The challenge of information seeking: How children engage in library work

Abstract: This investigation describes the research process used by grade five children in two Ontario classrooms during project work over 10 weeks in the school library. Participant observations in the library and small-group interviews before and after project completion were recorded for 53 students. Data concerning pupil identification, selection, perceptions, and use of library resources were gathered and analyzed. Findings revealed that these children have misconceptions about the research process and that their theoretical knowledge of it was often insufficient for the task of information retrieval. The inherent difficulties experienced by this group of students in using basic information tools are highlighted.

1. INTRODUCTION

A long-standing goal across all levels of education has been the development of information-literate learners who can find, apply, and evaluate information. Educators are in agreement about the worth of information literacy and its appropriateness to school-based education (American Library Association, 1991; Breivik & Senn, 1994). What remains to be clearly articulated within curriculum guidelines is how the goal of information literacy is to be achieved in the school system. Several possible approaches to teaching the research process have been suggested in the literature. These range from the straightforward presentation of information tools to the learner, resource-based learning (Beswick, 1977; Irving, 1983), and philosophies that expose the process of research (Kuhlthau, 1983; Eisenberg & Berkowitz, 1988; Stripling & Pitts, 1988), its inherent cognitive frameworks (Knapp, 1966; Kobelski & Reichel, 1981), and ultimately its metacognitive strategies (Moore, 1992). Although schools endeavour to develop information-literate learners, few research studies examine the effectiveness of these efforts or how children use information.

What is meant by information literacy and how is it developed? What are the inherent difficulties of information seeking? Most people think of information literacy in terms of technical skills, or more simply, as "doing". Librarians think of information literacy in terms of thinking and doing. Before books can be pulled from the shelf, questions must be asked.

1. What do I want to know? A needs analysis based on the research topic forms the first step.
2. What type of resource would have this information? Knowledge of how information is organized, and resource types (e.g. books, encyclopaedias, magazines, newspapers) and what is recorded in them, directs the next step of the search.

3. How do I use this resource to find the information I want? The search is enabled by evaluation of access tools such as table of contents, index, card catalog, Web, and databases based on initial questions.

4. How do I manipulate the information tool to focus on the information I want? Understanding how the access tool works allows isolation of relevant information. Also, the tools often require the initial questions to be expressed in different ways and with different vocabulary.

5. What facts are relevant to my initial questions? Interpretation and evaluation of search results are critical to successful information retrieval.

6. What should I record? What does useful information on my topic look like? Sustained focus on the research question is essential, but sometimes difficult.

7. What do I still need to know? What is missing from what I have collected so far? This is a complex metacognitive reflection.

8. How should I present the information? The application of the information may determine how it is recorded.

9. Have I answered my initial question? The cycle begins again.

This cycle of events reveals that the “know how” of information retrieval is dependent on the "know why" that drives the investigation. These steps need not be sequential and may involve looping back at various stages when actions did not yield useful information. The stages define a systematic top-down approach to information finding where an overview of the whole process is a prerequisite to understanding individual details of tasks. As a whole, information literacy enables us to analyse and interpret information, to make sense of it, to express personal ideas, develop arguments, refute the opinions of others, learn new things, or simply identify the truth or factual evidence about a topic. Consequently, information literacy contributes to our freedom to learn.

Knowledge of children as information users and how information literacy tasks are embedded in curriculum can help educators better understand how one motivates the other. Few research studies have examined children as library researchers or the effect of resource-based learning on student attitudes and motivation towards information finding. This is surprising because resource-based learning, though largely unsupported by a research base, is widely accepted in Canada and other parts of the world as a preferred methodology for developing information literacy at various levels of education. Resource-based learning achieves both subject content and information-literacy objectives through use of diverse learning materials. Students use resources such as books, magazines, newspapers, multimedia, Web, people and community to learn about a topic. Resource-based learning is student-centred and operates on the premise that students learn by doing and making meaning as individuals by problem solving with information tools. Resource-based learning in this sense follows a constructivist approach.
2. PURPOSE OF THE STUDY

As part of my doctoral study, I examined resource-based learning in two elementary school libraries at Kingston, Ontario (Laverty, 2000) to discover its effectiveness in cultivating information literacy. Of the six study questions addressed during the investigation\(^1\), this paper will address only one: What information-finding problems do grade five students exhibit during the research process.

