locate the information. These studies demonstrate that the task of searching for information may be predicted by the proposed cognitive components (Guthrie, Britten, & Barker, 1991). In addition, Guthrie and Mosenthal's (1987) model has shown applicability to both pencil and paper and computer-presented search tasks (Dreher & Guthrie, 1990; Guthrie, Britten & Barker, 1991) as well as to a variety of types of materials such as diagrams (Winn, 1993), graphs and tables (Guthrie, Weber & Kimmerley, 1993), pay stubs and plane schedules (Guthrie, 1988), technical manuals (Guthrie & Kirsch, 1987), and textbooks (Dreher & Sammons, 1994; Symons & Pressley, 1993; Symons & Specht, 1994; Yussen, Stright & Payne, 1993).

Characteristics of Efficient and Inefficient Searchers

Intuitively, an efficient searcher formulates a clear goal, selects and inspects only appropriate categories, extracts critical details, and monitors progress until the goal is met. Guthrie and Mosenthal (1987) suggest that this should ensure that the locating process is rapid and accurate. But what does research tell us about strategies used by efficient and inefficient searchers? Dreher and Guthrie (1990) studied high school students' performance on locating the answers to two specific questions in a Life Science textbook chapter. They found that more and less efficient searchers differed in their pattern of time allocation to various components of the Guthrie and Mosenthal (1987) model. Specifically, students who located the answers quickly spent relatively more of their total time selecting categories and less time extracting information than did

inefficient searchers. In other words, the best searchers reduced information extraction time by using category selection to their advantage at the beginning of search (Dreher & Guthrie, 1990) and this finding was even stronger for a more complex question.

More efficient searchers also performed better than did less efficient searchers on a measure of the recycling component. Dreher and Guthrie (1990) assessed recycling by rating the quality of the sequence of students' choices on the basis of how well they corresponded to an ideal route to answer the question. For example, if asked the simple question, "What is talus?", an efficient searcher could respond in two steps (i.e., consulting the glossary and answering the question). Overall, less efficient searchers tended to use more routes including more use of information-filled text than did more efficient searchers. In a similar study with college students, Dreher and Guthrie (1987, as cited in Dreher & Guthrie, 1990) noted that students who chose to begin with a more specific access system (glossary, index, table of contents) did better than those who chose a broader initial route (scan or page through text), suggesting that efficient searchers formulated a specific goal before searching.

In addition to efficiency data that includes measures of time, examining the responses of unsuccessful students or inaccurate searches also informs research in this area. What types of errors do searchers make? Dreher (1992) highlights the main findings of two studies (Dreher & Brown, 1990, as cited in Dreher, 1992; Dreher & Guthrie, 1990) in which high school and college students searched for information. When the search question was complex, requiring the location of three pieces of

information, 47% of students were unsuccessful. The majority of these students were able to locate the page of text containing the answer, but failed to extract the correct information. Students tended to settle for terms that appeared in boldface and did not monitor or evaluate their responses. Another study (Dreher & Brown, 1990, as cited in Dreher, 1992) manipulated the specificity of the question. On a question containing an explicit searchable term, 57% of students were successful in their search, whereas the success rate for a question without a stated search term dropped to 29%. Errors mirrored those of students in the Dreher and Guthrie (1990) study with the additional difficulty of more students being unable to generate an appropriate search term to locate the correct section of the text. Findings from a study by Yussen, Stright and Payne (1993) demonstrated that many students at the college level also were unsuccessful in their searches when the question did not contain an explicit searchable term.

Findings from these empirical studies have indicated that a significant portion of young adults experience difficulty with locating information tasks. These results parallel those found in national literacy surveys. For example, Statistics Canada (1995) reported that over half of adults in some countries failed to move beyond the two basic levels of literacy. Tasks at level two (Prose and Document literacy scales) require the reader to locate one or more pieces of information in the text or document, with distracting information present, and to make low-level inferences. The discrepancy between adults' ability to perform high level search tasks and the prevalence of such skills as necessary prerequisites to success at work and at school, is alarming.

Mediating Factors

In response, a few studies have attempted to identify factors that mediate and/or facilitate effective search skills. Some of these mediating factors flow logically from the previously described studies. For example, complexity of the task, both in terms of the number of pieces of information that must be located (Dreher & Guthrie, 1990) as well as the specificity of the question (Dreher & Brown, 1990, as cited in Dreher, 1992; Yussen et al., 1993) affects performance. Further studies have implicated prior conceptual knowledge and characteristics of the text or document structure as potential mediators of success.

Symons and Pressley (1993) considered that search efficiency may be related to the searcher's semantic knowledge of the content being examined. The study assessed the effects of prior knowledge on three components of the Guthrie and Mosenthal (1987) model: category selection, information extraction, and integration. Three groups of introductory psychology students at different points in the course (September – prior to instruction; January – following one semester of Psychology instruction; and May –following two semesters of instruction) represented the differing prior knowledge groups. The task involved students locating the answers to low-level inference questions with answers explicitly stated in the text. Findings indicated that prior conceptual knowledge had a beneficial effect on the information extraction component only. Search success was enhanced in terms of recognition of correct answers when they were encountered. The study did not find support that prior knowledge aided readers to narrow

their search to fewer sections of text or allowed them to integrate across sections of text.

Byrnes and Guthrie (1992) compared students with different amounts of knowledge of anatomy on three measures of search processes: total time to correct answer, the number of chapters searched, and the number of times the table of contents was consulted. Students with conceptual knowledge of the content area performed better on all three measures than did students with little knowledge of anatomy. Thus, prior knowledge enabled students to locate answers more quickly, to inspect fewer chapters, and consult the table of contents less often. In contrast to Symons and Pressley (1993), this study found that prior knowledge aided category selection, as measured by the inspection of chapters and table of contents. However, methodology differed in these studies in that separate file folders were used for each chapter in Byrnes and Guthrie, while the entire text was available for search in Symons and Pressley. Also, Symons and Pressley included additional measures of category selection such as the total number of pages examined that did not contain answers to questions. While investigations are needed to further explicate how prior knowledge affects reading to locate information, results from both studies support the contention that conceptual knowledge of the content of the text being searched must be considered.

Characteristics of the text or document have also been shown to affect performance on search tasks. For example, Byrnes and Guthrie (1992) found that a text that was organized in an unusual way actually hindered text search and overrode prior knowledge effects. While high knowledge students performed better on search process

measures than did low knowledge students, this difference disappeared when a non-standard text with an unfamiliar organization was used. In addition, both groups of students performed more poorly on the non-standard text.

As efficient category selection has been related to improved text search performance, features of the material that help readers to identify critical categories of information would be expected to enhance selective searching and, in turn, search success. Guthrie et al. (1991) investigated whether the number of clearly marked sections such as headings and labels would improve selective searching. They hypothesized that markers would facilitate search regardless of the type of document used (table, directory, or prose format). Results confirmed that college students spent proportionally more time on category selection and proportionally less time on extraction when searching the documents containing a higher number of marked categories (i.e. table and directory) than when searching the prose format, which contained fewer markers. Further, students were equally selective in their inspection of the table and directory, which had the same number of marked categories. Similarly, Kirsch and Mosenthal (1990) found that as the number of organizing categories that had to be inspected increased, so too did the difficulty of searching a document to answer a question.

Children, too, seem to be aware that features of text such as headings aid in information search. Kobasigawa et al. (1988) measured search times of children in grades 4, 6, and 8 who were randomly assigned to one of two conditions: a group in which headings were embedded in reading material and a group in which headings did

not appear in reading material. They found that, overall, headings facilitated the efficient search of text, yet although older students spontaneously used headings as locational aids, only half of the grade 4 and 6 children did so. An important finding in this study was that younger children did demonstrate appropriate and efficient use of headings when explicitly taught how to use them. This suggests that spontaneous use of text features such as headings may be a developmental skill, but that direct instruction facilitates their use with children as young as nine years of age.

Strategy Instruction

In this relatively new area of reading research, there is a dearth of studies investigating the effectiveness of text search instruction. One study conducted with college students manipulated goal formation by prompting students to plan their approach before beginning a search task (Dreher & Brown, 1993). Students in the prompt condition were asked three questions prior to each search: How will you proceed?, What parts of this textbook will you use and why?, and What specific topics or key words will you look for and why? Search did not begin until students reported their search plan. Findings indicated that the presence of planning prompts resulted in improved search success, as measured by accuracy and time. Dreher and Brown suggested that the planning prompt helped students to clarify their goals. In addition, planning prompts were associated with an improvement in category selection when the questions were complex (when they did not include explicit searchable terms).

Two instructional studies conducted with children were located. Dreher and

Sammons (1994) investigated whether asking guided questions before and during search would affect the performance of fifth graders search for information in a textbook. The guiding questions were designed to encourage planning, to identify appropriate textbook access systems (e.g. index, table of contents), to keep the goal in mind, and to evaluate the completeness of their answers. Children who were given these reminders located more correct answers than did children who were simply asked to search. The researchers stated that the facilitating effect of the guiding questions appeared to have been due to raising the likelihood that students would use the index. While index use did not guarantee success, due to the specific nature of the questions, very few students who failed to use the index were successful.

A second instructional study (Symons, MacLatchy-Gaudet, Stone & Reynolds - Study 1, unpublished manuscript) taught children in grades three, four and five to select categories systematically and to extract information carefully from passages of text (Strategy for Locating Information – SLI group). Additionally, some children were encouraged to monitor how well the extracted information fulfilled the search goal (SLI + Monitoring group). Results indicated developmental differences on measures of search efficiency, with accuracy and time to locate the answer improving from grade 3 to grade 5. Further findings showed that younger children (grade 3) in both strategy groups found more correct answers than did non-instructed children in the control group. For older children (grades 4 and 5), the effect of strategy instruction on search success became significant only when children were encouraged to monitor the accuracy of their answers.

The SLI + M group was more successful in locating correct answers than were children in the control group. In terms of time taken to locate an answer, both instructional groups found answers more quickly than did controls, but SLI and SLI+M did not differ from each other on this measure. Finally, children receiving instruction searched fewer pages overall, and monitoring further facilitated accuracy when key pages were searched (i.e. pages containing the answer). Children at all three grade levels benefitted from strategy instruction. As in Dreher and Sammons (1994), Symons et al. concluded that index use increased the likelihood that children would locate the target information, and for older children (grades 4 and 5) monitoring the appropriateness of answers against the search goal was an essential component of instruction.

In a relatively short period of time, research has gleaned much about the cognitive processes involved in reading to locate information. Initial efforts in the field have explicated a cognitive model of how readers search for and locate information (Guthrie & Mosenthal, 1987) and the model has been empirically supported. Using this model and building upon research that has suggested characteristics of efficient searchers, the types of errors searchers make and factors that mediate search performance, instructional studies have demonstrated that direct instruction on components of the model can be effective in improving search proficiency. Improvement in information-seeking skills takes a big step towards meeting the challenges posed by the information explosion and subsequent literacy demands. However, as Dreher (1993) points out, the problem also involves getting people to want to access information. "National performance

capabilities depend on helping people gain the literacy skills to cope with the ever-increasing availability of information and on helping them acquire the disposition to use these skills" (Dreher, 1993, p. 130).

Motivation

Researchers studying information-seeking strategies have emphasized cognitive aspects of reading to locate, and have ignored possible affective and motivational factors. This generalization also applies to the area of reading research in general. Hidi (1990) states that very little progress has been made toward integrating cognitive factors with affective and motivational aspects of thinking. The present study asks whether and how particular aspects of motivation affect text search performance. Since this question has not previously been addressed in text search research, the broader context of how motivation affects learning in general will be discussed next.

As noted by Cordova and Lepper (1996), there are no preschool children with "motivational deficits", yet a few years later many children's motivation to learn has become problematic. Researchers studying motivation have found that motivational difficulties seem to increase steadily as children progress through school (Wigfield, 1997; Worthy, Turner, & Moorman, 1998). Further, a national literacy survey (Creative Research Group, 1987) reported that lack of motivation was the main reason given by adults aged 18 –34 for not finishing high school. Given that motivation has been linked to academic performance (e.g. Hidi, 1990), these findings underscore the need to identify ways in which to circumvent children's waning motivation for learning.

Motivation is multifaceted and encompasses a number of interrelated constructs (Wigfield, 1997). To name just a few, children's self-efficacy (Guthrie & Alao, 1997; Wigfield, 1997), intrinsic and extrinsic motivation (Wigfield & Guthrie, 1997), sense of agency or self-determination (Alexander, 1997; Guthrie & Alao, 1997; Turner, 1995), and interest (de Sousa & Oakhill, 1996; Hidi, 1990; Schraw, Bruning, & Svoboda, 1995; Schraw & Dennison, 1994) have each been associated with increased motivation and academic performance.

Wigfield (1997) reported that children's expectancies for success and self-efficacy are directly related to and predictive of their achievement performance. "When they think they can accomplish a task, people are more likely to choose to do it, expend effort and persist when they encounter difficulty, and ultimately complete the task" (p. 60). Thus, perceived competence has implications for motivated learning. Guthrie et al. (1996) stated that strategy instruction that included modeling, explaining, and practice increased motivations for reading. Perhaps, as Guthrie and Alao (1997) suggested, this was because strategy instruction enabled students to feel competent in their applications of skills to new texts in new situations.

