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**THE EFFECTS OF INTERACTIVE COMPUTER SOFTWARE ON  
EARLY LITERACY ACQUISITION**

**BY**

**SUSAN ELEANOR NIKKEL**

**A Thesis**

**Submitted to the Faculty of Graduate Studies  
in Partial Fulfillment of the Requirements  
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## ABSTRACT

The purpose of this study was to describe and analyze the literacy invitations in two, grade one classrooms in a suburban dual track (English/French Immersion) elementary school. The main focus of the research was to document the integration and implementation of an interactive software computer program into classroom literacy instruction. Data were obtained over a three month period from January to March 1994 and included: classroom observations, collection and analysis of students' oral reading and writing samples, and interviews with both students and their teachers.

The study considered the effect of interactive computer software on students' reading and writing proficiency. Findings suggest that the computer software does more than pique the interest of students. Using the interactive software programs enabled students to become more strategic readers and to increase both their oral reading fluency and comprehension. There was an observable increase in motivation to read other materials, either in the same genre or by the same author. As assessed both through length and the increase in the number of conventionally spelled words, the quality of students' writing was also enhanced. Reading and rereading the stories also enabled students to participate more fully in classroom discussions and follow-up activities. The study provides a theoretical framework for integrating interactive computer software into literacy acquisition programs.

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The writer wishes to thank her family for their support and dedicates this thesis to her mother, the late Muriel (Parkinson) Wade, who valued an education for her children.

## CHAPTER 1

### NATURE OF THE STUDY

Computer programs will not replace books and pictures, nor will technological developments lessen the need for reading and writing. Rather, technology in the information age will create demands for readers and writers who can select and use appropriate materials and media for specific situations and purposes. ...

Connections between print and technology can be made in the early years, with carefully selected software programs that contain meaningful texts and that are used for purposes that are understood by children and are important to them.

The connections between reading, writing and technology must occur in social contexts. In addition to interacting with the children as they are involved in reading and writing, teachers must allow and encourage children to interact with one another as they engage in activities that promote their communication abilities in an information age (Irwin, 1987, pp. 49-50).

#### Statement of the Problem

The purpose of this research was to describe and to analyze the literacy invitations in two, grade one classrooms. Many of the invitations that were available to the students were similar to the ones in whole language classrooms described by Bergeron (1990). These attributes of whole language included: fostering reading for meaning, using real literature in various genres, incorporating writing that was both meaningful and functional, and providing and encouraging opportunities for students to work cooperatively in order to enrich students' learning and fuel their need to know.

The classroom teachers in this study wanted to implement the interactive computer software into their literacy program and monitor the effects of such programs on their students' literacy development. The teachers wanted to determine the best way to achieve curricular integration of these literacy resources while at the same time maintaining sound pedagogical principles. Thus the study had three main foci: (a) the teachers, (b) their students, and (c) the interactive computer software.

### Significance of the Study

Given the new technology, administrators, parents, and society in general would like to see students use computers in their classrooms. School divisions are supplying hardware and moneys for software to meet these demands. Teachers are encouraged to use the technology, frequently with little or no training. Many teachers are unable to articulate either their own educational goals or the goals of the software. Often teachers are undecided about whether the computer is a teacher or a tool. This study was undertaken to help educators integrate technology into their pedagogical practice based on sound theory. Professionals need to make connections between the computer-based instructional activities under investigation in this study and the pertinent research and theory related to off-line reading and writing activities. Practitioners need to understand that the same evaluation principles and theoretical basics apply to the computer software that apply to other instructional materials. There is a need to investigate a wide range of variables; for example, motivation, social contexts, and the amount of time spent on the activity - variables that are frequently not considered as factors in computer program instruction.



The majority of studies concerning the effects of computer assisted learning attend to the consequences of specific programs (Decker, 1991; Drexler et al, 1990; Hoot & Kimler, 1987) and use a quantitative research design (Reinking & Schreiner, 1985; Roth & Beck, 1987; Standish, 1992). This study provides qualitative research to meet the needs of today's professionals who wish to integrate computers into instruction that is based on a holistic philosophy.

#### Contribution to Existing Literature

The research of Blackstock (1989) seems to suggest that computer programs facilitate changes in teachers and their curricular methods and are successfully integrated when teachers: (a) see their relevance in working with children and (b) receive support and encouragement in effecting change. The position of Irwin (1987) and others (Durrell, 1991; Miller, 1989) is that few computer software programs are congruent with current views on literacy acquisition. Other researchers consider that the computer is a teaching tool. Reitsma (1988) for example, suggests that the development of proficient reading skills in beginners is enhanced by independent practice when opportunities for reinforcement are provided through computer-generated speech feed-back. There needs to be more research to support these contentions.

#### Research Questions

The present study poses questions regarding the instructional use of computer programs in classrooms and their educational effects. The first set of questions pertains therefore to instructional use.

### Instructional Integration

1. How is the CD-Rom computer software integrated to meet the curricular requirements of the class?
2. Are sound pedagogical methods being used in integrating these programs?
3. Do these programs reflect the literacy philosophy of the teachers?

The first question was designed to document the way in which the teachers integrated the computer into their regular reading and writing programs. It is important that computer use be part of the literacy acquisition program and not an "add on". In this way the computer becomes another avenue, in conjunction with sound pedagogical practice, to develop literacy. Computer use must be related to learning as a whole and not carried out as an isolated activity.

The second research question was generated based on the belief that teachers have little opportunity to voice their understanding of how children acquire literacy. Once this tacit knowledge becomes explicit, teachers will be better able to evaluate computer software by determining the congruency between the computer program and their own philosophical tenets about teaching and learning.

The third question addresses the need for teachers to be actively engaged in the learning process and make curricular decisions based on current language theory.

### Effects on the Students

Current literacy theory suggests that print be presented in interesting and relevant contexts, in which children are able to use all of the language cueing systems [the graphophonic, semantic, syntactic and pragmatic] drawing on their prior knowledge and creating new meaning. If these "talking books" are able to present interesting and relevant print, will the reading and writing performance of these early learners be enhanced? The fourth and fifth questions were therefore developed to determine the effect of using interactive computer software programs on student performance.

4. Do interactive software computer programs enhance the reading efficiency of students?

5. Is writing performance ultimately enhanced by using the interactive software?

6. In what ways does the introduction of interactive computer software do more than pique the interest of students?

In our current technological age, students have opportunities to do many interesting things with computers, often unrelated to academic learning. The sixth question was posed to establish whether students viewed the computer programs as instructional tools to facilitate learning.

### Overview of the Study

The research methodology used in this study is described by Guba (1989) as a form of evaluation in which the claims, concerns, and issues

serve as the basis for determining what information is needed. Evaluation research is embedded within the social constructivist perspective that affirms learners acquire and create knowledge in the process of interacting with others as they complete tasks in meaningful and functional situations. The more knowledgeable person is able to model, question, and provide feedback, and to encourage the learner to operate independently. Rogoff (1984) termed this finely tuned interaction between more knowledgeable and less knowledgeable persons as guided participation.

The theoretical basis of guided participation can be found in the work of Vygotsky (1978, p.86) who described the Zone of Proximal Development (Z.P.D.) as "the distance between a child's actual developmental level, as determined through independent problem solving and the child's potential development, as determined through problem solving either under adult guidance or through collaboration with more capable peers." Learners move through their Z.P.D. by scaffolded instruction which encompasses three main phases. An adult, or knowledgeable peer: (a) models the intended outcome; (b) provides guided practice during which the instructor and the student share the responsibility for attaining the desired outcome; and (c) furnishes opportunities for independent work by the student.

From these perspectives, literacy acquisition is best described in terms of the philosophy of whole language. From a content analysis of sixty-four professional articles related to whole language, Bergeron (1990) characterizes whole language as

a concept that embodies both a philosophy of language development as well as the instructional approaches embedded within, and supportive of, that philosophy. This concept includes the use of real literature and writing in the context of meaningful, functional, and cooperative experiences in order to develop in students motivation and interest in the process of learning (p. 319).

Using these descriptors which provide the theoretical basis for understanding literacy acquisition, the investigator assumed the role of participant observer to document the integration and implementation of interactive computer software programs into classroom literacy using observations in two, grade one classrooms in a suburban, dual track (that is, an English-French Immersion) elementary school. In addition to classroom observations, oral reading and writing samples were collected and both the students and their teachers were interviewed.