Both librarians and classroom teachers can benefit from a better understanding of the demands of information retrieval. Patterns of student research activity expose the complexities of seemingly simple information tools such as the card catalogue. While children may state that they know how to find information, observation of their practice reveals many misconceptions about the nature of library tools and organization. This study offers educators some ideas about common problems with student research tasks that emanate from the original design and assignment of topics and the support systems made available during the research process.

3. METHODOLOGY

In keeping with the methods for classroom research outlined by Stenhouse (1985), data was collected through analysis of school documents, unstructured taped interviews with teachers and librarians, observation of project work using a detailed behaviour checklist and field notes, informal discussion with students at work, and structured small group interviews with students. Stenhouse's pioneering work in curriculum research advocates direct observation of classroom events as a starting point for the inductive development of theory and as a means of accumulating observations to characterise the uniqueness of particular situations. The aim is to create meaningful conceptual classifications so that the observer is able to formulate a fundamental theory of classroom situations.

Participant observation was used to work alongside students, fully understand their concerns, gain their trust, and field their questions. A total of 53 students were observed: one class of 25 students (15 boys and 10 girls) studying whales and another class of 28 students at a different school (18 boys and 10 girls) studying Mayan civilization. The study setting was realistic and typical in that teachers and librarians implemented project work without guidelines or constraints. No research instruction was given. Structured assignments were not created with information literacy in mind. Students were able to advance through their research tasks within a familiar library environment using whatever approach to information gathering they favoured. Two cases were investigated in order to present a rich picture of contrasting learning scenarios.

Cognitive aspects of information-handling are difficult to monitor and interpret and may not be revealed by pupils in their response to tasks set by teachers. One of the greatest difficulties during classroom observation is recognizing the occurrence of an "event". To prompt recognition of seemingly conventional or typical responses, a checklist of observations ensured that actions were not overlooked. Observations were conceptualised
in terms of information-handling behaviours in an attempt to understand and interpret children’s actions. Accounts and inferences of events were also compared to those reported by the study participants before, during, and after their project work.

The following types of behaviour were recorded using an observation checklist:

- Creation of a research plan outlining questions to be answered, types of information to be found, and resources to be checked.
- Discernible patterns in finding information such as use of a card catalogue with one or more subjects, browsing shelves, and book and encyclopaedia selection.
- Skill with tables of contents and indexes within books and encyclopaedias.
- Problem-solving behaviour when appropriate information could not be located.
- Ability to use the card catalogue by identifying keywords that led to call numbers on the shelf and testing alternate headings when initial vocabulary matches were unsuccessful.
- Ability to record and organize information by demonstrating methods of grouping similar facts or topics such as use of headings, spacing, or diagrams.

The present study does not aim to provide generalities from which the outcomes of similar sets of events can be predicted. Rather it concentrates on describing and evaluating two single pedagogic events that teachers can use to shape their own teaching practice. While an in-depth case study is not generalizable to other settings, it can offer accurate knowledge about one situation that in turn may be applied to a new experience. These descriptions concur with the notion of constructive replication (Martin & Bateson cited in Pellegrini, 1996, p. 37) where classroom events are compared despite differences in schools, classrooms, and even study methods. Stenhouse (1985, p. 12) asserts that in educational research, statistical predictions suffer from weak external validity because they apply to action with the same treatment to the entire population: "This does not apply in education. It is the teacher's task to differentiate treatments." In recognition of this problem, naturalistic styles of educational research have developed so that the data is not stripped of its specific circumstances and characteristics - which may be best when dealing with pedagogy.

4. RESULTS
The study made apparent the many demands of information-seeking. This section describes patterns of student activity during each phase of the research process and documents examples of student remarks and conversations that reflect that pattern.

4.1 Purpose of the Task
Problems began with the assignment of the research question (or, rather, the topic). Pupils were given the task of finding information on a topic and were not encouraged to formulate a research question. One class studied a specific whale while the other class
studied general topics relating to Mayan civilization such as Mayan cities and jungles. This reflects the notion of “knowledge telling” (Bereiter & Scardamalia, 1985) that dominates elementary-school inquiry. Bereiter and Scardamalia (1985, p. 73, 79) argue that this is not a conscious strategy and they describe knowledge telling as a form of reflecting what the writer finds on a topic without actually addressing an intended goal. This type of knowledge is considered to be inert in the sense that although it may be expressed on paper, it is not being applied to a problem or put to use in any way. The assignment of broad or unfocused research tasks is identified as one method by which schools promote knowledge telling.