Self-Determination

A deeper level of engagement and learning often results when a student perceives a degree of agency or self-determination (Alexander, 1997). Deci (1992, as cited in Guthrie & Alao, 1997) states that self-determination applies to activities that are undertaken with a sense of wanting, choosing and personal endorsement. Several studies

have shown a relationship between children's self-directed learning and motivation. Guthrie et al. (1996) found that perceived self-direction influenced children's involvement, curiosity, and challenge in reading situations. Morrow (1992) showed that an element of choice contributed to motivations for reading, reporting that the books that children most enjoyed were those they had the most freedom in selecting. This study investigated the impact of a literature-based program on the literacy achievement, use of literature, and attitudes toward reading of children of minority backgrounds (Morrow, 1992). One aspect of the program emphasized self-selection of books and activities and self-directed periods of independent reading and writing; in other words, children were given the opportunity to take responsibility for some of their literacy learning by having choices and making decisions. Teachers reported that choice was a factor that motivated literacy activity. Children chose activities that were meaningful to them and participated in chosen activities voluntarily and with enthusiasm. Consistent with teacher reports, interviews with children indicated that choice was a motivating factor. Seventy–four percent of the children in the program listed 'being able to choose what you want to read' as one thing they liked about the reading program. In addition, 34% of the children stated that lack of choices was something that they didn't like about their regular reading program; "You can't choose what you read, the teacher tells you what to read and it's the same for everyone".

Perlmuter and Monty (1977) conducted a series of related studies that systematically investigated the role of choice in learning using modified paired-associate

tasks with college students. Students in the choice condition were given some control over the learning situation by choosing from five possible responses which words to associate with each stimulus word, prior to the commencement of the task. In the forced condition, the experimenter decided which of five responses would be paired with each stimulus word, thus designating the stimulus-response pairs. Results indicated that allowing students to choose what was to be learned benefitted performance, in that choice participants learned more rapidly and became more proficient than did force participants. A similar study allowing students to choose among stimulus alternatives yielded analogous results. An acknowledged limitation of these studies was that choice subjects may have had the benefit of certain mnemonic cues that aided in the formation and retrieval of the learned associates (Perlmuter & Monty, 1977).

Cordova and Lepper (1996) also included the provision of choices as a strategy for increasing fourth and fifth-grade children's sense of control and self-determination. During a math computer game, children in the choice conditions were permitted to select and name the icons that would represent themselves and their opponent on the game board as well as to select the starting points for secret passages in the game. Findings indicated that allowing children even a modicum of choice in the learning activity produced dramatic increases, not only on measures of motivation, but in the amount of arithmetic learning and children's perceived competence in arithmetic.

Interest

Research on the effect of interest on learning, particularly in the area of reading,

has grown in recent years (Alexander, 1997; Hidi, 1990; Schraw, Bruning, & Svoboda, 1995). The literature has also drawn a distinction between two types of interest: personal and situational interest. Personal or individual interest is described as being unique to the individual, topic-specific, and long lasting (Hidi, 1990). A child may hold a strong and long-lasting interest in cats, for example. In addition, this personal interest is apt to be accompanied by increased knowledge about cats as well as motivation to learn more about cats. Alexander (1997) reported that an individual's personal interests are strongly tied to the knowledge they possess about a given topic, with those with more knowledge in academic topics reporting higher levels of personal interest in these topics. Deci (1992, as cited in Alexander, 1997) also reports a relationship among personal interest, prior knowledge, and intrinsic motivation. Situational interest, in contrast, is elicited or evoked more suddenly by something in the environment, is often common across individuals, and may have only a short term effect on learning (Hidi, 1990). Examples of situational interest include interest sparked by a particular text or text features (Schraw, Bruning & Svoboda, 1995) or game-like activities (Cordova & Lepper, 1996; de Sousa & Oakhill, 1996). Unlike personal interests that are linked to prior knowledge and familiarity, situational interest can often be evoked by elements of novelty, uniqueness, and surprise (Hidi, 1990).

Both personal and situational interest have been shown to influence cognitive performance. Estes and Vaughan (1973) found that when fourth graders read passages they rated as personally interesting, they scored significantly higher on text recall and

inferencing, than when reading passages rated as uninteresting. Similarly, Asher (1979) reported that sixth graders showed superior comprehension on topics of personal interest. Shirey and Reynolds (1988) designed a recall task for sentences of varying interest to adults. In their study, sentences rated as "very interesting" to "not at all interesting" were presented to undergraduates who were asked to recall them. Highly interesting sentences were recalled much better than were less interesting sentences. While it is difficult to make a clear distinction between personal and situational interest in the above studies, Bernstein (1955) suggested that interest is derived from characteristics of the reader, factors in the text, and the interaction of the two. As Schraw and Dennison (1994) state, "interest is not a quality that can be defined without regard to the context in which learning or reading occurs" (p. 13).

A number of studies have investigated the effects of personal interest in a topic on reading comprehension. Asher and Markell (1974) assessed the pre-reading interests of fifth graders using a picture rating technique representing 25 topics. Each child then read passages that corresponded to his or her high and low-interest areas. They found that children comprehended more of the high than low-interest paragraphs as measured by cloze comprehension tests in which children supplied responses for deleted words. Stevens (1980) reported similar findings with fifth and sixth graders using multiple choice comprehension tests. However, this study found that topic interest enhanced comprehension for high ability students only. In contrast, Belloni and Jongsma (1978) provided evidence demonstrating that interest not only facilitated comprehension for low-

achieving seventh grade students, but also allowed them to transcend their frustration levels to read passages two to four grade levels above their measured instructional reading levels. It should be noted, however, that the comprehension test used in this study may have represented an easier task than that of the previous study. Belloni and Jongsma employed the cloze procedure by deleting words in the same passages that students had read in the experimental phase. Thus, students may have simply recalled the omitted words. In addition, topic interests in this study were determined by asking students to select one story they would most like to read and one they would least like to read. This opportunity for choice may have had some impact on the findings. Pauk (1973) also described benefits of interesting material for low-achieving students, stating that the material "held their interest so well that concentration was at an exceptionally high level, enabling them to read at higher levels without difficulty" (p. 461). The majority of studies on the relationship between topic interest and reading comprehension does conclude that children have better comprehension when reading material on topics which are highly interesting to them. However, the question remains whether they comprehend high-interest material better because of attentional and motivational factors, or because they have high prior knowledge about the topics in which they express interest. Baldwin, Peleg-Bruckner, and McClintock (1985) addressed this issue by separating and examining the effects of prior knowledge and topic interest on reading comprehension. High-achieving seventh and eighth–grade students first completed a pre-reading interest inventory and multiple-choice prior knowledge tests. Based on these

measures, students were assigned reading passages for which they had various combinations of high and low prior knowledge and topic interest. Comprehension was measured using ten-item multiple-choice tests for each of four passages. Results indicated that topic interest and prior knowledge each improved reading comprehension and that together, topic interest and prior knowledge had an additive effect. These findings suggest that both affective and cognitive factors must be considered when examining the role of interest on reading comprehension.

All of the above-mentioned studies employed a within-subjects design in which students read passages of both low and high interest. Asher, Hymel, and Wigfield (1978) put forth the contention that the results obtained in these studies may have been dependent on a contrast effect, whereby children selectively responded to the more interesting passages in their set of materials. These researchers thus set out to replicate a previous study (Asher & Markell, 1974) using a between-subjects design in which each child was given either all high-interest or all low-interest passages. Findings confirmed the facilitative effect of interest on reading comprehension and indicated that the effect is not dependent on the contrast phenomenon. Again, results are limited by the confounding of topic interest and prior knowledge.

The majority of studies examining the effects of interest fall within the area of situational interest (Hidi, 1990). Schraw and Dennison (1994) showed, for example, that assigning people different purposes for reading affected interest as well as text recall. In this study, college students were asked to take one of three perspectives before reading a

passage; that of a home buyer, a burglar, or a no perspective control group. Recall scores indicated that segments of text relevant to one's purpose were recalled better than segments relevant to another purpose. Interest ratings of the 115 text segments showed identical findings; segments relevant to the reader's assigned perspective were rated as more interesting than other segments. This phenomenon of text information appearing more interesting to one group of readers than another was labeled purpose-driven interest (Schraw & Dennison, 1994). Although not tested in this study, one would expect that purpose-driven interest would have an even stronger effect if the purpose for reading was self-generated, based on personal interests or choice. Another implication of the findings, pointed out by the researchers, was that interest in a text may be changeable via external manipulations.

De Sousa and Oakhill (1996) confirmed that reading under different externally-imposed conditions affects interest and, in turn, cognitive performance. They investigated eight and nine- year-old children's comprehension monitoring performance on tasks that involved detecting embedded problems such as prior knowledge violations, internal inconsistencies, and nonsense words in passages. Children first received instruction on detecting these types of problems and then completed two tasks. One task asked children to edit a passage (the "editing task"), while the other had children pretend to be detectives while looking for the problems (the "detective task"). Findings indicated that comprehension monitoring, as measured by the number of problems detected, was higher for the detective task than for the editing task. Twenty-three of twenty-four

children also reported higher interest in the detective task. This study illustrates that situational interest can be evoked using a game-like strategy and this interest facilitated comprehension monitoring.

In addition to the effect of choices, the study conducted by Cordova and Lepper (1996) highlighted the importance of interest on motivation and arithmetic learning. To make the task more interesting, the arithmetic concepts were presented to some children in an appealing context of a fantasy computer game and included personalized information such as the child's name, names of their friends, or favorite foods and toys within the fantasy. As with the choice effect, these manipulations resulted in enhanced motivation, amount of arithmetic learning, and perceived competence. For example, children completing fantasy and personalized versions of the game, relative to children in a control group, stated that they would stay after school to play the game, would enjoy an even more difficult game in the future, believed they were good at the learned concept (order-of operation rules), and scored higher on a follow-up test assessing learned skills (prior arithmetic skills were controlled). Interest, then, is a powerful motivator that can translate into improved academic achievement.

Motivation and Text Search

Motivation is often considered a characteristic of the individual, when in fact it is greatly influenced by the kinds of learning environments in which children find themselves (Wigfield, 1997). Evidence from the previously described studies indicate that various measures of academic performance are enhanced when children are

motivated. While the effects of motivation on reading to locate tasks have not been empirically tested, Guthrie et al. (1996) did include search performance as one measure of achievement in a year-long study designed to increase literacy engagement.

The study was conducted with children in grades three and five and included a number of motivational variables that were later used to derive a set of principles for creating classroom contexts that encouraged literacy growth and engagement. (Guthrie et al, 1996; Guthrie & Alao, 1997). Among the motivational factors were the following: 1) real world experiences were used to arouse situational interest. Guthrie and Alao (1997) suggested that these situational interests may evolve into personal interests if the classroom context permits; 2) self-direction – student's personal interests and choices contributed to the goals of instruction; 3) interesting texts that matched the topical interests and cognitive competencies of the children; and 4) cognitive strategy instruction including modeling, explaining, and opportunities for student practice.

One of the performance measures in the study was text search skills (Guthrie et al., 1996). The researchers stated that teaching the students to search was fundamental to enabling them to pursue their interests and answer the questions they generated. Students were encouraged to choose topics for learning and taught how to search for appropriate informational books. They then learned how to use the table of contents, index, headings, and pictures as guides. Instruction was aimed at improving search processes identified by previous researchers (Armbruster & Armstrong, 1993; Guthrie et al., 1993). These processes involved goal formation, categorizing (understanding the organization of

books), extracting information, and abstracting (putting ideas together and forming a general understanding) (Guthrie et al., 1996). Findings indicated that students in both grades showed improvements in each of the strategies involved in searching for information. In fact, grade three students, at the end of the study, performed as well as beginning grade five students on search measures. Further, students improved on motivational attributes as evidenced by effort and persistence, elaboration of reasons for choosing books and topics, and increased interest in the chosen topics.

Overall, Guthrie et al. (1996) reported that 100% of the students who increased on measures of intrinsic motivation, also increased in literacy engagement, of which text search was a part. This study did not use a control group, nor did it tease out which dimensions of the classroom environment were more or less influential. The data do not permit a causal conclusion regarding the direction of the relationship between motivation and literacy growth (Guthrie et al., 1996). However, the results suggest that text search performance, skills in writing, informational text comprehension, and narrative interpretation, all increased concurrently with motivation.

Present Study

The current study sought to investigate empirically the effects of motivation on text search performance. Specifically, the study addressed two main questions: 1) Will the self-selection of topic influence children's performance on locating answers to questions in an informational text? and 2) Will interest generated by the use of a game-like context facilitate text search? Providing children with the opportunity to choose the

topic of their search was expected to enhance performance for several reasons. First, it may instill a sense of self-determination and control over the learning activity, as suggested by previous research (Alexander, 1997; Cordova & Lepper, 1996; Perlmuter & Monty, 1977; Turner, 1995). Second, the topic chosen may reflect the children's personal interests and/or prior knowledge. The relationship between personal interest and prior knowledge has been noted in past studies (Alexander, 1997; Hidi, 1990) as well as the facilitative effect of prior knowledge on text search performance (Byrnes & Guthrie, 1992; Symons & Pressley, 1993). Embellishing the search task with game-like features was intended to arouse situational interest through novelty, with subsequent improved performance expected. Individuals interested in a task have been shown to pay more attention, to persist for longer periods of time, and acquire more and qualitatively different knowledge than individuals without such interest (Hidi, 1990).