#### Definition of Terms

Terms relevant to this study are defined in the following section

Computer Terminology

<u>CD-Rom Book</u>	An electronically enhanced version of a hard copy book. With a "click" on the mouse and the arrow pointing to any particular word or picture, the computer program provides pronunciations, divides words into syllables, and yields second language translation and simple in-context definitions. Also referred to as <i>Hypertext Media Programs, Interactive Computer Software, and/or Talking Books</i> .
<u>Bravo Books</u>	Interactive multimedia storybooks that surround the story with a variety of information including sound effects, video clips, and animation. Guided reading support is provided by providing pronunciation of unfamiliar words, phrases and sentences, and labels for unfamiliar objects. Children are invited to respond to the literature by recording messages in their own voices or by typing into a pop-up notepad.
<u>Discis Books</u>	Interactive multimedia storybooks that display the pages of well-known storybooks on the computer screen, accompanied by illustrations and sound effects. There is the option of having the story narrated by the storyteller who will pronounce the words and provide definitions on request.

<u>Off-line</u>	Information not presented on the screen of the computer, that is, the information appears in hard copy.
<u>On-screen</u>	Information that appears <u>on</u> the computer screen

### Instructional Terminology

<u>Big Books</u>	Donald Holdaway (1979) developed this term for books that are large enough to be seen from a distance and contain language that is repetitive enough to enable children to predict upcoming text and participate in reading, even on first presentation.
<u>Eye-on-Print Behavior</u>	This term refers to the left to right eye movement across a line of print. Clay (1991) suggests children need to pause to scan word patterns or letter forms without loss of place or message. She indicates that this learning is best done on information-rich texts.

<u>Fluency</u>	Freedom from word identification problems which may hinder expression of ideas.
<u>Practice</u>	A behavior, reading in this case, is repeated several times, with the goal of improving performance/integrating all the linguistic and non-linguistic systems: semantics, syntactic, orthographic, lexical, and pragmatic.
<u>Proficient Reading</u>	The ability to read with comprehension and fluency.
<u>Repeated Reading</u>	Frequent rereading of the same passage to improve fluency, develop automaticity in word recognition and increase comprehension (Samuels, 1979).



## CHAPTER 2

### LITERATURE REVIEW

The curricular theory underlying this research is the social constructivist perspective which embodies the theoretical practice of whole language and Vygotskian axioms, specifically: assisted learning; the social nature of higher mental functions; and the zone of proximal development. Reviews related to the instructional aspects instituted in this study address: (a) the acquisition of literacy; (b) early reading instruction; (c) the role of Big Books and shared reading in early reading development; (d) the reciprocal relationship between reading and writing; and (e) the effect of practice on beginning reading.

The literature concerning the introduction of computer programs into instruction will focus on computer applications in early reading and the potential for such programs as teaching and learning tools.

#### Social Constructivism and Whole Language

The theory of social constructivism is based on the assumption that knowledge is constructed through an individual's interaction with the sociocultural environment; that higher mental functions are social and cultural in nature; and, that knowledgeable members of a culture help others learn.

The sociocultural environment. "Social construction theory maintains that knowledge is socially patterned and conditioned, that coming to know is a result of social experiences and interactions., and that all knowledge and knowledge construction are essentially social acts" (Straw, 1990, p.173). A social constructivist explains that knowledge is "what people know" or how they define their situations (Greene, 1990). Knowledge is seen as temporary, developmental, socially and culturally mediated, and thus non-objective. This perspective stresses the symbolic processes by which human beings create, sustain and produce their life-worlds. Knowledge is perceived as being identical with language and other symbol systems, and as such, these are regarded as inseparable. All aspects of our physical and social world are determined through language and thought.

Historically, literacy has been an important tool in maintaining the hegemony of the dominant classes in many societies (Scribner, 1984; Anyon, 1980). Not being a member of the dominate culture may be a disadvantage, as Shirley Brice Heath (1982) discovered when she observed children from different communities, first in their homes and then in schools. She investigated the way patterns of communication generated in the home corresponded with the patterns which predominate in the school. Heath observed children from three communities: African-American working-class, white working class, and both African-American and white middle class. Her findings suggest that success was closely associated with community membership. The community whose communication patterns most closely resembled those of the school

produced the most successful students. What young children knew about language and its use was learned as part of the interactional/communicative routines of the group in which they grew up. As suggested by Heath, it seems that early home social environments shape the way children come to understand the world by providing them with a particular set of mediation tools by which they learn how to make and take meaning. These tools vary from community to community.

The social and cultural nature of higher mental functions. The second assumption of a social constructivist theory of learning suggests that the higher functions are social and cultural in nature. Vygotsky (1986) suggested that higher level functions, such as reading and writing, are those that require voluntary self-regulation, conscious realization, and the use of signs for mediation. All of these functions develop as a result of social phenomena. More knowledgeable individuals begin by modeling desired behaviors and/or thinking aloud about what has to be learned. Through the use of language and interaction with others, learners begin to acquire this knowledge themselves. By talking to themselves as ideas develop, learners internalize this knowledge until it is their own. Explained in Vygotskian terms, the initial learning that occurs between people is interpsychological; that which occurs within the learner is intrapsychological. Thus the movement from interpsychological to intrapsychological learning becomes discernible as children become more able to engage independently in activities that once required support from knowledgeable others.

The development of higher mental functions is explained through the phenomenon of "the zone of proximal development" (ZPD). The ZPD is defined as "the distance between a child's actual developmental level as determined through independent problem solving and potential development as determined through problem solving under adult guidance or a collaboration with more capable peers" (Vygotsky, 1978, p.86). The learners are engaged in a task beyond their immediate capability and a facilitator guides them in achieving understanding. Thus knowledge is acquired by participating in a supportive, social-instructional environment.

The role of knowledgeable others in learning. An important function of an adult or knowledgeable peer is to facilitate the learning of tasks that are beyond the learner's level of competence. Thus the third assumption of the social constructivist theory is assisted learning. Learning occurs in social contexts that enable the more knowledgeable person to model, question, and provide feedback, until the learner can operate independently. Because this is social, learners have to be engaged in their own learning. This involvement gives the facilitator messages as to the appropriateness of the instruction.

Teaching and learning that occurs in this milieu has been termed guided participation (Rogoff, 1984). "Guided participation involves a finely tuned interaction between the assistance provided by adults and the children's skills ensuring proximity to an involvement with more experienced people" (p.27). Based on her ethnographic observations in formal and informal learning situations, Rogoff suggests that in providing

learning contexts, adults describe new information in terms that are known and familiar to children. Adults structure and tailor the problem to each learner's skill level, and ensure that novices gain expertise so they can assume responsibility for relevant aspects of the task. All participants are actively involved in the learning process and the instruction may be explicit or tacit.

A social constructivist view suggests that the reading and writing processes are inseparable (Straw, 1991; Tierney and Pearson, 1984), and as such represent the language of the culture. The theoretical practice of whole language is embedded in the social constructivist theory of learning. The whole child is seen as an active learner in a community of learners, where an adult or knowledgeable peer provides opportunities for engagement in authentic and purposeful learning activities. Language learning is seen as social and as such includes not only language acquisition, but also the transmission and modification of culture. The teacher invites the learners to participate in literacy activities that are purposeful and meaningful to the individual. Reading and writing are the learning vehicles, not the objects of learning.

### Vygotskian Perspectives

As suggested in the foregoing, knowledge is socially constructed and is dependent on the culture in which the learning takes place. Classrooms are social organizations and can be arranged in such a way that social interactions will be supportive and accepting of the cultures and social values pupils bring to school.

Students are able to learn more about their world through social interactions with peers and adults. This assisted learning is sometimes referred to as scaffolded instruction and encompasses three main phases: (a) modeling of the intended outcome by an adult or knowledgeable peer; (b) guided practice in which the instructor and the student share the responsibility of attaining the outcome; and (c) independent work by the student. This scaffolded instruction provides a framework for developing instruction. The process is dependent, however, on positive social interactions between the teacher and the learners.

The zone of proximal development (ZPD) is an essential component of the social constructivist theory. This term describes the potential learning range of an individual. Vygotsky describes it as the "distance between a child's actual developmental level as demonstrated through independent problem solving and the potential development as determined through problem solving under adult guidance or in collaboration with a more capable peer" (Vygotsky 1978, p.86). There are three underlying aspects of the zone of proximal development: (a) There is a difference between the child's present accomplishment and his/her potential for future learning; (b) What a child can achieve alone is different from what he/she can achieve with guidance; and (c) The learning gap is moved forward via transfer of control from a more knowledgeable to less knowledgeable individuals (McCarthy and Raphael, 1992).