Assigned topics did not inspire answers to questions, analysis of materials, and the synthesis of different points of view so the purpose of the project work was seen as the retrieval of information rather than a solution to a problem or an answer to a specific question. Unfortunately, student investigation hinged on student understanding of the purpose of the research. It became clear that where a goal is not clearly articulated, the goal becomes the product of the actions taken in pursuing it (whatever "it" may be in the mind of the student), and so cannot be used as a measure against which success can be determined.

**Student Dialogue**

Selina: Do we just use books?
Brandi: Yah, we have to get facts on our whale so let's check them. Just put down what you get. Then we'll get enough.
Selina: So . . . copy everything we find? What's the name?
Andras: Sperm whale.
Brandi: Yah. We check for just the sperm whale and see what there is about it.

**4.2 Asking Questions**

Tasks were set by the teachers at both study sites and tended to represent broad categories that appear to be typical of projects at this level. The pupil's goal was not to answer a specific question that necessitated comparison or synthesis of information. When the purpose of project work is not stated, one might assume that students spontaneously ask useful questions on little-known subjects prior to an investigation or at least call on prior knowledge of the subject. The present research shows that this is not the case where children work in isolation but it is sparked automatically with group work where children describe aloud what they are doing as they work side-by-side. Although studies of children's inquiry skills reveal that they rarely generate their own questions to guide research (Robinson & Rackshaw, 1977; Sheingold, 1987) this may be due more to circumstance than to ability. Sheingold supports the view that children do not pose questions to direct inquiry simply because it is not taught or openly encouraged. These conclusions concerning the inability or reluctance to generate questions were substantiated in the two case studies.

**Student Dialogue**

Interviewer: What topic do you have?
Ryan: I have to find about the earth's atmosphere.
4.3 Using the Card Catalogue

Despite its unassuming appearance, the card catalogue is a complex finding tool. Children's theoretical knowledge of the purpose and organization of the catalogue and the function of the Dewey Decimal system was generally insufficient for the task of retrieving useful information. Before beginning their project work, 15 of 53 students stated that they had difficulties using the card catalogue and 19 stated that it was the one tool in the library they liked using the least. This suggests a general lack of confidence in its use. In these case studies, 36 of 53 (or 68%) students checked the card catalogue but only 16 of 36 (or 44%) were successful in matching their terms. Apart from difficulty with prescribed subject headings, the children did not understand the role of multiple cards on a single subject, the information that traced other headings on many cards, or the purpose of the Dewey Decimal number. The general assumption was that catalogue cards represent general shelf locations and that only the first part of the number is needed to locate the shelf.

While students could not pinpoint what made the catalogue so hard to use, their comments hinted at the notion that its contents were unpredictable. Students do not generally understand the concept of a controlled vocabulary and the need to broaden or narrow their own natural vocabulary to find a match at the catalogue. These children were able to consider alternate terms when prompted, such as the examples of BOATS for SAILBOATS, or ATMOSPHERE for EARTH'S ATMOSPHERE, but the technique of automatically generating new words was not in their personal repertoire of strategies in using the catalogue. The inability to propose alternate headings resulted from unfamiliarity with the topic in some cases, such as cities of Central America, but also from an inability to think about why there was no match in the first place, as in the case of sailboats. When no keywords were matched in the catalogue, absence was presumed to mean that the library had no materials on the topic but it did not suggest that their search strategy was at fault. There was no metacognitive reflection on the lack of match results.

Where children dealt with complex subjects that necessitated heading generation, 74% of terms did not match catalogue entries. For example, there were no matches on ATMOSPHERE but entries were available under AIR. Hirsh and Borgman (1995) confirm that children's vocabulary was not sufficiently developed for them to understand many of the terms used in the catalogue, to select appropriate terms especially for complex topics, and to generate alternative terms when initial attempts proved unsuccessful. Moore (1988) found that children have great difficulty generating alternative subject headings and that nine- and ten-year-olds find no relevant information with 70% of the terms they select. Moore and St. George (1988) ascribe this inability to the limited knowledge base of children at this age; they are as yet unable to formulate refined topic questions.
Student Comments on the Catalogue

*Richard:* When it's not in the thing [catalogue] and you want to find out and then you . . . uh . . . ask the librarian and then she tells you but you're not getting anything from the card.