The present study included a 2 (choice vs. no choice) x 2 (game-like format vs. standard format) between subjects design. Grade three children were randomly assigned to one of four conditions. In addition to manipulating the effects of choice and format, the study measured student's pre-search interest and prior knowledge on each topic in an attempt to tease apart and control for the contributions of these variables on text search performance.

Alexander (1997) stated that information via expository texts is often regarded as a cognitive event that is unmotivating. Guthrie et al. (1996) have demonstrated otherwise; children exhibited motivated behaviors while searching informational books to

pursue their interests. Past research in this field has placed the emphasis on cognitive processes involved in reading to locate information. The present research attempts to extend current knowledge about children's text search by adding the motivational components of student control through choice and student interest in the task. It was hypothesized that the opportunity to choose a search topic and to express written responses in a game-like format would result in better text search performance, a more efficient text search process, and higher post-search interest ratings.

Method

Participants

Eighty-six grade three children were recruited from elementary schools in rural Nova Scotia. Information packets describing the study were sent to the superintendent of schools requesting their participation and written consent was obtained from parents (See Appendix A). Ninety-three consent forms were sent home to parents. Of these 93, parents of five children declined participation because their children were nonreaders, while two consent forms were not returned to the school. Due to the nature of the study, teachers were asked to identify students with significant reading problems amongst those participating and these data were excluded. One nonreader participated in the study and data from this student were not included in the analyses as he was given some guidance with the search tasks. In addition, one student was absent on the days of testing; thus the final sample included 84 students. The mean age of students was eight years seven months and the sample consisted of 48 boys and 36 girls. Students were randomly

assigned to one of four conditions; 1) Choice- Standard Format, 2) Choice- Game-Like Format, 3) No Choice- Standard Format, or 4) No Choice- Game-Like Format with approximately equal numbers of students in each condition. Children were asked verbally if they wanted to participate and were assured that the results would be confidential and not part of their school grade. All students were given a pencil to thank them for their participation.

Materials

Three informational books from the 'I Wonder Why' series were used in the study; I Wonder Why Camels Have Humps and Other Questions about Animals (Ganeri, 1993), I Wonder Why Castles Had Moats and Other Questions about Long Ago (Steele, 1994), and I Wonder Why Stars Twinkle and Other Questions about Space (Stott, 1993). All three books contain 32 pages, a table of contents, and an index. The table of contents is very specific and each section is in the form of a question (e.g. "What is a Black Hole?"). The entire index is contained on one page and each alphabetical section is highlighted by a large initial letter at its beginning. Colorful pictures are included on every page and the readability level of each book was calculated to be at grade three (Fry, 1968).

Books from a series were chosen to control for text features as well as general attractiveness of the book format. In addition, to determine whether particular topics were more interesting than others to children at this age level, an initial pilot study was conducted using two of the books (Castles and Space) and a third book, I Wonder Why I

Blink and Other Questions about My Body (Avison, 1997). Participants were 23 grade three students (12 males, 11 females) and 21 grade four students (14 males, 7 females) from the same school district as that of the present study. The children were asked to rate the three books from most to least interesting and their 'first choice' (most interesting) was used as the measure of interest. Grade three results indicated that 9 children (6 males, 3 females) preferred the topic of Space, 9 children (3 males, 6 females) preferred the Castles topic and 5 children (3 males, 2 females) preferred the Body topic. In Grade four, 10 children selected the topic of Space (6 males, 4 females), 8 chose Castles (6 males, 2 females) and 3 children (2 males, 1 female) picked the Body book as most interesting. Overall, 44 children rated the three books with Space, Castles, and Body selected as the first choice by 19, 17, and 8 children, respectively. These findings suggest that interest is distributed across the three topics for boys and girls, but that the Body book was of least interest to both genders.

Children in the pilot study were further asked to generate a topic which was of interest to them. As personal interests are expected to vary, many topics were generated. However, the topic of animals was common to 11 of the students and thus the third book (I Wonder Why Camels Have Humps and Other Questions about Animals) replaced the Body book in the present study. The inclusion of three books provides the opportunity for children of both genders to make a meaningful choice to search a text that they find personally interesting.

Search Questions

Each participant was given 4 questions (See Appendix B) for which to search for answers in their book (either self-selected or assigned). Each question contained an explicit searchable term that could be located through either an index or table of contents search. Past research has indicated that, for specific questions, an index search would be more efficient (Dreher & Guthrie, 1990; Yussen et al., 1993). However, findings from Symons et al. (unpublished manuscript) suggested that young children use the table of contents much more frequently than the index unless instructed directly to search the index. Each question required children to locate one piece of information with a one to two word answer and answers were stated directly on one page of text. Also, answers to the four questions were located in approximately the same areas across books. Thus, questions placed equal demands on the searcher regardless of the book being searched.

Interest Manipulation - Format

The search tasks were identical for all participants regardless of condition (i.e., students were given a question and asked to search the text for an answer). However, to increase situational interest, half the students recorded their answers using an appealing format. For each topic, four cutout drawings were provided on which to record answers using markers and children were given adhesive putty to affix their answers on a colorful (28" x 22") theme board. The drawings consisted of animals (Animals book), fantasy characters (e.g. knight, dragon; Castles book), and planets (Space book). Drawings were laminated and theme boards were mounted to increase durability. Children in the

standard condition simply recorded their answers on the question worksheet. Thus, the difference between the two conditions (standard vs. game) was in the presentation of the children's answers.

Prior Knowledge and Topic Interest

As prior knowledge and personal interest in topics were expected to influence the dependent variables, these were measured at the beginning of the testing session. First students completed an 18-item interest inventory that included three words representing each of the topics used in the study (e.g., the words "space", "stars", and "planets" represented the space topic). These nine words were embedded in the list amongst an additional nine words that were unrelated to the three topics (See Appendix C). Students rated their interest in each topic on a scale from 1 (not at all interesting) to 4 (very interesting) and relevant ratings were summed to provide a topic interest score with a maximum of 12 for space, castles, and animals.

Students also completed prior knowledge multiple-choice tests for each of the three topics (See Appendix D). Items were selected from the books used in the study and were factual in nature. There were 10 items for each topic and three choices per item. None of the items were related to the search questions presented in the testing phase. Students received a prior knowledge score out of 100% for each topic.

Prior knowledge and topic interest were not manipulated, but were used as covariates in the study to control for their potential influence on dependent measures. The covariate scores used in the analyses were the prior knowledge and topic interest

ratings obtained on the topic that had been assigned or was chosen. For example, if a student selected (or was assigned) the space book, his/her prior knowledge and topic interest covariates were those obtained on the space topic.

Procedure

Each student was tested individually in one 30-minute session. The researcher first told the children that we wanted to find out what kids their age were interested in. We discussed the four points of the scale on the topic interest inventory using examples generated by the children and the researcher read each item while students circled the number corresponding to their interest. Following completion of the topic interest inventory, children were told that we also wanted to find out how much kids their age knew about different topics. To alleviate concerns about the accuracy of their answers, students were assured that people know more about some things than others and it was okay to just do their best. The researcher read each of the items as well as the answers aloud to ensure comprehension of the questions, thus giving a more accurate prior knowledge score.

As an introduction to the task of locating information in books, children were asked to describe a time when they had to look up something for a homework assignment or research project. They were then told that they were to use a book to find answers to questions on a specific topic. Students in the choice condition were presented with three books and given two minutes to preview and select their topic. Students in the no-choice group also previewed the three books and then were randomly assigned a topic.

All students were given a brief orientation to the books' access systems (i.e., table of contents and index) and an example of their task. The orientation to the 'Space' book was as follows:

"There are certain parts of a book that can help us to find the information that we're looking for. For example, if I open to the table of contents at the front of the book (open to table of contents), I can read all about the different sections of information. If I wanted to know 'what a black hole is', I would look for a section on black holes in the table of contents. Here it is, on page 12. Another way to look up information is to use the index in the back of the book (open to index). The index is in alphabetical order just like a dictionary. First I would think of the word I wanted to find out about and then I would look it up. Black holes start with a B (model search in the B section). Here it is, on page 12." Instructions for all books were identical except for the example used.

As previously mentioned, the table of contents and the index are equally specific in these books and either may be used to locate the page containing the answers. So as not to encourage children to use one route over another, the above orientation counterbalanced the order in which the table of contents and the index was mentioned.

Following the orientation, students completed four test questions. For each search task, the researcher read the question aloud and students were asked to repeat the question. While participants searched, their searching methods were recorded using a pre-established coding procedure and the data entered into a computer software program designed for this study. The computer coded participant ID numbers, condition (i.e.

choice, format), and question numbers as well as tracked student accuracy, time to locate an answer, and the number and sequence of search routes (e.g. index search, table of contents search, key page search) used for each question. In addition, the computer program included the coding options of quitting or running out of time before completing a search. The program was piloted with undergraduate students prior to the study to ensure information was coded accurately.

Dependent Measures

The study examined the effects of choice and format on measures of search performance, search process, and on post-search interest.

Text Search Performance

Accuracy. Search accuracy was defined as the number of correct responses on the test questions for a maximum score of 4.

Time. Total time searching was recorded for each question individually. Timing of the search began after the students repeated the question aloud and ended when they located an answer. If an answer had not been located following 4 minutes of searching, the student was stopped and asked if he/she would like to move on to the next question. This time limit was imposed for practical reasons as well as to reduce frustration for children who were making an exhaustive but unsuccessful search. Findings from Symons et al. (unpublished manuscript) indicated that non-instructed children completing search tasks similar to the present standard task took an average of just over two minutes when they found correct answers to questions. In addition, the books used in the current study

contain fewer pages to search and has a less challenging readability level than that used by Symons et al.

Text Search Process

Search sequence. The sequence of actions that the children used while completing the search tasks was also coded. Two measures of children's search routes were examined: a) the number of actions taken, and b) a rating of the quality of the search sequence.

First, the number of actions taken by children was determined by counting each of the following options: examination of the index, the table of contents, examining text pages, flipping through the text, recording an answer, and quitting or running out of time. Each of these was counted as one action; returns to an option were also counted. For example, a child who searched the index, then examined text pages, returned to the index, and then recorded an answer would have used four actions in total.

Second, the quality of the sequence of search actions was rated on the basis of how well they corresponded to an ideal route. The rating procedure is summarized in Table 1, and was modified from that used by Dreher and Guthrie (1990). For each test question, an efficient searcher could respond in three steps: index or table of contents search, key page(s) search and recording the answer. Thus, only the first four actions were rated. The actions included: index search; table of contents search; examine key page(s); flip through text pages; examine text pages; record an answer; and quit or run out of time. The categories are similar to those counted in the number of actions measure

Table 1

Coding Scheme for Search Sequences

Order of Behavior	Behavior	Rating
First	Search Index	5
	Search Table of Contents	5
	Flip Through Text	1
	Examine Key Page(s)	0
	Examine Text Pages	0
	Record an Answer	0
Second	Examine Key Page(s)	5
	Search Index	3
	Search Table of Contents	3
	Examine Text Pages	3
	Flip Through Text	0
	Record an Answer	0
	Quit/Run Out of Time	0
Third	Record an Answer	5[a]
	Search Index	2
	Search Table of Contents	2
	Examine Key Page(s)	2
	Examine Text Pages	2
	Flip Through Text	0

(table continues)

Order of Behavior	Behavior	Rating
	Quit/Run Out of Time	0
Fourth	[Nothing]	5
	Record an Answer	3[a]
	Search Index	1
	Search Table of Contents	1
	Examine Key Page(s)	1
	Examine Text Pages	1
	Flip Through Text	0
	Quit / Out of Time	0

[a] If last action, otherwise 2 points were subtracted.

with the addition of the category "examine key page(s)." A key page(s) search was defined as a search of a page or pages that included the answer and/or was listed specifically in the index or table of contents. Examination of text pages was recorded whenever students examined pages of the textbook that were not listed in the index or table of contents as pertaining to the question. The distinction between key page(s) and text page(s) was not relevant when simply counting the number of actions taken.

As indicated in Table 1, either an index or table of contents search as the first action received the highest rating. The information in both of these access systems offers specific assistance in locating a specific term and thus received the same rating. Flipping through the text was given some credit as well, since students would be attempting to search for an answer. Because students would not have yet identified text as key pages, this option received no credit as a first action. Also, this sequence rating scale is based on the assumption that the answer was not already known to the children, thus no credit was given for recording an answer as a first step (children were instructed to use the text to locate the answer even if the answer was known to them).

As a second action, examine key page(s) received the most credit since it would have been listed in the index as well as the table of contents and most likely contained the answer to the question. Index or table of contents search may also be appropriate second actions for those who had started inefficiently in their first route. Examining text pages may also be appropriate; for example, students who first searched the table of contents may have been led to pages related to the question rather than to the key page(s).

Flipping through the text, quitting or running out of time received no credit for this step or for the remainder of the rating scale.

Recording an answer is the best third action and received the most credit, unless it was not the last action taken; as further selections would indicate either that the children were guessing or that they had initially extracted an incorrect or partial answer. Again, an index or a table of contents search would be helpful if the previous action had been a less specific information source. Students may also at this point be searching key page(s) or examining text pages depending upon previous search actions.

Children who completed the task using three actions received the highest rating at the fourth step (for doing nothing, see Table 1). Finally, if a fourth action was used, recording an answer would be most appropriate, although children who got off to a slow start might still need to consult the index, table of contents, key page, or other text pages.