Vygotsky introduced the notion of ZPD in an effort to deal with two practical issues in educational psychology: the assessment of children's cognitive abilities and the evaluation of instructional practices. In the case

of assessment, Vygotsky pointed out that establishing the child's potential to achieve is based on prior accomplishments. In order to assess the child's potential it is therefore necessary to examine the realm of the activity in which growth takes place.

The second issue is that of evaluating instruction. Vygotsky argues that "...instruction is good only when it proceeds ahead of development, when it awakens and rouses to life those functions that are in the process of maturing" - those that lie in the zone of proximal development. In this way, "instruction plays an extremely important role in development" (1965, cited in Wertsch & Stone, 1985, p. 165).

Vygotsky claimed that mental processes can be understood only if an individual understands the tools and signs that mediate them. Signs are the tools of social interactions. These signs - which may be implicit within speech and/or gestures, are in the beginning a response to an individual's external environment. Vygotsky (1986) describes the process as one of internalization: "An operation that initially represents an external activity is reconstructed and begins to occur internally" (pp. 56-57). With time, this speech turns inward and becomes inner speech. This silent verbalization exists parallel to one's cognitive functions and thus meshes with thought to manifest itself as direct outer speech.

All higher mental functions have a social origin. External activities that are mediated through interactions and conversations with other individuals undergo transformations and become internal activities. All human activities exist on two planes - external and internal. "Every function in the child's cultural development appears twice: first on the

social level, and later on the individual level; first between people - interpsychological, and then inside the child - intrapsychological" (Vygotsky, 1978, p.57). The child invents in the context of authentic social experiences in which conventions are implicit. Over time, these inventions begin to conform to the social conventions.

### Literacy Acquisition

Theories of reading. Early reading and how children learn to read have been the basis of great debates. Authorities are polarized around which approach to use in the teaching of beginning reading. Many suggest that beginning instruction with the smallest unit, letters and their sounds, is most beneficial in teaching reading. Researchers (Bond & Dykstra, 1966; Chall, 1967) have long recognized that knowing the letters of the alphabet is important for success in beginning reading. Once students master letter names, knowing the relationships between the symbol-sound match is essential (Adams, 1990; Ehri, 1983). Some authorities believe that reading and comprehension develop from smaller parts to increasingly larger parts: by sounding out words and identifying them, by combining the meanings of individual words to derive the meaning of the sentence, and by combining the meanings of sentences to obtain the meaning of the whole text. Such models of reading are called sub-skill, code-emphasis, or bottom-up, because the instructional emphasis stemming from them would, in the extreme, focus only on letters and their sounds to help the beginning reader break the code through phonetic means.



Many authorities argue that reading is a process to be learned mainly through actual reading; thus readers require extensive practice (Chomsky, 1976; Samuels, 1979). Repeated reading of whole text helps to overcome decoding difficulties and enables the reader to integrate all the knowledge systems - not only the letters and their sounds but also meaning or semantics and language sense or syntax, thus encouraging readers to devote more attention to the meaning of the text (Samuels and LaBerge, 1983; Stanovich, 1980).

Top-down model advocates suggest the purpose for reading is to obtain meaning. In their view, readers construct meaning from text based on their prior knowledge and experiences (Goodman, 1986; Smith, 1973). Goodman (1967) calls breaking the code a "psycholinguistic guessing game". He suggests that readers use three, not one, cueing systems to predict and infer upcoming words: their semantic knowledge or familiarity with the topic; their syntactic knowledge or grammatical sense; and their graphophonic knowledge or knowledge of the symbol/sound correspondence.

These two models of reading do not account for developmental differences in expert and novice readers nor do they account for what occurs during the reading process. Rumelhart (1977) presented an interactive perspective which suggested that as readers process print they rely on all the knowledge systems to unlock upcoming words - syntactic, semantic, lexical, and orthographic. "Reading is thus neither a 'bottom-up' nor a 'top-down' process, but a synthesis of the two" (Zakaluk, 1982, p.12). Reading is thought to be an interactive, cognitive process in which readers

decipher the code and at the same time construct meaning based on their prior knowledge and their knowledge about reading. As suggested by Vygotsky the social context in which the reading lessons occur also support learning.

### Instructional Implications

The instructional implications which stem from the consideration of both Rumelhart's (1977) interactive model of reading and Vygotsky's (1978) theory of social learning suggest that the kind of classroom required for successful learning in early reading must provide a semantic and orthographic base as well as a social dimension. A learning environment where there is interaction and collaboration enables learners to work in their "zone of proximal development" (Vygotsky, 1978) - that cognitive area in which a learner cannot yet act alone, but can function successfully with support from an adult or more knowledgeable peer. Language is central to this process.

### The Role of Language

The "uncommonsense" (Mayher, 1990) makes sense as we discover more about children and their reading development. In classrooms where teachers develop their students' reading and writing by building on their students' language and personal experiences, learning occurs in a supportive and encouraging environment. Learning comes about through informed teaching. Through exposure to published literature in lieu of adaptations in basal readers, participation in authentic literacy events, and instructional monitoring students are able to develop

patterns and rules that they are able to apply to their daily interactions with print (Clay, 1991)

Brian Cambourne (1988) identified seven conditions under which language and literacy learning take place. These conditions are relevant to all language learning; that is, learning to read, to write, to spell, to speak, and to learn a second language.

1. Immersion of learners in texts of all kinds.
2. Multiple, ongoing demonstrations of construction and use of texts.
3. The expectation that learners will succeed.
4. Allowing learners to make their own decisions, to take responsibility.
5. Time and opportunity to use literacy in realistic, authentic ways.
6. Allowance for approximation; understanding the essential nature of mistakes in promoting learning.
7. Response ("relevant, appropriate, timely, readily available, non-threatening, with no strings attached") from more knowledgeable peers and adults

(Cambourne, 1988, p.33).

### Early Reading

What we do know about early reading is that many children, when given the opportunity, learn to read and write long before they come to school (Harste, Woodward & Burke, 1984; Holdaway, 1979; Teale &

Sulzby, 1986). Through their storybook reading children develop a sense of story, and daily they come to recognize many words that are functionally important to them - McDonald's, Stop, Walk, Don't Walk. Examples of environmental print are abundant in our culture. Beginning students know many letter names, they know that letters and sounds go together to make words - they want to know how to print their names, write letters, help make grocery lists, and write "I luv u 's". These are examples of some of the literacy knowledge many of our students have when they arrive at school (Clay, 1966; Morrow, 1989). Early readers need many opportunities to capitalize on this functional knowledge about reading and engage in literacy activities that allow them to develop and enhance these abilities in secure and encouraging environments.

Big books and shared reading. Donald Holdaway (1979) was responsible for bringing the bedtime story out of the home and into the classroom through the practice of shared reading. A child's first experience with print is frequently with a caregiver and a book in which the child can listen to the story and see the print and the pictures, all at the same time. When the child comes to school, the teacher continues the reading aloud but often, due to the number of students, there may be "little instructional value simply because the print cannot be seen, shared and discussed by all students" (Holdaway, 1979, p.64). To remedy this difficulty, Holdaway suggests using shared reading with books that are large enough to be seen and language which is repetitive enough so that children will be able to predict and participate, even on the first reading. The task difficulty is controlled by the number and spacing of the

repetitions, and by varying the degree of predictability in the language structure.

Holdaway characterizes the shared book experience instructional procedure as similar to the bedtime story situation and suggests there are three phases of experience through which a favorite book passes during the procedure (Park, 1982). First the book is introduced for the purpose of enjoyment. Questions may be posed that anticipate the meaning, explore the vocabulary, and perhaps focus on some of the words in the text. The second stage is to read the story again; this repetition is frequently demanded by the listener. The last phase of shared reading involves providing for independent reading.

In sum, a shared book experience provides opportunities in a supported environment for children to:

1. Engage in literature that may have been beyond their independent capabilities.
2. See appropriate literacy strategies modeled by teacher and peers.
3. Develop the sense of literacy conventions, that is capital letters, punctuation, word boundaries, sentence sense.
4. Develop a writing and reading vocabulary.
5. Develop a sense of story schema.
6. Learn about something through reading
7. Enjoy a story, certainly one of the life long goals of reading.

The reciprocal relationship between reading and writing. Early views of literacy development separated reading and writing into opposing processes. Reading was viewed as a receptive process while writing was expressive. Instruction in writing was delayed until children were able to read. Clay (1975) proposed that writing even precedes reading when children are encouraged to participate in print-rich environments. Delores Durkin (1966) suggested that, it was children's interest in writing that helped them become readers. She observed the "ability to read seemed almost like a by-product of [the] ability to print and spell" (p. 137). Frank Smith (1983) sensed that it was mainly through reading that writers initially learn all the writing techniques they know. He believed that "Children must read like a writer, in order to learn how to write like a writer" (1983, p. 562). Current theory (Harste, Woodward & Burke, 1984; Shanahan, 1984; and Tierney & Pearson, 1984) suggests that reading and writing are related processes that emerge simultaneously.