*Kyle:* You use the boxes that have the letters . . . Look for the beginning like for whales you'd go under W then a lot of times you'll know where it is.

4.4 Selection of Materials

The ability to assess useful starting points demands an awareness of the concept of information, its generation, and the forms of its storage (Irving, 1983; Cleaver, 1987). This prior knowledge of the ways information is recorded and disseminated must be connected to an understanding of the library collection and its access points for information retrieval success. While students were able to name many sources of information prior to beginning their library work, they did not consider consulting a range of resources in the library. Instead, they focussed on collecting information in the right amounts as if this action itself would serve as a means of learning. Phrases such as "getting the right amount of information", "writing down all the right information", "looking things up", and "getting enough information", were used by students in both classes as a gauge of what proper information-finding behaviour entails.

Despite their recognition of the scope of resources in the real world, they pursued limited types of materials in the library, although both library collections included filmstrips, videos, computer files, vertical files, and journals, along with the regular print collection. Knowledge of a range of resource types did not generally influence the scope of the search at either school although six children did carry on their investigation at home on a personal computer.

Encyclopaedias were the preferred information tool because of their ready and obvious access in the reference area, their familiarity, their ease of use resulting from their alphabetical arrangement, and their concise contents. It is not surprising that children rely on these sources so heavily because they meet the needs of most assignments very well. Typically, projects require general information collection on broad topics such as whales or Ancient Egypt. Where a pupil's goal is not to answer a specific question that necessitates comparison or synthesis of information, encyclopaedias readily provide general facts under simple categories.

Student Comments

*Interviewer:* Do you have an idea where to begin to find the information?

[topic is the atmosphere]

*Ryan:* Well I think I'll go to the encyclopaedia. That's probably going to have it.

*Interviewer:* Why do you think it would be there?

*Ryan:* Well . . . encyclopaedias tell a lot. They have a look of books to look in.
4.5 Finding Books on the Shelves

Location of books on the shelves was often hindered by students' lack of understanding of shelving conventions and the purpose of the classification system. As students moved from the card catalogue to the shelves, it was apparent that Dewey numbers were being used for the purpose of general shelf location rather than isolation of specific works since only the first three digits of the call number were rehearsed or recorded. Apart from lack of understanding of Dewey numbers, 26% of the students were unaware of the sequencing of books from the highest to the lowest shelf with continuation on the adjacent bay. Once a shelf was located, students scanned from left to right and did not backtrack to find the start of the pertinent section.

This study confirmed that these pupils select materials by a match of words from the original topic to book titles (Moore, 1992) and that 70% of nine-year-olds and 50% of thirteen-year-olds select books in such a fashion (Kobasiwawa, 1983). Further selection judgements included examination of the book's size and cover illustrations to determine the nature of the book's content.

Once a section was targeted, students first tended to pull books on the basis of random sampling similar to the findings of Cole and Gardener (1979). In the present study, once a keyword match was made and there were several book choices, further physical analysis took place. Analysis of cover impressions (sometimes in combination with internal layout and pictures) was used to gauge usefulness by 11 of 29 students. The class checking whale books evaluated content using a combination of graphics (style and abundance); amount, size, and layout of text; and size of book. These students were able to explain that juvenile books (identified on the basis of amount of text, size of print, and illustration style) were discarded because they did not meet the criteria for prevalence of factual information. This view implies that almost a third of the children in one class carried a mental model of what a useful book would look like given the target assignment.

4.6 Using Finding Aids

In the present study, 27 of 53 students (or 51%) consulted finding aids in books and demonstrated various degrees of understanding of their purpose and use. Topic words were preferred as entry points in both aids, some flexibility of terms was revealed when these were absent, and tables of contents were successfully used at times to locate starting points and to judge usefulness. The way in which finding aids are used depends on student understanding of what purpose these tools serve, what they are looking for, the nature of the assignment, their knowledge of the topic, and the overall complexity of the book itself.