The specific numbers in the table (e.g. 5 for index search; 1 for flip through text) are arbitrary, but indicate the relative worth of the actions taken compared with an ideal route. The maximum score for each question was 20 points and children using six or more actions received a two-point penalty. The rating procedure can be illustrated with an example. A student may take the following actions: search table of contents, examine text pages, search index, search key page(s), and record an answer. Only the first four actions would be rated. As Table 1 indicates, the first action, table of contents, would receive 5 points. The second action, examine text pages, would receive 3 points. Index search as the third action, would receive 2 points, and the fourth action, examine key

page(s), would receive 1 point. The fifth action, recording an answer would not be rated. Thus, the student's sequence rating would be 11 points.

Post – Search Interest Measures

Following completion of the search tasks, children completed a five-item interest inventory. Questions addressed their interest in the topic as well as in the activity in which they participated. Three of the questions read as follows: 1) How interesting was the book that you read?; 2) How much did you like searching for information?; and 3) How much would you like to learn more about this topic? Interest was rated on a four-point likert type scale ranging from 1 to 4. See Appendix E for the delineation of the four points of each scale. Post-search interest was calculated by summing the ratings on these three questions for a maximum score of 12. Additionally, all three topics were listed and children were asked to rank order their interest in each. This item was included to ascertain whether children in the choice condition would rank their choice of topic as number 1, indicating that their selection remained the book they liked most following the search activity. Also, it was used as a check to determine whether children in the no-choice condition were assigned the book they might have selected if given a choice.

As a further measure of interest, a fifth item asked children if they would like to ask their own question and search the book for an answer. The number of children who opted to generate their own question was compared for each group. It was expected that children who were interested in their topic and/or activity would be more likely to ask an additional question than those who were not as interested. In the Cordova and Lepper

study (1996), children in the personalization and choice conditions indicated that they would be more willing to stay after school to play additional math games than children in the control condition.

Results

Preliminary Analyses

Although the books used in the study shared the same text features and had equivalent readability levels, initial analyses were conducted to check for a topic effect to see whether success differed with different books. As books were randomly assigned to the no-choice groups and thus not affected by personal choice, only this half of the sample was used ($n = 42$). A one-way analysis of variance (ANOVA) was calculated on each dependent variable with topic as the independent variable. Post-hoc analyses using Tukey's HSD were used following a significant topic effect. Table 2 displays descriptive statistics on dependent measures for each topic. Results indicated no effect of topic on mean searching time ($F(2,39) = 1.21$, $p = .31$), mean sequence scores ($F(2,39) = .18$, $p = .84$) or mean number of actions taken during searching ($F(2,39) = 1.76$, $p = .19$). There was, however, a significant effect of topic on accuracy ($F(2,39) = 3.56$, $p < .05$) and on post-search interest ratings ($F(2,39) = 4.72$, $p < .05$). Tukey's HSD revealed that accuracy scores were higher for the animals book than for the castles book. No other differences were found on accuracy. In addition, the space book was rated as more interesting than the castles book.

Forty-two children were given a choice of topics. Nineteen children chose the

Table 2

Descriptive Statistics on Dependent Measures for each Topic

	Topic					
	Space (n = 14)		Castles (n = 13)		Animals (n = 15)	
Measure	M	SD	M	SD	M	SD
Accuracy	2.79	1.12	2.08	1.32	3.27	1.10
Time (Mins.)	1.63	0.73	1.55	0.65	1.27	0.57
Number of Actions	4.04	1.32	3.52	0.65	3.48	0.39
Sequence Quality	16.45	2.99	16.92	3.27	17.03	1.99
Post-Search Interest	10.64	1.22	8.15	1.99	10.20	3.03

Note. Maximum scores for accuracy, sequence quality, and post-search interest were 4, 20, and 12, respectively.

space book, 16 chose the animals book, and seven children chose the castles book. A chi-square goodness of fit test did not indicate that students chose one topic more than the other, $\chi^2_{(2)} = 5.57$, $p = .06$. In the no-choice condition, space, animals, and castles were assigned to 14, 15, and 13 children, respectively.

Prior Knowledge and Topic Interest

Prior to searching, all participants completed prior knowledge tests and topic interest ratings on each of the three topics. Means for the entire sample on these measures are presented in Table 3. As previously stated, the covariates used in subsequent analyses consisted of the scores obtained on the respective prior knowledge test and topic interest ratings for the topic that was assigned or had been chosen. The overall mean percentage for the prior knowledge covariate was 66.9% (SD = 18.17) and the mean topic interest covariate was 8.80 out of 12 (SD = 2.36). Two 2 x 2 (choice x format) analyses of variance (ANOVA's) were calculated to determine whether the conditions differed on these measures. There was no significant main effect of choice ($F(1,80) = .35$, $p = .56$) or format ($F(1,80) = .03$, $p = .87$), nor was there a significant choice x format interaction ($F(1,80) = .09$, $p = .76$) on the prior knowledge covariate. Despite rating topics prior to book selection as well as randomization to condition, a main effect of choice was found on the topic interest covariate ($F(1,80) = 13.56$, $p < .001$). Children in the choice condition had a higher topic interest rating ($M = 9.69$, $SD = 1.89$) than did children in the no-choice condition ($M = 7.90$, $SD = 2.46$). There was no main effect of format ($F(1,80) = .29$, $p = .59$) and no significant interaction ($F(1,80) = 1.52$, $p =$

Table 3

Mean Prior Knowledge Scores (%) and Topic Interest Ratings on each Book for Entire Sample (N = 84)

	Prior Knowledge		Topic Interest	
Book	M	SD	M	SD
Space	64.17	18.77	9.85	2.02
Castles	60.95	18.67	7.76	2.21
Animals	67.14	17.46	8.21	2.32

Note. Maximum prior knowledge score is 100% and maximum topic interest rating is 12.

22) on the topic interest covariate.

The data were also reviewed to find out whether children's choice of book may have been affected by prior knowledge and/or topic interest. We found that 27 of the 42 (64%) children chose the book that they had rated highest in topic interest, and 24 children (57%) chose the book on which they obtained the highest prior knowledge score. For 18 of those children (43%), the book chosen was the one representing the topic on which they obtained the highest prior knowledge score as well as their highest interest rating. Finally, seven children (17%) chose a book that was not based on their highest prior knowledge score or highest topic interest rating.

Using these two measures as covariates ensures statistical control of their effects as well as removes their contribution to children's choice of topic leaving any remaining choice effect pure. The correlation between the prior knowledge and topic interest covariates was not significant, $r = .06$, $p = .60$, indicating that their potential effects on the dependent variables are autonomous. In fact, children's prior knowledge and topic interest were uncorrelated for all three topics.

General Analysis Strategy

The data were analyzed in a 2 x 2 (Choice x Format) between -subjects analysis of covariance (ANCOVA) on each dependent variable with prior knowledge and topic interest as covariates. An alpha level of .05 was used for all statistical tests. Pearson correlations were also carried out to ascertain relationships among dependent measures. Significant correlations were found between accuracy and time ($r = -.42$, $p < .001$),

number of actions and sequence quality ($r = -.71$, $p < .001$), and between time and post-search interest ($r = -.30$, $p < .01$).

Text Search Performance Measures

Table 4 displays means for the number of correct answers located and the time spent searching for answers to the search questions for each of the four conditions. Table 5 presents results of the analyses of covariance on text search performance measures.

Accuracy. There was no significant main effect of choice or format on the number of correct answers found, nor was there a significant choice x format interaction. A Pearson correlation coefficient indicated a significant relationship between prior knowledge and accuracy scores, $r = .50$, $p < .001$ with higher prior knowledge scores associated with more correct answers. Further, the prior knowledge covariate uniquely adjusted the accuracy scores. Topic interest was not significantly correlated with accuracy, $r = .15$, $p = .17$, nor did it provide any reliable unique adjustment.

Searching Time. After adjustment by covariates, there was a main effect of choice on mean searching time, but no significant effect of format or choice x format interaction. Children in the choice condition spent less time searching for answers than did those in the no-choice condition. As with accuracy, the prior knowledge covariate was significantly related to searching time, $r = -.38$, $p < .001$, with higher prior knowledge associated with less time searching for answers. Again, the prior knowledge covariate provided a unique adjustment to searching time. The topic interest covariate was not significantly correlated with searching time ($r = -.02$, $p = .86$) and did not provide any

Table 4

Descriptive Statistics of Text Search Performance Measures

Measure				Format	
				Game	Standard
Accuracy					
	Choice	M	Unadjusted	3.38	3.10
			Adjusted	3.35	3.00
		SD		0.80	0.94
		n		21	21
	No-Choice	M	Unadjusted	2.70	2.77
			Adjusted	2.74	2.86
		SD		1.49	1.02
		n		20	22
Time (Minutes)					
	Choice	M	Unadjusted	0.99	1.09
			Adjusted	0.96	1.07
		SD		0.41	0.62
		n		21	21
	No-Choice	M	Unadjusted	1.31	1.63
			Adjusted	1.32	1.67
		SD		0.57	0.70
		n		20	22

Table 5

Analyses of Covariance for Text Search Performance Measures

Source	df	F	
		Accuracy	Time
Prior Knowledge	1	26.29*	14.76*
Topic Interest	1	0.45	2.76
Choice	1	2.78	13.97*
Format	1	0.32	3.69
Choice x Format	1	1.25	1.04
error	78	(0.90)	(0.29)

Note. Values enclosed in parentheses represent mean square errors.
* $p < .001$.

unique adjustment of scores on this measure.

Text Search Process Measures

Sequence Data. The mean number of actions taken to answer the four search questions and the mean quality of the sequencing of those actions are listed in Table 6. Results of the analyses of covariance for text search process measures are presented in Table 7. After adjustment for covariates, there were significant main effects of choice and format, with no interaction of choice and format on the mean number of actions taken to complete the search questions. Children in the choice condition used fewer actions than did those in the no-choice condition and children in the game-like format condition used fewer actions than did those in the standard format condition. Despite these differences, all conditions had a mean of fewer than 4 actions, suggesting an overall efficient text search strategy. Pearson correlation coefficients between prior knowledge and mean number of actions (r = -.05, p = .67) and between topic interest and mean number of actions (r = -.11, p = .30) were not significant. Neither prior knowledge nor topic interest uniquely adjusted scores on this measure.

Similar results were found for sequence quality scores. There were significant main effects for choice and format, but no significant interaction. Again, the choice condition had higher sequence scores than did the no-choice condition and those in the game format condition obtained higher sequence scores than did students in the standard format condition. While main effects were observed, sequence scores overall approached the ceiling score of 20, indicating that students closely approximated the ideal search

Table 6

Descriptive Statistics of Text Search Process Measures

Measure				Format: Game	Format: Standard
Number of Actions					
	Choice	M	Unadjusted	3.29	3.35
			Adjusted	3.28	3.34
		SD		0.39	0.40
		n		21	21
	No-Choice	M	Unadjusted	3.38	3.95
			Adjusted	3.38	3.96
		SD		0.49	1.08
		n		20	22
Sequence Quality					
	Choice	M	Unadjusted	18.63	17.49
			Adjusted	18.62	17.45
		SD		1.64	2.63
		n		21	21
	No-Choice	M	Unadjusted	18.15	15.58
			Adjusted	18.17	15.61
		SD		1.56	2.98
		n		20	22

Table 7

Analyses of Covariance for Text Search Process Measures

Source	df	F	
		Number of Actions	Sequence Quality
Prior Knowledge	1	0.08	1.02
Topic Interest	1	0.05	0.01
Choice	1	5.14*	4.35*
Format	1	4.81*	13.49**
Choice x Format	1	3.16	0.18
error	78	(0.45)	(5.38)

Note. Values enclosed in parentheses represent mean square errors.
* $p < .05$. ** $p < .001$.

route. The prior knowledge and topic interest covariates were not significantly correlated with this process measure with Pearson correlation coefficients of .12 (p = .30) and .14 (p = .20) respectively. Again, sequence scores were not adjusted significantly by either prior knowledge or topic interest.

Interest Measures

Post-Search Interest Questionnaire. Table 8 presents results of the analysis of covariance for post-search interest ratings. After adjusting for covariates, there were no significant main effects of choice or format and no significant interaction between choice and format on the initial three items of the post-search interest questionnaire. Mean interest ratings out of 12 for each condition are presented in Table 9 and ranged from 9.55 to 11.19 with an overall mean of 10.30 (SD = 2.08). Of the two covariates, only topic interest was significantly correlated with post-search interest ratings (r = .47, p < .001), with higher initial interest ratings associated with higher post-search interest ratings of their topic. No significant relationship was evident between prior knowledge and post-search interest (r = .07, p = .51). In addition, the topic interest covariate provided a unique adjustment to post-search interest scores while prior knowledge did not.

Ranking of Topics. As an additional measure of interest, children were asked to rank order the three topics from the topic they liked the most (1) to the one they liked least (3). Descriptive information indicated that within the choice condition, 32 of the 42 children (76%) ranked their chosen book as number 1, following the search tasks. In contrast, 20 of the 42 children (48%) who were assigned their book by the experimenter

Table 8

Analyses of Covariance for Post-Search Interest Ratings

Source	df	F
Prior Knowledge	1	0.14
Topic Interest	1	14.93*
Choice	1	1.29
Format	1	0.30
Choice x Format	1	0.42
error	78	(3.47)

Note. Values enclosed in parentheses represent mean square errors.
* $p < .001$.