Reading and writing are related processes closely linked to the other language modes - listening and talking - and develop as students experience language in its various expressions. Readers and writers construct meaning based on their knowledge of the graphophonic, semantic, and syntactic cueing systems as they interact with print.

Bromley (1989) states that literacy learning is enhanced by combining instruction in reading and writing. Students benefit from this reading/writing connection because: (a) reading and writing develop simultaneously; (b) reading and writing reinforce each other; and (c) through reading and writing, language is used for communication. Students benefit when they are actively engaged in meaning construction

with language that has a purpose and for which they receive tangible feedback.

Effect of practice. When young children process favorite books it is difficult to tell whether they are really reading or not. Holdaway (1979) wonders if the reading of familiar text is really reading? He suggests that memory's contribution to 'reading' the text varies and is dependent, in part, on the frequency of repetitions, the recency of those repetitions, and the relevancy of the material. Memorization of a book by young children before they know how to read is a common occurrence among children who are read to a great deal (Chomsky, 1976). Certainly as parents/caregivers we can remember the evening when time was short and we attempted to skip a page or two of the bedtime story, only to be told 'you missed the part about...'

Repetition of whole texts is nevertheless an important part of classroom instruction. Research by Martinez & Roser (1985) indicates that students' responses to literature change with repeated exposure to literature. After rereading a story, students: (a) talked more about the story, (b) changed the form (whether the talk was a question, a comment, or answer), and (c) focused on different aspects of the story, indicating greater depth in their understanding. In addition to enhancing understanding, repeated reading of the same text increases students' familiarity with printed words and enables them to become more fluent and confident oral readers.

### Computers in School

Taylor (1980) suggests that all educational applications of computers can be placed into one of three major classifications: tutor, tool, or tutee. D.E. Salomon (1988, cited in Bangert-Drowns 1993, p.70) notes that tutorials have implicit or explicit educational purposes and provide specific guidance and practice to help achieve those objectives. Tools, enable students to acquire new skills through frequent practice and internalization of the processes, or strategies exhibited or stimulated by the tool.

Martha Irwin (1987) suggests that few of the current software programs are congruent with the prevailing data about literacy acquisition. Most software programs are based on a subskill theory rather than the holistic and interactive theories suggested by today's research. Thus with the availability of computers and their accompanying software, it is necessary to integrate computer technology with the instructional program -- at appropriate times, in ways that are based upon sound educational principles, and in ways that are meaningful to the students. Computer software programs can be sources of pleasure and information, tools for communication, and means for mechanical and repetitive practice activities. Irwin (1987) cautions that the computer will be isolated if it is taught about rather than used as a tool, or if it is used to teach ideas about language rather than as a means for children to use language.

The social contexts provided by computer use are as important as those inherent in Big Books and Shared Reading experiences. Software



programs that can be read from the screen help children to: (a) develop an understanding of reading; (b) use technology; and (c) develop values. With the help of an adult or knowledgeable peer, the child learns how to manipulate the hardware and develop thought processes relevant to using the software program. With frequent modeling and observation, the child soon begins to internalize the operation of the computer and eventually wants to be in control. As children work through the text part of the program, they will require the same support as they require in working through books (Irwin, 1987).

Irwin suggests that computers will not replace books or pictures. She does indicate that "technology in the information age will create demands for readers and writers who can select and use appropriate materials and media for specific situations and purposes" (p. 49). Teachers are encouraged to make connections between print and technology in the early years by choosing software programs containing meaningful texts that can be used as authentic learning invitations. These connections must occur in social contexts with teachers modeling and guiding computer uses just as they would model and guide the uses of printed materials.

Irwin wrote her article, "Connections: young children, reading, writing and computers" to offer suggestions for incorporating computer activities in the reading program and although her discussions appear theoretically based, she provides no empirical data to support her contentions.

### Recent Research

Computer software programs. CD-Rom books are displayed on the computer screen and feature the actual text and illustrations of the original hardcopy book. Students may listen to the story read aloud by a variety of voices, as well as enjoy a musical background and sound effects by clicking on the loudspeaker icon. Individual phrases can be highlighted to coordinate with the pacing of the storyteller.

Standish (1992) suggests that the use of this type of computer technology should improve reading comprehension, although the results of her study were inconclusive. She investigated the effects of using CD-Rom books as a supplement to the regular basal reading program, using second grade students as subjects. The Metropolitan Achievement Tests were administered as pre- and posttests to measure performance in both the control and treatment classrooms. The treatment time was four weeks.

During the treatment phase each student was exposed to the CD-Rom program for at least 15 minutes, three days a week. The students, working in pairs, maintained records of new words and their meanings, and used the new words in original sentences to help reinforce the vocabulary learned. Students were also required to write what they liked best about the stories presented on the CD-Rom and to indicate their best-liked character and their reasons for that choice. Students in the control class did not have access to this program.

Standish expected that the study would show that the reading achievement of the students in the treatment class was significantly higher

when compared to the achievement of the control group. Her findings did not support this expectation. A number of factors may contribute to Standish's inconclusive findings: the limited time in which the study was carried out, the use of a standardized test only to measure performance, the workbook-like style of vocabulary activities, and the basal approach to reading practiced in the classrooms. These factors all contribute to a bottom-up approach to reading and thus do not emphasize the acquisition of literacy through the activation of all knowledge systems through the provision of relevant and authentic activities. Students' anecdotal comments, however, indicated a high level of interest as well as excitement about reading when using the books on the CD-Rom.

As suggested in the foregoing literacy review, the literacy invitations teachers extend to their students should enable them to participate in functional and relevant activities based upon their sharing of a variety of literature genres. In the classrooms studied by Standish (1992) a skills model approach to reading instruction was used. The focus of instruction was at the word level as suggested by the activities and the assessment practices implemented.

Hypertext studies. A three year study conducted by Anderson-Inman, Horney, Chen, & Lewin (1994) using hypertext materials created with the *ElectroText Authoring System* was aimed at assisting middle school at-risk students in overcoming reading inadequacies. Although there are other computer authoring systems available, the authors of this study felt that their information was sufficiently generic to apply to all hypertext materials.

These materials resemble those used in the present research, although the CD-Rom books are not as "developed" in their enhancements. *ElectroText* enhancements are of two types - those to encourage: (a) text comprehension which include the provision of definitions, fact questions, and graphic organizers and other types of enhancements to encourage active reading skills, and (b) appreciation for the author's craft. The latter includes thought questions and notetaking options. Anderson-Inman et al (1994) call this form of hypertext "supported text" or "enhanced text" (p. 280) which might point to a Vygotskian influence.

In contrast, the CD-Rom books (*Discuss*, *Bravo*, and *Journeys*) used by the grade one students in this study contained a glossary, a note pad (*Bravo*), a means to "click on" and be told unknown words and the names of pictures in the book.

Although there are differences in the ages of the subject, the duration, and educational setting and contexts, the study conducted by Anderson-Inman and her colleagues (1994) with middle years students has relevance for this thesis. Students in both studies were observed to check out the whole document prior to reading. In the initial exposures to the programs, the "say it" or "click on button" tended to be used frequently, even when not needed. Anderson-Inman et al (1994), identified distinct reading profiles: booklovers, studiers, and resource junkies' (p.284), who were also present in this study.

Findings from the Anderson-Inman et al (1994) study suggest that hypertext literacy is composed of at least three types of skills: traditional

reading, computer, and hypertext reading. Thus in implementing such programs in the classroom, there is need for clearly defined computer literacy. Traditional reading skills must correspond with the difficulty level of the text to be read. Students' computer skills must be such that they are both comfortable using the hardware and cognizant of how to operate it. In using hypertext students require: (a) a knowledge of the structure of the document - its genre, enhancements, and how to use them ; (b) a willingness to engage in reading the text; (c) a sense of purpose in regard to the use of the enhancements and the application of a multiphasic approach to reading -- a deliberate intent to re-engage with the text.

The Anderson-Inman study concludes that the hypertext environment is not for all students. Students do not automatically see value in the enhancements that are provided to support their comprehension and story appreciation; especially if the enhancements are not shown on the screen. As a result both instruction and practice regarding the operation and application of enhancements are essential for successful and maintained learning. The conclusion also underscores the role of participating teachers who need to be cognizant of and knowledgeable about the computer software they are implementing.