The diverse nature of contents tables and index structures in the library materials revealed why students might have limited expectations of how these tools might help them. For example, in the collection of 32 books relating to whales at one school library, there were eight books (25%) with no table of contents and six (19%) with no index. The scope of contents within the books ranged from a 31-page storybook without page numbers
describing a fictional day in the life of a whale with limited vocabulary to a detailed 127-page encyclopedic book suitable for an experienced reader. The length of a book was not always a predictor of whether a finding aid would be present: one 30-page book had an index while a 60-page work had neither index nor contents table. Of the books with tables of contents, seven were not very useful to students because their terms were too vague, while four were difficult to use because they presented so many subheadings that the relationship of headings was obscured and guide words were not bold enough to clarify alphabetic divisions. In one case ambiguous entries were unhelpful, in another the entry format overwhelmed utility.

Encounters with resources therefore affect the very nature of the questions asked and impacts the learning of both content and information skills. Value of content may be determined as much by student interpretation of accessibility judged by internal presentation as by the presence of real subject content suggested by a match on the target search word within the books own search aids. Cole and Gardner (1979) found that students rarely used contents and index pages during project work but instead prefer the first resource that offers information connected to the topic regardless whether it addresses their specific information need.

**Student Comments**

*Ian*: Sometimes you don't know which one to use. Like the contents thing might not tell you much... but it could. Or the one that comes at the end... it might not help either. It depends.

*Interviewer*: Can you show me how you would use this?

*Ian*: (Opens *Earth: The Ever-Changing Planet* and proceeds to read the headings). Atmosphere isn't here so I don't think it's in this book.

*Interviewer*: What about the index? You didn't try that.

Across both classes, 74% of the students consulted encyclopaedias (20 of 25 at one school and 19 of 28 at the other). Since encyclopaedias are designed specifically for research (as compared with more general books) they should offer easier and more effective entry points. Students expected that all subjects would appear alphabetically in the appropriate volume but in practice there were many discrepancies between their entry words and the headings provided. Most pupils used the guidewords at the top of each page to isolate topics. In nine cases where there was no topic match, students did not know about the existence of the *Research Finder* (index to the encyclopaedia set) or how to interpret "see references". The researcher prompted pupils at first, and soon they passed this information on from one to another as they worked at the encyclopaedia table. These exchanges demonstrate how teamwork can foster independent learning through teaching scenarios.

**4.7 Evaluating Information**

Evaluation is said to be the most difficult part of doing research for people of all ages (Irving, 1983). Once information sources are in hand, the investigator must assess them in terms of their relevance to the initial search questions and the value of the publication in its own right. Evaluation determines whether the material adds to or conflicts with
previously acquired knowledge and it also determines the course of future action if further information is to be sought.

The entire research task is one of constant evaluation in terms of both process and content. Many decisions about the value of materials were made before books were successfully pulled from the shelves. The study students exhibited many examples of evaluation such as:

- rethinking words for the card catalogue
- matching call numbers to shelves and backtracking when incorrect number ranges were stumbled upon
- selecting sources on the shelf by matching focus words in titles
- checking tables of contents and/or indexes and spontaneously generating alternate vocabulary when no topic matches were secured
- returning to book-finding aids and to the catalogue once new vocabulary was identified
- suggesting the use of the Research Finder to other students indicates that the tool is of value in locating information

Students demonstrated self-checking behaviour and sometimes voiced self-questioning when dead ends or inconsistencies were encountered in the search process. They also revealed that information retrieval is not serial in nature but has an iterative character in which the researcher pieces information threads together to construct personal understanding. This identification and interpretation of clues informs subsequent decisions about directions to pursue, relationships between sources, and relevancy of materials. All students in the case studies remarked that they had a sense of the process of research after their work was finished and they were asked to reflect on the experience. During their investigations, several students were aware that what they were learning about their topic was helping them to re-direct and improve the search process.

All the knowledge extrapolated from the decisions made up to the point where a book is in hand informs whether the information contributes to, reinforces, or conflicts with what has been understood thus far. Stripling (1995, p. 164) writes that library learning must be thought of as an active construction of understandings using reflection and self-assessment to modify ideas and fit them into an existing context. Research projects allow for information-gathering as a continuous process rather than unconnected tasks thereby encouraging the construction of knowledge at every subsequent phase (Moore, 1995). Stripling explains this constructivism as involving a subject-learning strand representing what students understand about their topic as well as a process strand where students internalize something of the act of information seeking and use. It is the simultaneous inter-weaving of the two learning strands and the extent to which they are connected to a prior mental framework that determines the degree of understanding. When students focus on a learning framework such as a research model during their investigations, they are able to look past the short-term activities at hand (such as viewing the information as an end in itself) to the larger goal of understanding.
Student Comments

*Kevin*: (discussing the index) Well sometimes I can't find what I want so I just go down all the words until I see something.