Table 9

Mean Post-Search Interest Ratings

Format	Choice			No Choice		
	M		SD	M		SD
	Adjusted	Unadjusted		Adjusted	Unadjusted	
Game	10.39	10.57	1.66	10.17	9.90	2.15
Standard	10.77	11.19	1.17	10.09	9.55	2.70

Note. Maximum score is 12.

ranked their book as the one they liked the most. Correlations between students' initial topic interest ratings and post-search ranking of topics indicated significant relationships for the space book ($r = -.35$, $p < .001$) and the animals book ($r = -.44$, $p < .001$), but not for the castles book ($r = -.19$, $p = .08$). For the space and animals books, the higher students' topic interest rating was at the beginning of search, the better (lower) ranking they received at the end of search.

Self-Generated Question. Two Chi-Square tests of homogeneity were calculated to determine whether choice or format influenced the number of students who elected to ask their own question and search their book for an answer. Results revealed no significant differences for choice ($\chi^2_{(1)} = 0.90$, $p > .05$) or format ($\chi^2_{(1)} = 1.61$, $p > .05$). Results from the entire sample indicated that 58 children (69%) elected to ask their own question and 26 children (31%) declined. Of the 58 children who searched for answers to their self-generated question, only 37 located an answer. The lack of success of the remaining 21 children is attributed to the absence of an appropriate answer in the book.

Topic Effects

Preliminary analyses suggested that books differed in terms of difficulty (accuracy) as well as post-search interest for children in the no-choice condition. These results implied that the castles book may have been the most difficult and the least interesting topic. Accordingly, since more no-choice than choice participants searched the castles book, additional analyses were conducted with topic as a third independent

variable. Data were analyzed in a 3 x 2 x 2 (Topic x Choice x Format) between-subjects analysis of covariance (ANCOVA) on each dependent variable with prior knowledge and topic interest as covariates. Significant topic effects were followed up with post-hoc comparisons using Tukey's HSD. Significant interactions were followed by one-way ANOVA's and Tukey's HSD. Again, an alpha level of .05 was used for all statistical tests. Because of small and unequal cell sizes, Levene's test of equality of error variances was carried out for each analysis. Heterogeneity of variance was noted for the number of actions variable ($F(11,72) = 4.11$, $p < .001$), sequence quality ($F(11,72) = 2.04$, $p < .05$), and post-search interest ratings ($F(11,72) = 2.21$, $p < .05$). Although these analyses are exploratory in nature, it is noted that the results may lack validity.

Results of the analyses of covariance on text search performance measures are presented in Table 10. Table 11 displays descriptive statistics for each condition on accuracy. As in the main analyses, there were no main effects of choice, or format on accuracy, nor was there a significant choice x format interaction. There was, however, a main effect of topic on the number of correct answers found. Tukey's HSD indicated that children searching the animals book found more correct answers than did children searching the castles book. Topic did not significantly interact with choice or format and there was no significant three-way interaction. As before, the prior knowledge covariate significantly adjusted accuracy scores, while the topic interest covariate did not.

Main effects were found for choice, format, and topic on mean searching time. Children in the choice condition were faster than those in the no-choice condition, and

Table 10

3 x 2 x 2 Analyses of Covariance for Text Search Performance Measures

Source	df	F	
		Accuracy	Time
Prior Knowledge	1	18.30***	11.60***
Topic Interest	1	0.48	0.29
Choice	1	1.75	10.16**
Format	1	0.30	8.97**
Topic	2	3.57*	4.66*
Choice x Format	1	1.32	0.25
Choice x Topic	2	0.35	0.61
Format x Topic	2	0.58	3.70
Choice x Format x Topic	2	0.28	0.36
error	70	(0.88)	(0.25)

Note. Values enclosed in parentheses represent mean square errors.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 11

Descriptive Statistics of Choice and Format Conditions for each Topic on Accuracy

Format		Topic		
		Space	Castles	Animals
			Choice	
Game				
M	Unadjusted	3.54	3.33	3.00
	Adjusted	3.42	2.99	3.37
SD		0.88	0.58	0.71
n		13	3	5
Standard				
M	Unadjusted	2.83	2.50	3.45
	Adjusted	2.71	2.63	3.29
SD		0.98	1.29	0.69
n		6	4	11
			No-Choice	
Game				
M	Unadjusted	3.00	1.60	3.17
	Adjusted	2.84	1.95	3.25
SD		1.22	1.52	1.60
n		9	5	6
Standard				
M	Unadjusted	2.40	2.38	3.33
	Adjusted	2.65	2.55	3.25
SD		0.89	1.19	0.71
n		5	8	9

children in the game format were faster than those in the standard format. Post-hoc analyses indicated that searching times were faster for the animals book than for the space book. Mean searching times of choice and format conditions on each topic are presented in Table 12. Main effects of format and topic are qualified by a significant format x topic interaction. Results from one-way ANOVAs showed that topic differences were evident in the standard format, but not in the game format (See Figure 1). In the standard format condition, children searching the animals book were faster than those searching the space book and faster than those searching the castles book. Searching times did not differ between the space and castles books. Two-way interactions between choice and format and between choice and topic were not significant, nor was the three-way interaction. The prior knowledge covariate remained a significant factor in this analysis, while the topic interest covariate did not contribute uniquely to searching time.

Results of the analyses of covariance on text search process measures are presented in Table13. Table 14 displays descriptive statistics of each condition on the number of actions taken to search for answers. Main effects of choice, format, and topic were found on the mean number of actions taken to complete the search questions. Children in the choice condition used fewer actions than did those in the no-choice condition, and children given the game format used fewer actions than did those given the standard format. Children searching the animals book, as well as those searching the

Table 12

Descriptive Statistics of Choice and Format Conditions for each Topic on Searching Time

Format		Topic		
		Space	Castles	Animals
			Choice	
Game				
M	Unadjusted	1.07	0.80	0.91
	Adjusted	1.07	0.94	0.78
SD		0.47	0.34	0.27
n		13	3	5
Standard				
M	Unadjusted	1.52	1.51	0.70
	Adjusted	1.51	1.42	0.76
SD		0.78	0.38	0.26
n		6	4	11
			No-Choice	
Game				
M	Unadjusted	1.34	1.15	1.40
	Adjusted	1.36	1.06	1.43
SD		0.58	0.34	0.77
n		9	5	6
Standard				
M	Unadjusted	2.15	1.80	1.18
	Adjusted	2.06	1.77	1.26
SD		0.73	0.69	0.42
n		5	8	9

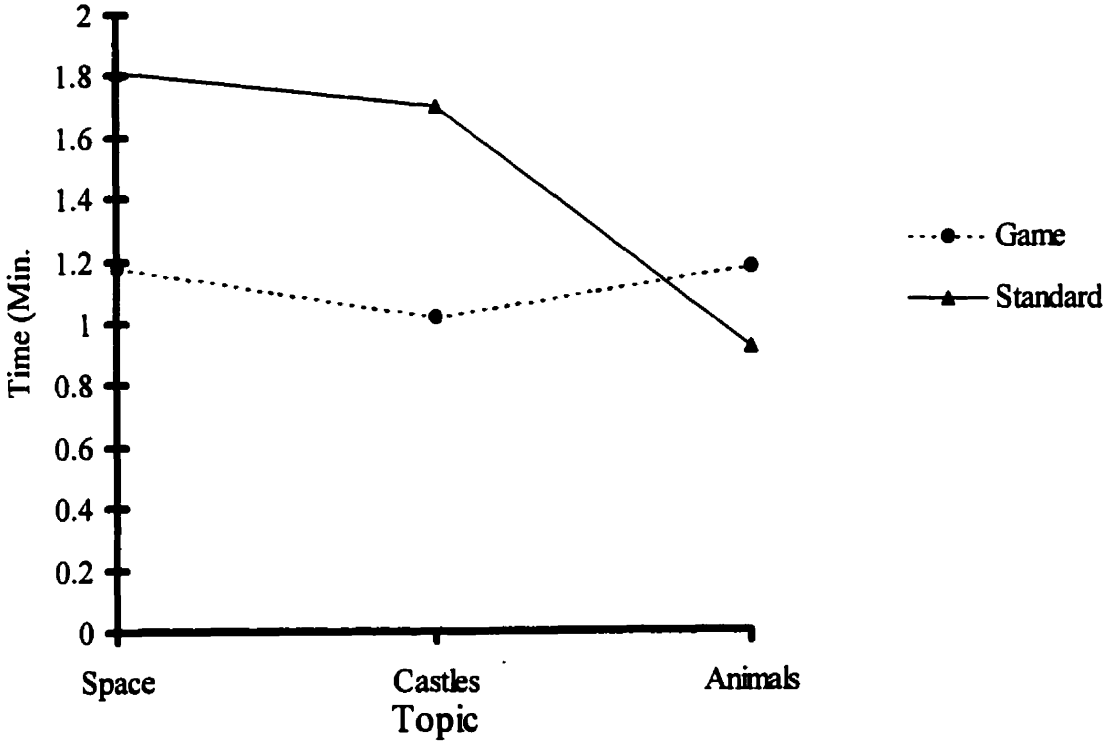

Figure1. Mean searching time by format and topic; two-way interaction pooled across choice conditions.

Table 13

3 x 2 x 2 Analyses of Covariance for Text Search Process Measures

Source	df	F	
		Number of Actions	Sequence Quality
Prior Knowledge	1	0.01	0.81
Topic Interest	1	0.55	1.08
Choice	1	6.00*	4.09*
Format	1	9.30**	18.00***
Topic	2	5.23**	5.84**
Choice x Format	1	3.86	1.77
Choice x Topic	2	2.29	0.24
Format x Topic	2	1.34	2.28
Choice x Format x Topic	2	1.80	0.95
error	70	(0.39)	(4.74)

Note. Values enclosed in parentheses represent mean square errors.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 14

Descriptive Statistics of Choice and Format Conditions for each Topic on Number of Actions Taken to Search for Answers

Format			Topic		
			Space	Castles	Animals
				Choice	
Game					
	M	Unadjusted	3.37	3.00	3.25
		Adjusted	3.41	3.00	3.23
	SD		0.44	0.00	0.31
	n		13	3	5
Standard					
	M	Unadjusted	3.42	3.25	3.34
		Adjusted	3.48	3.29	3.35
	SD		0.13	0.35	0.52
	n		6	4	11
				No-Choice	
Game					
	M	Unadjusted	3.53	3.19	3.38
		Adjusted	3.56	3.06	3.32
	SD		0.63	0.22	0.34
	n		9	5	6
Standard					
	M	Unadjusted	4.95	3.78	3.56
		Adjusted	4.94	3.74	3.51
	SD		1.80	0.70	0.43
	n		5	8	9

castles book, both used fewer actions than did children searching the space book, but did not differ from each other. None of the two-way interactions were significant, nor was there a significant three-way interaction.

Similar results were found on the quality of sequence scores (See Table 15 for descriptive statistics). Main effects were evident for choice, format, and topic. Children in the choice and game conditions obtained higher sequence scores than did those in the no-choice and standard format conditions, respectively. In addition, children searching the castles book obtained a higher sequence score than did children searching the space book, while sequence scores on the animals book did not significantly differ from the other two books. Again, the interaction between choice and format, between choice and topic, and between format and topic were not significant, nor was the three-way interaction.

Descriptive statistics for each condition on post-search interest ratings are presented in Table 16. Post-search interest ratings were not significantly affected by choice, format, or topic (See Table 17 for results of the 3 x 2 x 2 ANCOVA on post-search interest ratings). There was, however, a significant format x topic interaction. One -way ANOVA's indicated that topics were rated differently in the standard format condition, but not in the game format condition. Means for the significant interaction are illustrated in Figure 2. In the standard format, the castles book was rated as less interesting than both the animals book and the space book, while the animals and space book ratings did not

Table 15

Descriptive Statistics of Choice and Format Conditions for each Topic on Sequence Quality

Format			Topic		
			Space	Castles	Animals
				Choice	
Game					
	M	Unadjusted	18.46	20.00	18.25
		Adjusted	18.23	19.81	18.55
	SD		1.55	0.00	2.14
	n		13	3	5
Standard					
	M	Unadjusted	15.46	19.13	18.00
		Adjusted	15.15	19.06	17.88
	SD		2.37	1.01	2.63
	n		6	4	11
				No-Choice	
Game					
	M	Unadjusted	17.83	19.55	17.46
		Adjusted	17.61	19.93	17.72
	SD		1.78	0.76	1.02
	n		9	5	6
Standard					
	M	Unadjusted	13.95	15.28	16.75
		Adjusted	14.14	15.54	16.88
	SD		3.25	3.15	2.46
	n		5	8	9

Table 16

Descriptive Statistics of Choice and Format Conditions for each Topic on Post-Search Interest Ratings

Format			Topic		
			Space	Castles	Animals
				Choice	
Game					
	M	Unadjusted	10.62	11.33	10.00
		Adjusted	10.10	11.32	10.29
	SD		1.66	0.58	2.12
	n		13	3	5
Standard					
	M	Unadjusted	11.67	10.50	11.18
		Adjusted	10.91	10.06	11.07
	SD		0.52	1.73	1.17
	n		6	4	11
				No-Choice	
Game					
	M	Unadjusted	10.89	9.20	9.00
		Adjusted	10.45	9.78	9.68
	SD		1.05	1.10	3.41
	n		9	5	6
Standard					
	M	Unadjusted	10.20	7.50	11.00
		Adjusted	10.37	8.02	11.53
	SD		1.48	2.20	2.65
	n		5	8	9

Table 17

3 x 2 x 2 Analysis of Covariance for Post-Search Interest Ratings

Source	df	F
Prior Knowledge	1	0.13
Topic Interest	1	11.65**
Choice	1	2.13
Format	1	0.02
Topic	2	1.36
Choice x Format	1	0.12
Choice x Topic	2	1.58
Format x Topic	2	3.48*
Choice x Format x Topic	2	0.61
error	70	(3.01)

Note. Values enclosed in parentheses represent mean square errors.
* $p < .05$, ** $p < .001$.