What the Inman-Anderson et al (1994) study does not discuss is the extent to which students require preparation in order to learn effectively in hypertext environments. Whether this is a concern for the present study needs to be considered and evaluated based on the age of the subjects.

Change and the new technology. Another three year study, (Blackstock, 1989) was designed to consider the various forms of change

that occur when creating a computer-rich environment. A group of grade one children, their teacher, and their uses of computers as they progressed through three years of schooling were studied by five principal investigators. The researchers used qualitative methods for data gathering including analyses of field notes, interviews with the classroom teacher at the beginning of the project and at the end of the school year, group interviews with the students, videotaped interviews with individual children, videotaped observations of the classroom and the computer center, and computer printouts of the children's efforts. The researchers were active participants in the classroom.

The findings of the Blackstock study suggested that:

1. The introduction of new technology can initiate changes in a teacher curriculum and methods of instruction which appear unrelated to the computer.

2. New technology will be successfully implemented only when it is viewed as a natural aspect of the on-going process of adapting the curriculum to meet the needs of children.

3. Support from colleagues is essential especially during periods of doubt and reflection.

4. Children learn with and about computers without a great deal of direct instruction - "The "subculture of computers" develops through conversing with older siblings; working on available computers in other classrooms; eavesdropping; and being with peer experts.

The teacher in the three year Blackstock study was similar to the teachers in the present study: she was a novice computer user, learned

about the software programs a step ahead of her students, and was disappointed by the lack of appropriate computer materials to integrate into her programs. The teaching-learning relationship thus became more collaborative - an exchange between "equals" - not having the same knowledge, but each being contributors of different knowledge.

Blackstock noted that one of the audiences for the report was teachers faced with the day-to-day task of using technology creatively and productively as a natural aspect of their teaching. This investigator is hoping to assist a similar audience.

Efficient reading skills and technology. An earlier study by Reitsma (1988) also has implications for the present study. Reitsma conducted a study to determine which of three ways of practicing reading best facilitates the development of efficient reading skills in beginners: guided reading, reading-while-listening, or independent reading with computer generated speech feed-back available for students to use at will. First grade students read five stories especially written for the study; in all groups except the control, 20 target words were repeated in each text. Subjects were assessed for accuracy and speed on the 20 target words before and after training. Both the guided reading condition, in which children had to read on their own and had to correct all errors themselves with sustaining feedback, and the speech-select condition, in which students practiced independently but had immediate speech feedback from a touch pad, were significantly more effective than the control and reading-while listening conditions.

Reitsma (1988) concludes that beginning readers need to be engaged in independent efforts to read as much as possible in order to make gains in reading. A computer-based speech-feedback system could thus be a promising and useful tool in reading instruction.

### Summary

The whole child is seen as an active learner in a community of learners, where an adult or knowledgeable peer provides opportunities for engagement in authentic and purposeful learning activities. Language learning is seen as social and as such includes not only acquisition of language, but also the transmission and modification of culture. The teacher invites the learners to participate in literacy activities that are purposeful and meaningful to the individual. Reading and writing are the vehicles for learning, not the objects of learning.

Interactive models of the reading process suggest that readers construct meaning when they comprehend in much the same way writers construct meaning when they compose. Meaning is not in the text to be removed; but is constructed in the mind of the reader on the basis of information secured from the reader, the text, and the reading context (including other readers). We recognize children begin school with vast information about reading and writing. Providing opportunities for shared reading in supportive environments using Big Books encourages young students to read and reread predictable books that may be beyond their capabilities. The repeated reading of the same text in turn increases the



opportunity both to make meaning and develop familiarity with printed words, thereby enabling students to become more fluent and confident readers.

Computers are present in classrooms and teachers are encouraged and often mandated to use this technology. As Irwin (1987) and others (Durell, 1991; Miller, 1989) suggest, few computer software programs are congruent with current views on literacy acquisition. The interactive computer software programs used in the present study are on-screen versions of complete books, and enable students to be engaged in print-rich environments. Although Standish (1992) used these CD-Rom books in her study, her findings were inconclusive and did not support her expectations of reading achievement gains. It is this author's contention that the instructional emphasis in the Standish study which focused at the word level contributed to the lack of student achievement. Reitsma (1988) showed that the computer is an efficient way to develop proficient reading skills in beginning readers. The hypertext environment is not for all students (Inman-Anderson et al, 1994) and students need to be instructed in its use and value.

The research confirms that the computer facilitates changes in teachers and their curricular methods (Blackstock, 1989) and is successfully integrated when teachers: see its relevance in working with children; and receive support and encouragement to effect change (Blackstock, 1989; DeFord & Harste, 1982; Gage, 1984).

The present study is undertaken to provide an empirical and theoretical basis for the implementation and integration of interactive

computer software into the development of literacy acquisition in beginning readers.

## CHAPTER 3

### RESEARCH METHOD and DESIGN

The design employed in this study is best characterized as one of fourth generation research described by Guba and Lincoln (1989) which rests on two basic elements: (a) Responsive evaluation which is a mode of study that focuses on the claims, concerns and issues of the stakeholders (Stake, 1975), and (b) constructivist methodology which supports the notion that experience is studied as a whole in the context of its natural setting. This implies that the parameters and boundaries of the research are determined through an interactive process of negotiation involving both the stakeholders and the investigator.

Guba and Lincoln (1989) suggest that responsive evaluation has four phases:

1. The initiation and organization of the evaluation.
2. The identification of the concerns, issues, and values of the stakeholders.
3. The collection of information that pertains to their concerns, issues and values.
4. The reporting of the results and recommendations.

By definition, in evaluation research there is no design specified at the onset of the study and as such the design changes as new insights and issues emerge.

### Setting

The dual track (English -- French Immersion) elementary school where the study occurred is situated in a relatively recent housing development in which there are both single and multi-family dwellings. On the surface, the families seem to be able to cope with the economic difficulties of the present day, but conversations with the school administrator indicate that many families are indeed experiencing financial hardships. The community represents families who are very proud, who will not accept financial support. Thus families are tightly budgeted to maintain their homes. The majority of families tend to be intact and the school has a strong parent volunteer program suggesting that many moms (and some dads) are at-home during the school day. The parents appear to be interested in their children's schooling and actively support learning at home. Home reading programs are popular and are carried out successfully in many of the classrooms. Many students said that their moms taught them to read or helped them at home by having them sound out the difficult words.

The two grade one teachers had an interest in collaborating with the investigator to monitor the effects of using the computer as a supplement to their daily reading program. The principal had welcomed the investigator to take an active role in this collaboration. By the very nature of being members of these particular classrooms, all of the students became part of the study. The school and the investigator sent each parent a letter informing them of the project and requesting permission to allow their child to become involved. One family chose not to allow their child to be a part

of the study. In addition, six children in each classroom were selected for closer monitoring. These students were selected because their teachers felt they: (a) needed confidence building, that is they were not risk-takers, (b) needed extra practice; and/or (c) needed to be challenged. The parents of these students were personally contacted by the school to obtain permission for participation in the study.

The classrooms were composed of: a natural mix of abilities, one ESL student, and several students receiving resource support. There were no identified special needs students in either class. One class was French Immersion. In this classroom the time allocated to English language arts was seventy-five minutes daily. In the English classroom, an integrated curricular approach was implemented so that language arts instruction was not defined by the clock.

The two classroom teachers involved in the study were willing to take a risk and have an "unknown" enter their classrooms to observe, ask questions, and facilitate change in their curricular methodology. They were prepared to talk about their beliefs, reflect on their actions, and try to incorporate new technology; while at the same time providing appropriate literacy activities for their students. They displayed initiative and creativity in altering their teaching methods to enable the integration of computer technology in their classrooms. One teacher developed her own "Big Book" when one was not available. The illustrated Big Book then became an invitation for the children to write their own version of the original story.



Interviews	with teachers	-to maintain frequent contact with the stakeholders -to analyze and evaluate the data, and -to update the concerns, claims, and issues of all involved
	with students	-to provide honest and sincere reactions to the programs, -to share their knowledge and observations in written and oral format

By repeated searches through the data the researcher will identify emerging generalizations.

Student data. The students had many opportunities to read the stories on-screen and off-line. The investigator completed running records - written records of oral reading - to evaluate targeted students' strategies, reading fluency, and amount of requested support from the "click on" feature of the computer. Readers who are able to monitor comprehension and detect miscues are able to engage a variety of methods to improve understanding.