*Interviewer*: How does that help you?

*Kevin*: In this one .... I tried WHALE SOUNDS first but it wasn't there but I saw WHISTLE which was weird but ... that's a sound! So I checked there and it did have stuff ... some. Then I still tried SOUNDS ... that was my best word. I even got the word COMMUNICATE ... by accident ... when I was looking for something else. I think that's an OK word to use too. And it works sometimes!

### 4.8 Recording Relevant Information

Information is subjected to further processing when notes are taken and transformed by the student's own language. The potential is here for the student to interpret what he or she has discovered by imposing a personal structure on the information. In order to make sense of this task, students must refer back to the topic questions, the purpose of the assignment, and the audience for whom the finished work is intended (Irving, 1983).

Overall, students found recording information difficult. Direct copying ensued by 40% in one class and by 46% in another. Lunzer and Gardner (1979) reported that ten to fifteen-year olds often copy passages directly from resources, especially reference books, using strategies that promote memorization rather than synthesis of information. Brown and Day (1983) discovered that it is rare for ten-year olds to invent a topic sentence that captures the essence of a text. Information tends to be copied because any information is acceptable to meet the need of amassing a certain amount of material otherwise known as “knowledge telling”. Crystal verified this form of information collection: “I did a project on the pyramids of Egypt ... and I ended up with a folder of 12 pages of information and I didn't understand a word”.

Given the manner in which many students copied sentences leads to several conclusions. Where questions have recognizable answers it seemed unnecessary to reword information already presented in its simplest form. If the topic itself falls within a broad category it is easier to record anything than face the challenge of rethinking about the real information target if there is no emphasis on this (Sheingold, 1987; Kobasigawa, 1983). Note-taking relies on the ability to recognize important points yet studies show that children have difficulty identifying these and need assistance in focussing their attention on relevant information (Baker & Brown, 1984).

Students are expected to record information as sentences but this prevents them from transforming information by recording points that are later reworded and restructured. Pupils were not aware of a means to organize their work such as mapping out categories for types of information. Surprisingly, they were not required to record the name of the books and/or encyclopaedias they used to find information. The nature of what was ultimately recorded as notes agrees with findings reported by Sheingold (1987) with respect to the connection between the driving question, notes recorded, and final solutions presented by students. In other words, the initial need determines the outcome
and when a need is not identified the outcome is unpredictable and possibly even unintelligible.

**Student Comments** (describing what they find difficult in the research process)

*Heather:* I find it really hard writing stuff down . . . like some of the information.

*Emily:* How to write it down in your own way ... but people around you will not understand it.

*Jasmin:* Same as Emily cause my Mom always tells me you're not supposed to take it out of the book. I have to change it around a bit. I have real problems with that because I can never figure out what words to use.

*Peter:* I have trouble with the same as Emily. ... I find it really hard cause you get kinda confused like you write down some stuff and you forget the facts in it and you can't really figure them out.

### 4.9 Metacognition

Moore (1992, p. 97-100) outlines the metacognitive categories that are used to codify student awareness of their progress during an investigation. Categories include monitoring (of both the research task and their own knowledge state), planning, revision and regulation, prediction, processing, and tactical strategies. Moore (1992, p. 205) notes that, "The student who fails to monitor is unlikely to recognize the conditions appropriate to alternative actions, even where alternative actions are in his or her repertoire".

Although the number of children observed was small, this study highlights the important role of metacognitive activity in the information retrieval process. Knowledge of information-gathering steps was necessary to progress through the research task. Thinking skills were needed to enable a searcher to monitor and assess the finding of materials. Efficient information seeking requires flexibility of strategy and a problem-solving approach so that methods are applied and managed to maximize results from finding aids such as the catalogue and book indexes.