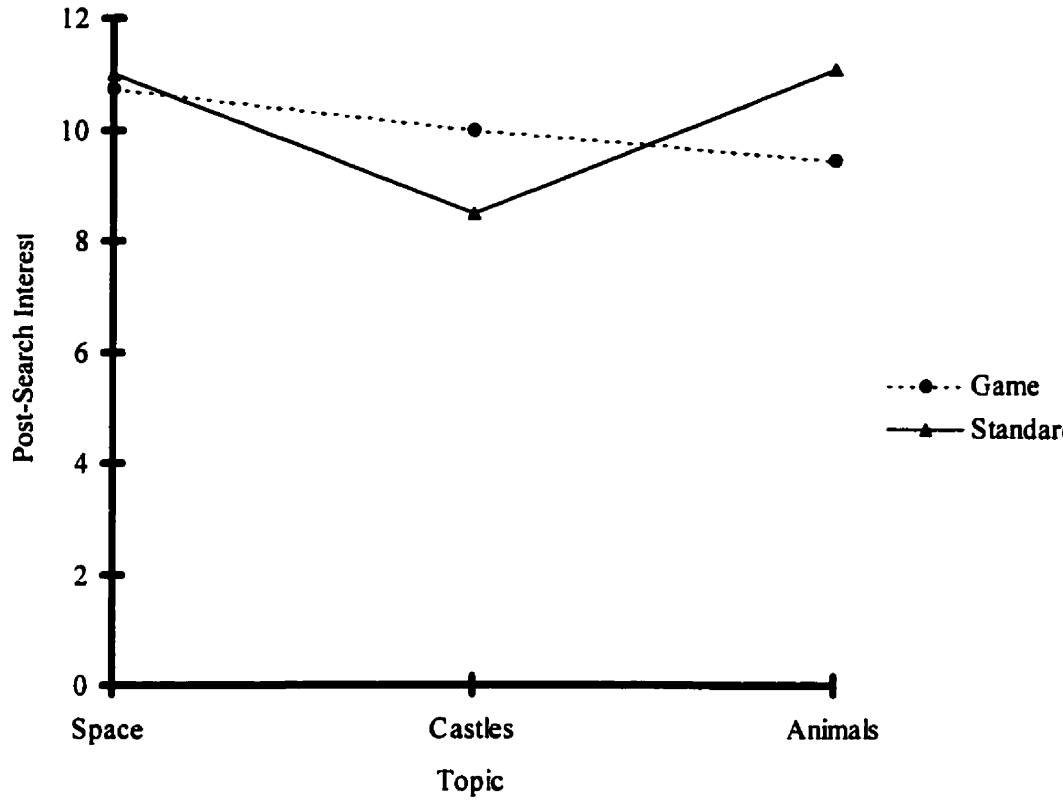

Figure 2. Post-search interest ratings by format and topic; two-way interaction pooled across choice conditions.

significantly differ from each other. No other two-way interactions were significant, nor was there a significant three-way interaction. The initial topic interest covariate again uniquely adjusted post-search interest ratings, while the prior knowledge covariate did not.

Discussion

This study is the first to investigate the effects of motivational variables on young children's information–seeking skills using an experimental paradigm. It was designed to explore the possible influence of providing children with an opportunity to choose their learning materials and to express their learning in an interesting game-like format. The hypotheses predicted that choice and situational interest created by an appealing format would result in improved text search performance, a more efficient search process, and higher subsequent interest, than would experimenter selected materials and a standard worksheet format. In addition, the study attempted to measure and tease apart the contributions of prior knowledge and topic interest, two factors that have been shown in past research to affect success on various learning tasks (Alexander, 1997; Asher et al., 1978; Baldwin et al., 1985; Byrnes & Guthrie, 1992).

Results provided evidence in support of some of the hypotheses put forth in the study. Both choice and format had an impact on some of the dependent measures involving text search. The main finding in support of a facilitative effect of format was on the text search process measures. Children who wrote their answers on pictures and pasted them on a theme board used fewer actions to locate answers and had an overall more efficient search sequence than did those who recorded their answers on a standard

worksheet. In addition, although children using the more appealing format did not do better on performance measures, the effect of format on time to locate an answer approached significance. Thus, it appears that format improved children's stance or approach toward the task, but was not strong enough to demonstrate performance differences. Interesting contexts may encourage students to persist with a task, but this does not guarantee that they will perform the requisite skills (Hidi, 1990). However, when book topic was considered as a variable, format did have some impact on searching time. When children were given the game format, time to locate an answer did not vary according to the book used. In contrast, for children in the standard format, searching times depended on the book searched. This implies that use of a game-like format overcame differences that would otherwise be affected by the book searched. The appealing format was intended to arouse children's situational interest through novelty as did Cordova and Lepper's (1996) fantasy condition and the 'detective game' used by de Sousa and Oakhill (1996). Further, it was assumed that children would welcome a more "fun" way to express their responses and dislike the traditional worksheet as reported by Worthy et al. (1998). In contrast to these studies, children in the appealing format condition did not indicate higher post-experimental interest than did children in the worksheet condition. Several explanations might account for these differences. First, the worksheet was not 'typical' of those used in classroom situations and may have appealed to students, particularly as students in this condition were not aware of the alternative format. Unlike de Sousa and Oakhill (1996), who used a within-subjects design, we could

not take advantage of the contrast between response formats. Second, it seems reasonable to state that a fantasy computer game (Cordova & Lepper, 1996) might represent a more powerful manipulation of situational interest than that used in the present study. Third, motivation as measured by the post-search interest inventory was high for all conditions, suggesting that in general all children enjoyed participating in the study. Finally, a format by topic interaction suggested that the specific book being searched must be considered in order for format effects to be apparent. Again, when given the game format, all books were rated as equally interesting, but book/topic effects were evident in the standard format condition. While this finding suggests further evidence that the more appealing format compensated for book differences, it is not clear whether topics differed because individual books were more or less interesting or alternatively more or less difficult in some way. Either of these explanations may also account for the format by topic interaction on mean searching times as well.

The book being searched affected all of the dependent measures, despite equivalent readability levels. It appears that, in general, children searching the animals book may have had the advantage, while no consistent advantage was shown for the space and castles books. As mentioned, this may have been due to the difficulty or appeal of individual books or may otherwise have resulted from individual differences among children. Regardless of the cause, these results indicate that the texts used in classroom activities have an effect on children's performance. More important for the present study is the fact that even when these differences were accounted for in the additional analyses,

choice of topic and type of format remained important factors affecting children's information-seeking skills. In some cases, an appealing format compensated for book differences. These results highlight the importance of including motivational variables in text search research.

Findings confirmed the effect of choice on children's text search performance as well as on search process. The opportunity to self-select a topic reduced the amount of time that children spent searching for answers, and resulted in the use of fewer actions to locate an answer, with a more efficient sequence of their searches. These results are consistent with previous studies reporting benefits of choice on children's arithmetic learning (Cordova & Lepper, 1996), associative recall (Perlmuter & Monty, 1977), and reading attitudes and intrinsic motivation (Guthrie et al., 1996; Morrow, 1992). But, what was the mechanism by which choice affected learning? A priori predictions concerning an effect of choice drew on several lines of research.

First, it was assumed that prior knowledge and/or topic interest might contribute to children's choice of book and that these factors might account for improved performance. For example, increased knowledge might have aided children in identifying a key word in the search questions, enabled them to be more planful in their approach, permitted faster location of answers by skimming more rapidly through familiar information, or prompted their recognition of the correct answer when it was located. Two studies within the text search literature provided evidence of the mediating effects of prior knowledge on various components of locating information tasks (Byrnes & Guthrie, 1992; Symons & Pressley,

1993). Likewise, personal interest in the topic might have enhanced the quality and performance of text search by motivating children to allocate more attention and to become more engaged in the task (Hidi, 1990). To date, the text search literature lacks research investigating the effects of topic interest on information-seeking skills. Previous reading research, however, indicates that high-knowledge and high-interest readers remember more of what they read in expository texts (Alexander, Kulikowick, & Schulze, 1994) and show higher comprehension on narrative passages (Baldwin et al., 1985), but much of the research confounds these two variables (e.g. Asher & Markell, 1974; Belloni & Jongsma, 1978).

The current study attempted to tease apart the effects of prior knowledge and topic interest as well as to statistically remove their contribution to choice of topic. Results indicated a strong correlation between prior knowledge and text search performance measures, with prior knowledge contributing uniquely to both accuracy and time to locate an answer. As in Symons and Pressley (1993), prior knowledge may have improved accuracy by enabling children to recognize correct answers when they were encountered. Byrnes and Guthrie's (1992) finding that prior knowledge decreased searching time was confirmed using different methodology and a much younger population. Taken together, these findings provide further evidence to support the inclusion of prior knowledge as an important factor in text search research.

In contrast, topic interest did not emerge as a unique contributor to children's information-seeking skills. This conflicts with a host of previous studies demonstrating

the benefits of topic interest on children's reading comprehension. Indeed, the literature on the relationship between topic interest and reading comprehension seems to be nearly universal in concluding that children have better comprehension when they read material in which they have personal interest (Baldwin et al., 1985). However, as previously noted, two methodological limitations, the failure to account for prior knowledge and the contrast phenomenon in within-subjects designs, make it difficult to ascertain whether topic interest per se has a causal impact on reading comprehension. One study (Asher et al., 1978) showed empirical support for a topic interest effect in a between-subjects design, but failed to account for prior knowledge. Two studies (Baldwin et al., 1985; Weber, 1980) were found that addressed the prior knowledge issue separately from topic interest, though both used a within-subjects design. Studies addressing both of the mentioned limitations could not be located. With a college population, Weber (1980) found that the amount of variance contributed by each variable was significantly affected by the order in which the two variables were entered into a regression equation. Prior knowledge accounted for a large significant portion of the variance regardless of when it was entered. On the other hand, when prior knowledge was entered first, it accounted for almost all of the variance previously accounted for by topic interest, but interest still accounted for a significant though small amount of variance in comprehension on some of the passages. One might assume that prior knowledge and topic interest are highly correlated, and that prior knowledge may for the most part be the causal element (Guthrie, 1981). Weber's (1980) findings indicated that prior knowledge and topic interest were highly correlated

and that the two factors had an additive effect on reading comprehension. Baldwin et al. (1985) confirmed the separate and additive effects of prior knowledge and topic interest. However, surprisingly, they found that these two factors were not correlated, but autonomous factors affecting reading comprehension.

The present study also found little association between prior knowledge and topic interest. These two factors were uncorrelated for each of the three topics included. Although this finding seems counterintuitive, Baldwin et al. (1985) offer a reasonable explanation. Their study, as well as the current one, was conducted with school-aged children; grades seven and eight, and grade three respectively. They argue that as people get older and increasingly specialized, knowledge and interest may come to correspond closely. In school, children are forced to study a variety of topics, and thus it is not surprising that many students could be fairly knowledgeable about topics without having any real enthusiasm for those topics (p. 502). If this argument is valid, the lack of correspondence between prior knowledge and topic interest might be expected for younger children.

The current design set out to address limitations inherent in previous studies of reading comprehension on a different type of reading performance – reading to locate information. It used a between-subjects design, thereby eliminating a contrast effect, and disentangled confounding effects of prior knowledge and topic interest. Despite the lack of association between prior knowledge and topic interest and the lack of effect of topic interest on text search measures, personal interest should not be dismissed from text

search research. Sufficient evidence exists in previous reading comprehension research to conclude that topic interest does play some facilitative role. Further, children's interest in their topic was highly correlated with and uniquely adjusted their post-search interest ratings. It is conceivable, then, that topic interest affected motivation and had an indirect effect of student's performance that was not detected in the current design. In addition, descriptive information gleaned in the present study did suggest that many children chose the book on which they obtained the highest topic interest rating and/or highest prior knowledge score. It is left for future researchers to confirm or deny effects of personal topic interests on information-seeking skills and to examine the interest-knowledge relationship in this domain.

Choice of book was influenced by the amount of interest and knowledge children possessed in the topic. What is more interesting, however, is the fact that the observed effects of choice observed were over and above the contribution of these factors. This finding alludes to a second line of research; self-determination, autonomy and control over the learning situation as important aspects of choice. When individuals are given the freedom to make choices and decisions, their sense of self-determination or autonomy is increased. The more autonomous the behavior, the more it is endorsed by the whole self and is experienced as action for which one is responsible (Deci & Ryan, 1987, p. 1025). The literature is replete with evidence to support the notion that autonomy is associated with intrinsic motivation (Morrow, 1992), greater interest (Cordova & Lepper, 1996), more cognitive flexibility (Deci & Ryan, 1987), engagement in an activity (Alexander,

1997), and learning in a wide variety of situations (Perlmuter & Monty, 1977).