As a way to improve comprehension and provide a reading - writing link, Sally, the English language classroom teacher, invited her students to retell the story of The Paper Bag Princess based on their hearing the story and pictures. The use of the retelling strategy is a valuable tool both to assess and to instruct. The teacher is able to determine: (a) the student's sense of story structure; (b) comprehension; (c) oral language complexity; and (d) reproduction and production of text and stories. By considering the

inventions and conventions in young students' written work we learn how children develop as readers and writers. Goodman (1993) affirms:

that readers and writers learn to control the complex phonic relationships of an alphabetic language like English in the course of learning how to make sense during reading and writing. That's the only way beginners can learn phonics in any useful and productive way. And not surprisingly, it's the same way they learn oral language, which hearing children have already accomplished long before they learn how to read and write (p. 67).

Teacher data. It is important for teachers to have an understanding of what they believe about language and language learning. Instruction is theoretically based and teachers must know/understand how their beliefs affect what children believe about language and language learning (DeFord & Harste, 1982). One of the tenets of this thesis is that the teacher's views of literacy acquisition must be congruent with the approach to literacy inherent in the computer software. Consequently, there was a need for the teachers' tacit knowledge of how children acquire literacy to become explicit in order to determine whether the programs under study were congruent with their tenets. Through discussion and reflection with the investigator, the teachers were able to voice their understandings.

Each teacher completed the DeFord (1979) Theoretical Orientation of Reading Profile (TORP) which was designed to differentiate preservice and inservice teachers according to their theoretical orientation to reading. The TORP applies a Likert scale response system to 28 items reflecting practices and beliefs about reading instruction which are categorized into three clusters or orientations: Phonics (smaller than word emphasis), Skills



(whole words with multiple skills for dealing with this unit), and Whole Language (larger than word segments).

The TORP has been useful in assessing teacher beliefs about reading (Miller, 1990; Pinnell et al, 1994); in determining teachers' adherence to their theoretical model in their instruction of reading (Watson et al, 1984); and confirming the influence of University instructors, cooperating teachers and professional development on preservice and inservice teachers (Bruinsma, 1985; Hurst, 1991; Roos et al, 1993; and Strickland, 1990).

Sally, a primary level teacher for the past twenty-five years, began teaching reading using the basal and the teacher's guide. She was not happy with this arrangement and wanted to change her teaching approach. She attended inservices, began to read the literature on the role of language in learning, and started to make changes in her classroom. She recognizes that many students develop some reading ability prior to attending school as a result of adults pointing things out and making the child aware of environmental print. She feels that at school:

*kids can learn in different ways- maybe not in different ways- but they use different methods, different things to help them, and that's why I try to use a variety of approaches with kids so they have whatever will work for them and they will be able to pick up on in school, whether it be sight words, initial consonants, whether it be the shape or words, the patterns in words, orally, that's why I begin with nursery rhymes -- auditorially they know it, they can say it, and then you can point out to them that what they hear and what they say and*

*what they see in print -- the little marks -- and this is what you say.*

She scored 120 out a possible 140 on the TORP. Many of her responses fell in the Whole Language cluster although observations suggest that she used a balanced approach in integrating skills instruction into pragmatic activities.

Linda scored 109 on the TORP, which places her at the borderline between the Skills and Whole Language clusters. This is an accurate descriptor for this particular teacher. She noted that she had completed the questionnaire with a focus on grade one. She added that:

*Some of the comments I've made if I were teaching at a different grade level they might change somewhat - now I still believe that students should be learning in a meaningful way. I don't believe in teaching phonics by themselves, I don't believe in teaching sight words by themselves. I like them integrated but I do believe in having lessons - I don't believe that you just go ahead by just presenting the children with reading and they are going to go ahead and do it .*

Linda's class is French Immersion, and as such has limited instruction in English Language Arts. The teacher feels that she has "*to be careful with my (her) time.*" This teacher has also taught for twenty years in variety of areas, not always in French Immersion. She is currently taking courses towards a Post Baccalaureate Certificate in Education and serves on the professional development committee for her school.

These reflections became a stimulus for change in the teachers' methodology. As one teacher commented "*I am always questioning am I doing the right thing? This has made us think...take stock.*"

The principal's involvement was crucial to the development of this project. She recognized that the teachers were ready to move forward and provided the necessary vehicles to support their development. Through a contact with the University of Manitoba's Faculty of Education, she welcomed the services of the investigator. Release time was provided that enabled the teachers to meet with each other and the researcher. The principal provided professional development opportunities for the teachers by facilitating their attendance at conferences, providing appropriate professional articles, and giving them opportunities to share their experiences with other teachers at a Divisional team meeting. Since the administrator was interested in and knowledgeable not only about the technology but also the literacy acquisition of young learners, she was able to develop a milieu that supported professional growth.

### Materials

CD-Rom books, such as the ones used in this study, enable students to read at an individual pace, identify unknown words, identify names of pictures in the book, and hear the text read orally. As the CD-Rom books are read aloud, proper oral techniques are modeled (the books developed by Bill Martin and John Archambault exhibit a story teller quality and are rap-like in presentation); phrases can be highlighted, improving the students' eye-on-print behavior. When the students read silently, individual words may be selected, via the mouse, to be read orally and

definitions or explanations of the meanings may be given. Pictures may be selected and the accompanying text will be shown along with a pronunciation and definition. A list of the selected words can be compiled on a print-out.

The interactive computer books used in this study, provide students with a new reading dimension. The original book is displayed on the computer screen as the actual pages that appear in the published version of the book, but with the text and illustrations enhanced by music, voice intonations and sound effects. The teacher is able to customize the presentation by: (a) varying the delays between phrases; (b) instituting slower reading rates; (c) altering the print style and size of type; and (d) deleting the sound. By clicking on a particular word or picture, the students obtain the pronunciation of a word and an explanation of its meaning. These programs put the reader in control of the situation and encourage independent reading. In this sense, readers are able to operate in their zone of proximal development as the computer provides support for the readers and enables them not only to engage in a successful reading experience but also to develop confidence.

There were three separate CD-Rom programs available in the school. The Discis Books are developed by Discis Knowledge Research Inc, a company founded in 1988 by Canadians, John and David Lowry. Working with Apple Canada Inc. and a team of 15 professionals including designers, music and sound experts, and speech and language specialists, the first Discis book was completed using a chapter of Tom Sawyer. Currently there are twenty-three titles available ranging from early

learning to science and nature topics. Discis also provides the Ginn Publishing Company's Journeys: Emergent Level One and Level Two in CD-Rom format. This is a collection of short stories, poems, and songs especially suited for young readers. The third interactive program available was Bravo published by the Computer Curriculum Corporation.

Critical reviews of these CD Rom computer programs (Martin, 1992; Perry & Perry, 1992; Techtrends, 1990) suggest that these talking books can provide rich reading experiences for young children by encouraging reading and improving understanding. The CD-Rom is able to bring stories alive with professional voice, in-context explanations, and object identification. Their biggest strength is the interactive nature of the disks/books. Students can see and hear the words numerous times. The voices and both the graphics and colour are excellent and stimulating. Each page appears on the screen as it does in the original hard copy. The stories have not been adapted or watered down.

The hardware and software used in the study. Each classroom had a Macintosh LC520 computer equipped with a CD-Rom that was a part of the school's network. In addition, each class also had a stand alone Macintosh, in one case with a printer. The Discis materials include a teacher's guide, the disk, and an individual hardcopy of the story. The cost is approximately \$50.00 for each of the CD-Rom computer programs regardless of the publisher.

## Challenges

Due to the nature of a constructivist paradigm there are "challenges" to be considered when conducting such a study. These may be:

1. Intense relationships develop when working in close contact with others, which may lead to misunderstandings, an attempt to control, and the development of a sense of territory.

2. It becomes difficult to maintain privacy and or confidentiality. It must be clear that all stakeholders have the right to correct erroneous information or remove direct quotations from data.

3. There is a need for open negotiations. Evaluators must be aware of their own motives and should spend time each day examining and reflecting on the interactions to determine if they have been straightforward and honest with the stakeholders.

4. The final report presented as a case study must meet the needs of the various audiences and include all necessary and relevant data.

## CHAPTER 4

### RESULTS

The purpose of this study was to describe and analyze the literacy invitations in two, grade one classrooms. The main focus of the investigation was to observe the integration of interactive computer software programs into literacy instruction. The following questions, which emerged through the interactive process of negotiation between the stakeholders and the investigator, provided the framework for the research and are responded to in chronological order.

1. How was the CD-Rom computer software integrated to meet the curricular requirements of the class?
2. Were sound pedagogical methods being used in integrating these programs?
3. Did these programs reflect the literacy philosophy of the teachers?
4. Did interactive software computer programs enhance the reading proficiency of students?
5. Was writing performance ultimately enhanced by using the interactive software? and
6. In what ways did the introduction of interactive computer software do more than pique the interest of the students?