During monitoring the learner checks levels of understanding, outcome of actions, present condition in a task, and overall task progress. Evidence of monitoring was revealed when a change in focus of attention occurred in response to information gained from book titles and covers once the correct Dewey section was located. Planning reflects, for example, the identification of topic questions that serve to limit aspects of a subject to be explored. Examples of planning were identified when individuals defined areas of interest by writing down specific headings under which to record information. Revising an approach to a task, such as selecting alternate search terms in the card catalogue, or regulating by preferring one approach over another, such as scanning the shelves at random after first locating a general Dewey section, also reveal evidence of metacognitive functions.

Prediction involves determining the potential success of methods of gathering information. Examples included assessing the relevance of books on the basis of titles and covers and judging a book solely by title. Processing refers to the recording of content in one's own words; organizing notes based on personal selection of headings or
categories; use of diagrams to record information; and reflections on content. Students acknowledged that they should record notes in their own words even though 43% failed to do so. Only 23% of study pupils showed organization of information in their personal notes through use of headings. This evidence showed that many of the children did not know how to identify key points and rewrite them in sentences and that they were unfamiliar with methods for organizing their work.

Tactical strategies are revealed when a student declares that a particular method will be adopted or other options considered to overcome a barrier. Examples included selection of alternate search words in an index when initial terms were absent. One student described the tactic of scanning for numbers in the text to find numeric whale facts. Several others stated preferences for encyclopaedias because they usually cover many topics or preferred starting points in the library.

Information-literate searchers are conscious of the research process as it takes place. They use metacognition to monitor each step and learn to revise a strategy when a barrier is encountered. Rather than concentrating on a single method for accessing information, they have a holistic view of information retrieval. For example, the student who only understands how to use the library book catalogue using keywords may be stifled when no matches are found. A student who understands how the catalogue classifies topics using subject headings, has a far better chance of success in an investigation. A student who realizes that the catalogue is one of many starting points leading to particular resource types and that it may not always be the best place to begin depending on the topic, also has additional insight into the search process.

5. CONCLUSIONS

The decoupling of theory and practice in student understanding of information literacy skills was reported in this study. While grade-five pupils can describe basic steps during information seeking, they generally lack knowledge of how the library system works and strategies to draw on when their favoured paths fail. It is interesting that students' theoretical description of how to conduct a library search revealed a simplistic one-step approach on an intellectual level: go to the catalogue or the shelves or the encyclopaedias and get some information. This strategy was generally accompanied by an emotional awareness that the process is usually fraught with difficulties. These difficulties were somewhat intangible and defied description by them. As stated by one student: "... but there's more to it than that!"

Teachers and librarians view library work at this level as a simple task and consequently little in-depth training for students is provided on research techniques. In theory, gathering information about a topic is a fairly straightforward sequential task. In practice every topic has unique and unanticipated problems that become apparent as the search unfolds. Variations in library resources alone present challenges with every card catalogue and book index or table of contents encountered.
Although the application of information skills is evident through action, it is the thinking that precedes and follows this that demonstrates understanding. The observed actions are the result of mental deliberations representing the cognitive skills component. Skill involves the selection and application of past learning and continues to develop with new experiences. This notion of skill as having cognitive and practical components best describes the richness and depth associated with information literacy. Students who become information literate possess a more complete approach to information gathering. They know about the process associated with finding, retrieving, evaluating, and applying information. This means they can identify their research actions and explain their choices. They are conscious of the process and can monitor their steps and their learning as they proceed.

On completion of projects, the children reflected some unanticipated attitudes towards their investigations. At one school, 92% said they had a positive research experience. This improved attitude reflects a change in 75% of the class from negative to positive feelings regarding research. At the other school, 50% of students were positive about undertaking research before the study and 100% had positive feelings after it. These attitudes were unanticipated given the many difficulties encountered and the duration of the work itself. The children cited their personal experience of what research is as the reason for this claim. Most students reported that they learned something new about information tools, but every student singled out the overall experience as the central reason for their improved attitudes. As expressed by one child: "You kind of remember it. If we have to do another project we'll know a lot about it [i.e. researching] and you'll get used to knowing what to use and how to use it."

ENDNOTES

1. The six study questions were: What information-finding problems do grade five students exhibit during the research process? What effect does a resource-based learning unit have on students' ability to find information? Does the resource-based unit foster or constrain the development of particular information skills? What is the relationship between a resource-based learning experience and the development of information literacy skills? What effect does a resource-based learning unit have on students' attitudes toward information finding? What aspects of a resource-based unit appeal to grade five students and why?

REFERENCES