Choice is also a crucial variable in enhancing an induced sense of control (Langer & Rodin, 1976), which in turn has shown benefits on learning (Perlmuter & Monty, 1977) as well as on measures such as physiological (Stotland & Blumenthal, 1964, as cited in Langer & Rodin, 1976) and psychological health (Langer & Rodin, 1976). Stotland and Blumenthal studied the effects of choice on anxiety reduction. In their study, participants were told they would be taking a number of ability tests; half were given a choice as to the order the tests would be administered. They found that participants given this choice showed less anxiety, as measured by palmar sweating, than did participants not given control through choice. Langer and Rodin (1976) assessed the effects of choice and autonomy on self-report and behavioral measures of well-being of residents in a nursing home. Some residents were given a communication emphasizing their responsibility for themselves and their freedom to make choices regarding day to day activities, while others were told they would be well cared for by staff and were assigned activity participation times. Results indicated that residents for whom self-determination was emphasized showed significant improvement over the comparison group on alertness, active participation, and a general sense of well-being.

Although the choice provided in the present study may appear inconsequential to some, choice of learning materials may represent a rare and meaningful activity for young children. Several recent studies highlighted barriers to self-selected reading materials in elementary school classrooms (Worthy, 1996; Worthy, Moorman, & Turner, 1999;

Worthy et al., 1998). For example, a frequently cited reason for not including free-choice reading was the pressure teachers felt to explicitly cover the curricula and skills needed to do well on statewide competency tests (Worthy et al., 1998). These researchers also noted a mismatch between students' preferred materials and those available through school sources. In addition, the opportunity for children to select their own reading materials is undermined by the fact that students are often required to check out books from the school library (Worthy et al., 1999). This requirement could be viewed as a controlling rather than an autonomy-supportive event (Deci & Ryan, 1987).

A review of the results as a whole in the present study suggests that these children were highly successful in their use of information-seeking strategies, with performance and process measures approaching ceiling levels. As a group, these children averaged three out of four correct responses to search questions and located answers quite rapidly with a mean time of just over 75 seconds per question. In general, children also closely approximated an ideal search route, with an overall sample mean of 17.46 out of a maximum of 20 on search quality scores. These findings are widely discrepant with reports from previous research indicating that adults and children experience difficulty with reading to locate tasks (e.g. Dreher & Brown, 1993; Guthrie & Dreher, 1990). An overview of the methodology and materials used in the study in light of what is already known about text search, provides some explanations for this discrepancy.

First, all children were given an orientation to the books' access systems which included some modeling of identifying a key word as well as how to use an index and

table of contents. Some evidence exists to suggest that young children benefit from such an orientation. Symons et al. (Study 3, Unpublished Manuscript) found that instruction in any aspect of text search was effective in improving students' observable search strategies. Third and fourth graders who were given instruction in category selection only (identifying key words and index use) obtained relatively high search sequence scores that equaled those obtained by children given full strategy instruction in category selection, extraction of information, and monitoring of their accuracy. That instruction was inherent in the present orientation was evidenced by the fact that virtually all children in the study chose to access either the table of contents or index as their first action rather than a more general and haphazard action such as flipping through the text. In addition, it was discovered that these children had received minimal, but direct instruction in locating information skills in their classrooms, thus they might have represented a somewhat biased sample.

Second, the books chosen for this study were at a readability level that was lower than that used in previous studies with children. Based on past research suggesting poorly developed information-seeking skills with this age group, the current study employed easier texts that were at the grade three reading level. An advantage of this would be the elimination of possible confounding of reading comprehension and reading to locate skills. However, the reading abilities of this sample were not measured and thus these texts may have been too easy. More challenging books may have resulted in a wider variation in performance.

The structure of the books used also may have contributed to the present results. The literature has implicated characteristics of texts and document structure as mediators of search success (Byrnes & Guthrie, 1992; Guthrie et al., 1991; Kobasagawa et al., 1988). The 'I Wonder Why' series contains a table of contents and index that are equally specific and are laid out in such a way as to enable the identification of separate categories at a glance. Further, the books are well organized with clearly marked sections throughout. For example, each individual page contains only one or two headings in large print. This would reduce the amount of time children needed to identify an appropriate section and to skim for information. Kobasagawa et al. (1988) have shown that headings facilitated efficient search of text and that young children are aware that text features such as headings aid in information-seeking. Guthrie (1988) reported that two components of Guthrie and Mosenthal's (1987) cognitive processing model, category selection and information extraction, together accounted for a large amount of variance in time taken to complete a text search task. Coupled with an orientation to the books' access systems (category selection), the organization of these books probably enhanced children's efforts in both category selection and information extraction.

Finally, the complexity of the task in terms of the number of pieces of information that must be located (Dreher & Guthrie, 1990) and the specificity of the question, (Dreher & Brown, 1990, as cited in Dreher, 1992; Yussen et al., 1993) has been shown to affect performance on search tasks. Search questions in the present study required the location of only one piece of information and included explicit searchable terms that could be

located in either the index or table of contents. In addition, answers to questions were stated explicitly in the books and thus did not necessitate any inferencing on the part of the children. Yussen et al. (1993) found that college students experience difficulty when search questions do not include an explicit searchable term. They reported that the amount of time needed to locate an answer to *indexed* questions (explicit term) was significantly lower than searching times for non-indexed questions, and further that students rarely found any answer or ran out of time on non-indexed questions. Similarly, Dreher and Brown (1990, as cited in Dreher, 1992) assessed the performance of college students on simple and complex search questions. The complex question required students to make higher level inferences and to generate their own searchable term. Results indicated that 57% of students were successful in locating an answer to the simple question, while the success rate for the question without a stated term dropped to 29%. Children in the current study, then, were assessed under conditions that provided opportunity for successful and efficient completion of tasks.

Asking children why they chose one book over another as well as why topics were ranked as they were at the end of the search tasks might have been beneficial. It would be interesting to find out if young children make choices based on conscious awareness of how knowledgeable or how interested they are in a topic. Queries about post-search ranking may have shed more light on whether the search activity influenced this measure. Several students spontaneously offered that they chose a book because they liked the cover, but did not like the book once they looked inside to search. In this case, neither

topic interest nor prior knowledge may have had an impact on choices for these children. Rather, a form of situational interest may have played a role.

Children in this study were also asked if they would like to generate their own search question. This was used as a measure of post-search interest, but it would be interesting to compare children's performance and search sequence on an internally-imposed versus externally-imposed questions. Many of the questions generated by the children did not contain searchable terms that were included in the index and/or the texts did not contain appropriate answers to their questions, thus it would have been difficult to obtain objective comparisons. Very little research exists concerning children's searching for answers to internally-imposed questions (Armbruster & Armstrong, 1993). This would be a useful avenue to explore in future text search studies involving motivational components, particularly as self-generated questions might be defined as autonomous behavior.

This study is the first empirical investigation of motivational factors on reading to locate tasks. Additional studies are needed to replicate the present findings and to explore the effects of other motivational variables on information-seeking. The present study included children in grade three only. Studies with older populations are needed to determine the generalizability of motivational effects across developmental levels. Other literature bases provide overwhelming evidence of the benefits on learning when people are motivated and it is time to integrate affective and motivational factors with cognitive aspects of text search. It is also suggested that future research study the effects of prior

knowledge and topic interest with methods that will disentangle their unique contributions on performance. This too should be studied from a developmental perspective, as knowledge and interest may be unrelated when children are young, but correspond closely in older populations.

In this age of information explosion, both children and adults must necessarily learn to locate needed information both quickly and accurately. Perhaps instruction in schools might change its focus from imparting content to students to teaching children efficient ways to access information. In doing this, educators should keep in mind the benefits of providing an autonomy – supportive environment (Deci & Ryan, 1987) and materials and activities that reflect the interests of children. Children need to have both the 'will' and the 'skill' to be successful (Pintrich & De Groot, 1990).

References

Alexander, P. A. (1997). Knowledge-seeking and self-schema: A case for the motivational dimensions of exposition. Educational Psychologist, 32(2), 83-94.

Alexander, P. A., Kulikowick, J. M., & Schulze, S. K. (1994). How subject-matter knowledge affects recall and interest on the comprehension of scientific composition. American Educational Research Journal, 31, 313-337.

Armbruster, B.B., & Armstrong, J. O. (1993). Locating information in text: A focus on children in the elementary grades. Contemporary Educational Psychology, 18, 139-161.

Asher, S. R. (1979). Influence of topic interest on black children's and white children's reading comprehension. Child Development, 50, 686-690.

Asher, S. R., & Markell, R. A. (1974). Sex differences in comprehension of high- and low interest reading material. Journal of Educational Psychology, 66(5), 68687.

Asher, S. R., Hymel, S., & Wigfield, A. (1978). Influence of topic interest on children's reading comprehension. Journal of Reading Behavior, 10, 35-47.

Avison, B. (1997). I wonder why I blink and other questions about my body. New York: Kingfisher Books.

Baldwin, R. S., Peleg-Bruckner, Z., & McClintock, A. H. (1985). Effects of topic interest and prior knowledge on reading comprehension. Reading Research Quarterly, 20(4), 497-504.

Belloni, L. F., & Jongsma, E. A. (1978). The effects of interest on reading comprehension of low-achieving students. Journal of Reading, 22, 106-109.

Bernstein, M. R. (1955). Relationship between interest and reading comprehension. Journal of Educational research, 49, 283-288.

Byrnes, J. P., & Guthrie, J. T. (1992). Prior conceptual knowledge and textbook search. Contemporary Educational Psychology, 17, 8-29.

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. Journal of Educational Psychology, 88(4), 715-730.

Creative Research Group. (1987). Literacy in Canada. Ontario: Creative Research group.

Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. Journal of Personality and Social Psychology, 53(6), 1024-1037.

de Sousa, I., & Oakhill, J. (1996). Do levels of interest have an effect on children's comprehension monitoring performance? British Journal of Educational Psychology, 66(4), 471-482.

Dreher, M. J. (1992). Searching for information in textbooks. Journal of Reading, 35, 364-371.

Dreher, M. J. (1993). Reading to locate information: Societal and educational perspectives. Contemporary Educational Psychology, 18, 129-138.

Dreher, M. J., & Brown, R.F. (1993). Planning prompts and indexed terms in textbook search tasks. Journal of Educational Psychology, 85, 662-669.

Dreher, M. J., & Guthrie, J. T. (1990). Cognitive processes in textbook chapter search tasks. Reading Research Quarterly, 25, 323-339.

Dreher, M. J., & Sammons, R. B. (1994). Fifth graders' search for information in a textbook. Journal of Reading Behavior, 26, 301-314.

Estes, T. H., & Vaughan, J. L. (1973). Reading interest and comprehension: Implications. Reading Teacher, 27, 149-153.

Fry, E. (1968). A readability formula that saves time. Journal of Reading, 513-578.

Ganeri, A. (1993). I wonder why camels have humps and other questions about animals. New York: Kingfisher Books.

Guthrie, J. T. (1981). Reading interests. The Reading Teacher, 34, 984-986.

Guthrie, J. T. (1988). Locating information in documents: Examination of a cognitive model. Reading Research Quarterly, 23, 178-199.

Guthrie, J. T., & Alao, S. (1997). Designing contexts to increase motivations for reading. Educational Psychologist, 32(2), 95-105.

Guthrie, J. T., Britten, T., & Barker, K.G. (1991). Roles of document structure, cognitive strategy, and awareness in searching for information. Reading Research Quarterly, 26, 300-324.

Guthrie, J. T., & Dreher, M. J. (1990). Literacy as search: Explorations via computer. In D. Nix & R. Spiro (Eds.), Cognition, education and multimedia: Exploring ideas in high technology. Hillsdale, NJ: Erlbaum.

Guthrie, J. T., & Kirsch, I. S. (1987). Distinctions between reading comprehension and locating information in text. Journal of Educational Psychology, 79(3), 220-227.

Guthrie, J. T., & Mosenthal, P. (1987). Literacy as multi-dimensional: Locating information and reading comprehension. Educational Psychologist, 22, 279-297.

Guthrie, J. T., Van Meter, P., McCann, A. D., Wigfield, A., Bennett, L., Poundstone, C., Rice, M. E., Faibisch, F. M., Hunt, B., & Mitchell, A. M. (1996). Growth of literacy engagement: Changes in motivations and strategies during concept-oriented reading instruction. Reading Research Quarterly, 31(3), 306-332.

Guthrie, J. T., Weber, S., & Kimmerly, N. (1993). Searching documents: Cognitive processes and deficits in understanding graphics, tables, and illustration. Contemporary Educational Psychology, 18, 186-221.

Hidi, S. (1990). Interest and its contribution as a mental resource for learning. Review of Educational Research, 60(4), 549-571.

Kirsch, I. S., & Guthrie, J. T. (1984). Adult reading practices for work and leisure. Adult Education Quarterly, 34(4), 213-232.

Kirsch, I. S., & Mosenthal, P. (1990). Exploring document literacy: Variables underlying the performance of young adults. Reading Research Quarterly, 25, 5-31.

Kobasigawa, A., Lacasse, M., & MacDonald, V. (1988). Use of headings for text search. Canadian Journal of Behavioral Science, 20(1), 50-63.

Langer, E. J., & Rodin, J. (1976). The effects of choice and enhanced personal responsibility for the aged: A field experiment in an institutional setting. Journal of Personality and Social Psychology, 34(2), 191-198.

Mikulecky, L. (1982). Job literacy: The relationship between school preparation and workplace actuality. Reading Research Quarterly, 17, 400-419.

Morrow, L. M. (1992). The impact of a literature-based program on the literacy achievement, use of literature, and attitudes of children from minority backgrounds. Reading Research Quarterly, 27(3), 250-275.