**1. How was the CD-Rom computer software integrated to meet the curricular requirements of the class?**

This question was posed to demonstrate the method of integration to enable practitioners in the field to use the computer in their own lessons. As suggested in the literature review, it is important that the computer be a part of the acquisition of literacy and not an "add on". In this way the computer is seen as a tool, another avenue, in conjunction with sound pedagogical practices, for developing literacy in all students.

Certainly if teachers are able to successfully integrate interactive computer software into their programs, they will need to have both more software and hardware. Thus it is hoped that the present data on integration will enable the school to obtain further funding to obtain these resources.

The investigator obtained these data from observations in the classrooms, interactions and interactions and discussions with the teachers in which ideas and methods were discussed. The investigator contributed to these discussions based on her own teaching and computer experiences as well as the ideas presented in the research literature that she was reading. Since the investigator had started meeting with the teachers in September, the comfort level of the participants was high and a sound relationship based on trust and common concern had developed.

Each teacher integrated the talking books in different ways, but ways that were comfortable and appropriate to their teaching styles, their



students, and their situation. Before the integration took place, there was much time spent with each teacher talking about their concerns and hopes.

### Early Attempts at Integration

Initial contact was made with the teachers in September at which time neither teacher was using the computer in her instruction. Sally, one of the teachers, indicated that she was concerned about how to use a computer to have her children write, to provide help, and not merely give the students busy work. This theme of organization was prevalent in many of Sally's comments, especially considering her students' lack of independence. In addition, Sally was aware of the difficulties her students would experience using the keyboard -- many of them did not know the letter names, and locating the letters was very time consuming. For a while, Sally invited a mom to come in and assist children in the use of a keyboarding program.

By mid-October, Sally was preparing a letter with a group of students instead of her morning message. In this activity five students would join the teacher at the computer and talk about what was to happen or had happened in their class. The students generated the ideas and the teacher used the opportunity to increase print awareness through the use of her think-alouds. In this case the teacher did the keyboarding. After the letter had been printed these five children would read it to their groups. Soon all students could read the newsletter and they took it home to be shared with their families. Although the teacher controlled this activity, it was a breakthrough in that she was attempting to use the computer as a tool in her classroom and to support an authentic activity.

Linda, the other first grade teacher, hoped to beat the keyboarding dilemma by placing a string down the centre of the keyboard to divide left hand and right hand letters. The students keyboarded previously composed writing. Linda would edit the composition with individuals; her goal being to have students compose directly on the computer. This class did not have a free standing printer and this proved to be a problem as students would have to go to the library to fetch their printed work from the network printer. Soon Linda's class became involved in writing riddles and sharing them with their classmates. This was an opportune time for the students to work directly on the computer and by the third week in November all students had composed a riddle directly on the computer.

#### Developing Computer Literacy

By November students in both classes were becoming more familiar with the computer and the keyboard: they knew to press the space bar after each word (spaces were not always evident in handwritten material), how to obtain capitals, and some could discern the difference between the capital I and L when composing in lower case letters. We were noting that several children who were experiencing motor difficulties in printing, both preferred and were more successful at using the computer. As Richard, a student, remarked, "*It's easier.*"

In January, the teachers had become interested in using the interactive computer software with their students. They were more comfortable with the computer and felt successful in using it as a writing tool. They seemed to have overcome their problems regarding organizational dilemmas and were now prepared to embark on a new

journey. They had a chance to peruse the available interactive CD-Rom materials and consider which materials would be appropriate for their upcoming themes.

### Support

It is imperative that the teacher become familiar with the software and understand the basic procedures of running the program. Prior to the onset of the study, the two teachers and the investigator received training in the programs from the library technician. Continued technical support was available from the librarian and library technician as required. Their assistance was important to the running of the programs. Technology and humans, being what they are, do not always cooperate and when a teacher has twenty plus students to attend to, a malfunctioning computer program is unwelcome. It is important for the successful use of technology to have technical support readily available.

### Initiating the Integration

Sally's class began with The Paper Bag Princess (Munsch 1980). This book was chosen because the class theme was dinosaurs and while it was "far-fetched", Sally thought that dinosaurs and dragons, as it were, were similar. The fact that there was no big book available was a problem but not one that was unsurmountable, as she constructed her own wordless big book version.

The first lesson began with the students assembled on the carpeted area of the classroom. She showed the front cover of the book and the students made predictions about what the book was about. The writing of

the questions became mini-lessons on print conventions and spelling. The children's questions were open-ended and were referred to for confirmation/negation during the reading. Following the reading, the teacher and her students answered the questions together. The teacher printed the answers under the question.

The students in this class were aware of the beginning, middle and ending of a story, in addition to such story elements as character setting, problem and solution. Using this vocabulary there was a brief discussion of these terms as they pertained to The Paper Bag Princess.

A discussion of the story elements continued the next day. As the teacher reread the story, the children indicated where the information belonged on chart paper displaying *beginning, middle and ending*.

The following day, as the teacher reread the story, the students offered words from the story that were interesting to them. These "powerful words" (a classroom term) were listed on a paper bag to be used by the students as a resource, to check out any troublesome words or to spell conventionally when they wrote. As the words were being listed, the teacher drew attention to root words, endings, soft consonants, and silent letters. In some instances, the children pointed out some of these elements on their own. Sally shared that on the third reading of the list, many students could say the words without support and "*used word attack strategies with those words that were troublesome*".

The next lesson began with the teacher and students reviewing their story map constructed the previous lesson. Sally extended the next invitation:

*We have all these ideas in our mind and we have read the story, so now we're going to take our Big Book and on the front it says Author Robert Munsch; it also says retold by Grade One, [Something] School, February 1994 and that's because you are going to be retelling the story.*

After a quick summary of the story, the students began with the first illustration drawn and coloured by the teacher. Using the picture clues and their prior knowledge about the actual story, the students worked through the retelling. At the end of this, the teacher suggested the students meet with a buddy, create a story in their own words that corresponded with their illustration, and then share it with one of the adults in the room. After five minutes, Sally directed her students to write a rough copy of their retelling cautioning them to use their powerful words, "doozer" (function) words and other words that they knew and to make sure there were spaces between the words.

Once the rough drafts (Appendix A) were completed, the students met with their teacher and matched their writing to the page in the Big Book. The piece was shared and the other students were encouraged to give suggestions that would improve the writing. The changes rested with the author, unless it was crucial to the story. The rough copies were edited with the teacher, who because of time limitations and planning conflicts, keyboarded the retellings. The original plan had been to have grade five

"computer buddies" work with the students. Once the material was printed, the pages were handed out randomly to the groups (no one got their own copy) and then read aloud to enable the group to sequence them with the pages from the Big Book.

The children all had a copy of the retelling which was contained in a booklet in the shape of the princess, made out of a paper bag. The completed paper bag princess books were read to a grade 2 and grade 3 classroom and then the completed projects were displayed on the bulletin board. The students had another copy of the retelling that they placed in their binder which enabled them to read their story at any time. Once the retelling was finished, comparable readers began to read The Paper Bag Princess on-line. In the first reading, the phrases were highlighted and read by the storyteller. The hard copy of the book was also available in the classroom and the students read it to each other, themselves and to parent volunteers. Two weeks after the start of the study, Sally reported that the parent volunteers related that most of the children "were reading it very comfortably". Students were encouraged to take the book home to share with their family.

Sally said that the vocabulary was quite difficult in this book but felt her students would be able to read it or at least be able to paraphrase it by the end of the novel study -- and she was right!

#### Another Invitation

Thomas' Snowsuit, another book by Robert Munsch (1985), was chosen because it was part of the Munsch series, hard copies were

available, and it befitted the weather. This story was presented in a more casual manner than the Paper Bag Princess had been. The following describes another example of how to use the computer material.

When Sally showed the book, many students recognized it from the previous year and were able to summarize the story. Sally read the story and shared the illustrations with the class. They were interested in the story and quickly took the part of Thomas and emphatically read his **"NNNNNNNO!"**

The students were working through the novel study portion of Sally's Language Arts program and Thomas' Snowsuit would become another title to choose. The book could be read both on-screen and off-line. The children were excited about reading the book on the computer. As well as reading the book on screen, the students could read to parent volunteers, participate in the various activities planned by the teacher, and take the book home to share with their families.

Not all procedures or methods of implementation are appropriate for all teachers or all students. A teacher must be agreeable with the strategies, and instructional procedures must meet that comfort zone. And so, the two teachers in the study approached the methods of integration in manners that reflected their individuality.