Pauk, W. (1973). The interest level – that's the thing. Journal of Reading, 16, 459-461.

Perlmuter, L. C., & Monty, R. A. (1977). The importance of perceived control: Fact or fantasy? American Scientist, 65, 759-765.

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. Journal of Educational Psychology, 82(1), 33-40.

Schraw, G., Bruning, R., & Svoboda, C. (1995). Sources of situational interest. Journal of Reading Behavior, 27(1), 1-17.

Schraw, G., & Dennison, R. S. (1994). The effect of reader purpose on interest and recall. Journal of Reading Behavior, 26(1), 1-18.

Shirey, L. S., & Reynolds, R. E. (1988). Effect of interest on attention and learning. Journal of educational Psychology, 80, 159-166.

Statistics Canada. (1995). Literacy, economy, and society. Canada: OECD.

Steele, P. (1994). I wonder why castles have moats and other questions about long ago. New York: Kingfisher Books.

Stevens, K. (1980). The effect of topic interest on the reading comprehension of higher ability students. Journal of Educational research, 73, 365-368.

Stott, C. (1993). I wonder why stars twinkle and other questions about space. New York: Kingfisher Books.

Symons, S., MacLatchey-Gaudet, H., Stone, T., & Reynolds, P. L. (1998). Strategy instruction for elementary students searching informational text. Manuscript submitted for publication.

Symons, S., & Pressley, M. (1993). Prior knowledge affects text search success and extraction of information. Reading Research Quarterly, 28, 250-261.

Symons, S. & Specht, J. (1994). Including both time and accuracy in defining text search efficiency. Journal of Reading Behavior, 26, 267-276.

Turner, J. C. (1995). The influence of classroom contexts on young children's motivation for literacy. Reading Research Quarterly, 30(3), 410-441.

Weber, C. K. (1980). Cognitive and affective influences on text comprehension. Dissertation Abstracts International, 40, 5802A. (University Microfilms No. 8010310).

Wigfield, A. (1997). Reading motivation: A domain-specific approach to motivation. Educational Psychologist, 32(2), 59-68.

Wigfield, A., & Guthrie, J. T. (1997). Relations of children's motivation to the amount and breadth of their reading. Journal of Educational Psychology, 89(3), 420-432.

Winn, W. (1993). An account of how readers search for information in diagrams. Contemporary Educational Psychology, 18, 162-185.

Worthy, J. (1996). Removing barriers to voluntary reading for reluctant readers: The role of school and classroom libraries. Language Arts, 73, 483-492.

Worthy, J., Moorman, M., & Turner, M. (1999). What Johnny likes to read is hard to find in school. Reading Research Quarterly, 34(1), 12-27.

Worthy, J., Turner, M., & Moorman, M. (1998). The precarious place of self-selected reading. Language Arts, 75(4), 296-304.

Wurman, R. S. (1989). Information anxiety: What to do when information doesn't tell what you need to know. New York: Bantam.

Yussen, S. R., Stright, A. D., & Payne, B. (1993). Where is it? Searching for information in a college textbook. Contemporary Educational Psychology, 18, 240-257.

Appendix A

Information Packet - Superintendent Letter

September 2, 1998

Dear Superintendent,

We are writing to request permission for grade three students in your school district to participate in a study on how children locate information in books. This study is part of a larger project that has been funded by the Social Sciences and Humanities Research Council of Canada being conducted by Dr. Sonya Symons of Acadia University. Similar research has been conducted with elementary school children in Wolfville and surrounding communities with the approval of the Superintendent of Valley schools, Dr. Jim Gunn.

The purpose of the study is to investigate grade three children's information-seeking skills and to determine whether student interest facilitates their search for answers in an informational book. Locating information is an important literacy skill in both school and the workplace and has only recently received attention from literacy researchers. We have studied factors that affect information seeking in university and elementary school students. We are presently interested in motivational factors and their potential impact on students' text search behavior. Specifically, the study seeks to increase motivation by allowing children to choose their own topic and by using materials that are appealing to children.

We are requesting the involvement of approximately 120 children in grade three. Each child will participate individually in one 30-minute session. The task will involve children searching for answers to questions in an interesting informational book and subsequently rating their interest in the book and in the search activity. We have included a project outline and a sample parent permission letter. In addition, permission will be sought from principals and teachers pending your approval.

You may contact us at 585-1405 (Sonya Symons) or 632-2719 (Lee Reynolds). We look forward to hearing from you. Thank-you for your time in considering this request.

Sincerely,

Sonya Symons, Ph.D. Lee Reynolds, B.Ed., B.Sc.

Project Outline

Project Topic: Interest as a Motivator of Children's Information-Seeking Skills

Principal Investigator:
Lee Reynolds, B.Ed., B.Sc., Graduate Student in Psychology
Under the supervision of: Dr. Sonya Symons
Psychology Department Head
Acadia University
Wolfville, N.S.
BOP 1XO
(902) 585-1405

Purpose:
To investigate how grade 3 children search informational books and to determine the effect of interest on children's information-seeking behavior.

Method:
- Each child will participate individually with the researcher for approximately 30 minutes. The study will involve tasks which require children to search books and try to find answers to questions. Tasks will vary in terms of their appeal to children and they will be asked to rate their interest in the book as well as in the search activity.
- Participation is requested of approximately 120 grade 3 children throughout the school district.

Confidentiality:
- Results are not part of any school record.
- Names of children, parents, and teachers are not published.
- Only individuals working directly on the study will have access to data.
- All individual data are confidential.

Parent and Child Consent:
Only those children and parents or guardians who have given written permission, and who indicate they are willing, will participate (refer to sample permission letter).

Ethical Considerations:
This study has been approved by the Acadia University Ethics Committee and approval will be sought from the Superintendent of the School Board. All students are encouraged to participate. If teachers feel that students have significant reading problems that will interfere with the student's ability to participate in the study, the researcher will modify the procedures to help the students complete the tasks.

Feedback:
A summary of group results will be sent to each teacher and parent.

Parent Letter

Dear Parent/Guardian:

The Reading Research Lab in the Psychology Department at Acadia University is looking for children to participate in a study on how children look for information in books. Locating information is an important literacy skill in both the school and the workplace. In this study, we will be investigating the effects of students' interests on their information-seeking skills. The children will be asked to search books to try to find answers to questions. The materials and books are interesting and written for children at a grade three level. Similar research has been conducted with elementary school children who enjoyed participating in the search activities.

Each child will participate individually at his/her school at a time that is convenient for your child and the teacher. Participation in the study will take approximately 30 minutes and the child is free to withdraw at any time. In this study the children's responses are confidential, analyzed as a group, and are not part of any school record or grade. Your child's data would contribute to the understanding of information-seeking strategies of children. We hope that the information we collect will help teachers as well as those who design educational materials.

We would very much appreciate it if you would permit your child to participate in this study. Please return the bottom portion of this letter to your child's teacher within three days. Our results will be shared with those who participate in the form of a letter as soon as possible. If you have any further questions about this study please feel free to call 585-1405 or 632-2719. Please retain the above portion as your copy of consent.

Sincerely,

Sonya Symons, Ph.D. Lee Reynolds, B.Ed., B.Sc.

----------[cut along dotted line]----------

Study of Interest and Information-Seeking

_____ I give permission for my child to participate in the Interest and Information-Seeking Study. I understand that my child may stop participating at any time she/he desires.

_____ I do not give permission for my child to participate in the Interest and Information-Seeking Study.

CHILD: Name: _____

Birth Date: Year _____ Month _____

PARENT: Name: _____

Address: _____

Phone: (Home): _____ (Work) _____

Signature: _____

Appendix B

Search Questions (Standard Format)

Search the book about *Castles* to find the answers to these questions.

📖 1. Who made up the stories about Sinbad?

 _____

📖 2. What animal carried the sickness of the black death?

 _____

📖 3. When did the Middle Ages end?

 _____

📖 4. Who banned soccer?

 _____

Search the book about *Animals* to find the answers to these questions.

📖 1. How many ants can an anteater scoop up with one flick of its tongue?

✎ _____

📖 2. What is a flamingo's favorite food?

✎ _____

📖 3. What do bats use to find their way in the dark?

✎ _____

📖 4. What animal group do dolphins belong to?

✎ _____

Search the book about *Space* to find the answers to these questions.

📖 1. What is the name of the tallest rocket ever launched?

 _____

📖 2. What does the milky way look like from the side?

 _____

📖 3. What kind of star is a red giant?

 _____

📖 4. What is it like on the earth's moon at night?

 _____

Appendix C

Topic Interest Inventory

Look at each of the topics and decide how interesting they are to you. Circle **1** if the topic is **not at all interesting, 2** if it is a **little interesting, 3** if it is **pretty interesting**, and **4** if it is **very interesting.**

	not at all interesting	**a little interesting**	**pretty interesting**	**very interesting**
	1	**2**	**3**	**4**
Animals	**1**	**2**	**3**	**4**
Skating	**1**	**2**	**3**	**4**
Castles	**1**	**2**	**3**	**4**
Airplanes	**1**	**2**	**3**	**4**
Stars	**1**	**2**	**3**	**4**
Buildings	**1**	**2**	**3**	**4**
Camels	**1**	**2**	**3**	**4**
Dinosaurs	**1**	**2**	**3**	**4**
Knights	**1**	**2**	**3**	**4**
Space	**1**	**2**	**3**	**4**
Pyramids	**1**	**2**	**3**	**4**
Olden Times	**1**	**2**	**3**	**4**
Baseball	**1**	**2**	**3**	**4**
Monkeys	**1**	**2**	**3**	**4**
Inventions	**1**	**2**	**3**	**4**
Trucks	**1**	**2**	**3**	**4**
Planets	**1**	**2**	**3**	**4**
Food	**1**	**2**	**3**	**4**

Appendix D

Prior Knowledge Tests

Space

1. The gigantic explosion that started the universe growing is called the

   a) Big Crunch
   b) Big Bang
   c) Big Dipper

2. Without gravity, things would

   a) float up into the air
   b) be very heavy
   c) not move off the ground

3. A scientist who studies stars and planets is called

   a) a time traveller
   b) an astronomer
   c) an astronaut

4. Which is the coldest planet?

   a) Pluto
   b) Neptune
   c) Saturn

5. What instrument would you use to look into space?

   a) microscope
   b) camera
   c) telescope

6. How many planets are there?

   a) 20
   b) 9
   c) 14

Space...

7. A star that gets too close to a black hole

   a) gets sucked in
   b) explodes
   c) bounces off

8. The sun is

   a) a galaxy
   b) a planet
   c) a star

9. Neil Armstrong landed on

   a) the moon
   b) the sun
   c) mars

10. The patterns of stars we see in the sky are called

    a) clusters
    b) constellations
    c) asteroids

Castles

1. During the Middle Ages people thought the world was

   a) round
   b) square
   c) flat

2. Long ago prisoners were kept in

   a) moats
   b) dungeons
   c) towers

3. Squires were boys training to be a

   a) knight
   b) baron
   c) prince

4. Long ago most people drank

   a) water
   b) milk
   c) wine or ale

5. Marco Polo was

   a) a friend of Sinbad the Sailor
   b) a knight of the round table
   c) a great explorer

6. Books were written out by hand by

   a) monks
   b) peasants
   c) barons

7. The ruler of Japan was called a

   a) King
   b) Leader
   c) Emperor

8. Robin Hood is famous for

   a) robbing the rich
   b) slaying dragons
   c) being a good story teller

9. Children who were sent away to learn a trade were called

   a) sorcerers
   b) teachers
   c) apprentices

10. Peasants were people who

   a) fought wars for the kingdom
   b) gave money and food to the rulers
   c) taught the King's children

Animals

1. Which animal changes its color with the seasons?

   a) rabbit
   b) penguin
   c) lizard

2. The largest animal that has ever lived is

   a) a dinosaur
   b) an elephant
   c) a whale

3. Most animals that live in the water breathe through

   a) gills
   b) fins
   c) lungs

4. A lizard is a

   a) mammal
   b) insect
   c) reptile

5. Ostriches cannot fly because

   a) they have no wings
   b) they are too big
   c) they are afraid of height

6. A herd of zebras

   a) always have exactly the same pattern of stripes
   b) never have the same pattern of stripes
   c) may have spots instead of stripes

7. If an animal's babies feed on their mother's milk, they are

   a) amphibians
   b) reptiles
   c) mammals

8. How many humps do camels have?

   a) one
   b) one or two
   c) two

9. Besides flying, a bird's wings are used

   a) to keep the bird warm
   b) to help the bird walk
   c) to swipe at fleas

10. Snakes smell with their

   a) noses
   b) tongues
   c) skin

Appendix E

Post-Search Interest Inventory

1) How interesting was the book that you read?

Not at all interesting	A little interesting	pretty interesting	very interesting
1	**2**	**3**	**4**

2) How much did you like searching for information?

Didn't like it	liked it a little	liked it pretty much	liked it a lot
1	**2**	**3**	**4**

3) How much would you like to learn more about this topic?

Wouldn't want to	a little	pretty much	really want to
1	**2**	**3**	**4**

4) Look at the three topics. Put a **1** by the topic you like the **most**, a **2** by the topic you like **next**, and a **3** by the topic you like the **least**.

Stars and Space _____

Castles and Long Ago _____

Camels and other Animals _____

5) Would you like to ask your own question and look in the book for an answer?