#### Integration Reflects Different Theoretical Orientations

Linda's theme, fables, was introduced by her prereading lesson of A Beautiful Feast for a Big King Cat (Martin, 1993). She initiated a discussion of familiar cat stories with her students. The discussion centred

on the events of these stories and the characters in them. Once the background information had been activated the teacher began to read the story aloud. Quickly the class picked up the rhythm and rhyme of the writing and began to chime in with appropriate vocabulary. Linda read the first twelve pages, stopping at a fitting time, and then asking her students to return to their tables and write what they thought would happen next in the story.

Once the students had submitted their written predictions (Appendix B), they were able to read the completion of the story on-screen with a partner who was a comparable reader. Over the next few days, the students shared their written predictions, noting the similarities and differences between their stories and the original, and listened to their teacher reread the story. By this time many of the students were able to read the book independently and share it with each other during free reading time. Linda invited her children to write the next episode of the story. Upon reading the next episodes, Linda realized that this story did not have a clear lesson, that *"it isn't like a true fable"*. One group of students performed a skit to portray the next episode and in the skit the mouse apologized to the cat, but the cat was not sure whether he would accept the apology. As she continued, *"It makes sense, if you hurt someone you're not going to go ahead and be their friend."* In addition to skits and individual stories, the teacher provided an opportunity for those students who were having difficulties finishing their next episode to join a group, which she headed, and complete a group writing with her.



The students shared their writings and discussed the purpose of the exchange. Their ideas suggested the need for: (a) clarification and expansion of ideas, (b) the receipt of new ideas from others, and (c) spelling assistance.

In order to clarify the idea of fables, Linda read other familiar fables to her class. The Lion and the Mouse was known to the students and they were able to identify the lesson.

Prior to reading the Fox and the Crow, the class brainstormed for ways to describe these animals. After reading, connections were made between the characteristics and the events. Linda reflected that once these connectons had been made, *"the lesson (of the fable) became easier to understand."*

The exposure to the fables set the stage for the next "talking book" to be read in the classroom, that being Rooster Tells a Tale. The students were asked to name known farm animals. Linda asked them to choose animals that could be in a story and to think of how to describe them. She read the original story to them, then they composed a retelling using their known farm animals. The students reread and edited their group retelling. The editing process indicated the sophistication of the students. As the decision was to be made about the title, Donald reminded his peers that *"it's against the law to call it your own"*, thus the title became Rooster Tells a Tale - Retold. The question of the crow's gender was raised, and Eric noted that the crow's a "she" because *"boys don't sing much - only girl birds sing so much"*. Students read the fable both on screen and in the

hard copy version. Other students went on to find other fables, some in on-screen versions and others off-line.

### Limitations

It is important to realize that technology exists in the real world of school - there will be down times, network and program difficulties, and other glitches that surface when you least expect or need them. Sally feels that technological difficulties "would be the thing that finishes it for a lot of teachers". She recognizes that she was fortunate to have technical support. Other difficulties recognized have been: (a) the lack of student keyboarding facility, not a concern for the talking books, but a major problem when young children are invited to write on the computer; (b) the absence of appropriate thematic materials; and (c) the lack of available hardware, especially if children are to compose on the computer.

### Summary

The two teachers approached the integration of the interactive CD-Rom interactive software in practices that reflected their individual theoretical orientations and the needs of their students.

To move out of the realm of the known and to work with new technology the teachers needed not only technical support when systems went down but the support and encouragement of the administrator who was interested in and knowledgeable not only about the technology but also the literacy acquisition of young learners. The teachers used a variety of approaches to integrate the talking books into their literacy invitations. Prereading activities included making predictions, shared reading, and/or

a writing activity. Students were able to read the text on-screen and in the hard copy. Opportunities were provided that enabled students to read to a peer, a younger student, to an adult in the classroom, to the family member, or to oneself. Post reading activities included retellings, developing the next episode, and using the text as a model for new writing, presenting a skit or a puppet show. All students, regardless of reading ability, participated in all aspects of the reading process and were contributing members of their learning community.

## **2. Were sound pedagogical methods being used in integrating these programs?**

The intent of this question was to determine whether the acts of integration were based on sound pedagogical theory. It is important that teachers base their instruction on sound language theory. It becomes essential that parents and other stakeholders view the computer as a valuable and effective tool that can be engaged to support literacy acquisition. Thus not only the acquisition but the programs must be seen by all as pedagogically valid.

Through the analysis of investigator observations, interviews with teachers and their students, descriptions of methods and instructional plans, and analysis of the obtained data, appropriate educational strategies for developing literacy in all students were determined.

### **Reading Instruction**

Teachers approach reading instruction with a general framework in mind. This provides the structure on which instructional activities occur.

Various instructional frameworks have been suggested (Betts, 1946; Cooper, 1986; Herber, 1978; and Stauffer, 1969). Although these formats differ somewhat, they are similar in that they focus on reading lessons that are presented in three parts: pre, during, and post-reading activities. The work of Ruddell and Unrau (1994) provides a theoretical basis for these formats. The Ruddell and Unrau model (1994) was based on the sociocultural interactions that happen during instruction. The key elements are the reader, the text, and the teacher. *"As the reading process occurs these three components are in a state of dynamic change and interchange as meaning negotiation and meaning construction take place"* (p. 998).

Prereading activities. At the prereading stage, readers try to make sense of their reading based on the information available to them and their past experiences with the topic and texts. To activate prior knowledge and encourage motivation, a prediction strategy is often used. One teacher, Sally, showed the students the front cover of the book and asked them to predict what they thought would happen in the story. Linda, the second teacher, invited her students to recall stories that had the same characters as the ones in the new story.

Another function of the prereading discussion is to establish a purpose to guide meaning construction that develops a higher interest in the reading comprehension process. Sally initiated her first lesson by indicating the purpose of her lesson, *"We are going to predict and ask questions about this story"*. Further in the lesson, the students wanted to find out about the author, Robert Munsch, and therefore established an authentic purpose for writing to him.

Linda requested that her students "*tell what might happen next*" after she paused at a strategic point in the story. She continued:

*After you've done that, then you will be able to listen to the story on the computer to see how right you were or how wrong you were, so go ahead and write your own prediction and tell me what you think will happen next.*

In her own way, each teacher both activated their students' prior knowledge and provided a purpose for the reading of the stories.

During reading activities. During the reading portion of the lesson, the central point was the actual reading and becoming familiar with the piece of literature. Some students required more support than others, and thus the scaffolding feature of the interactive software programs enabled less able readers to successfully complete the books and understand the events that took place. There is a danger of using the "click-on" technology exclusively, as evidence by Danny, but during reading is an opportunity for teachers to instruct and to discuss various strategies that the children could be using to decode and to confirm comprehension. Ruddell and Unrau (1994) suggest that if comprehension is to occur, it is essential that students use metacognitive strategies that support monitoring, rereading and comprehending. Strategies such as implicit and explicit modeling are appropriate.

When Sally read the Paper Bag Princess to her students, they readily responded to confirmations of their predictions. After hearing that the Paper Bag Princess arrived at a cave with a large door, one student exclaimed "*I was right!*"

Post reading activities. On the basis of the illustrations and listening to the story, the students in this classroom were able to retell the story of the Paper Bag Princess which they did orally and then in writing. Their comprehension of the story was intact and was developed through the variety of interactions that they had with the story.

The teachers' oral reading and the explicit modeling of expressive oral reading provided by the CD-Rom storyteller helped demonstrate fluent reading. The students' oral readings reflected this meaning-making. Sally noted to her students that "*Your eyes were seeing that question mark and your voices made it sound like a question.*"

Reading activities on-screen enabled students to request unknown words, listen to rereadings and reread on their own as many times as they felt necessary without reactions from others.

### Artifacts

Once students had read a piece of literature they were encouraged to use what they have learned in various ways. Students responded using various sign systems (Harste, 1994) portraying their specific strengths and interests.

Not all the students in Linda's class chose writing as the media to express their next episode of A Beautiful Feast for a Big King Cat, Sharon, a high functioning student, and Anita, a student encountering difficulties, teamed to perform a play for their classmates. The play's dialogue was based on Sharon's written script. Although most of the post-writing activities were completed at the students' desks, both teachers did try to

have students compose their writing on the computer. This proved to be difficult due to the limited number of computers in the classrooms and the time required to keyboard the writing.

Both teachers recognized that students learn from each other and provided cooperative learning opportunities for their students. Students worked in pairs reading on-screen and in small groups to develop stories and other demonstrations of their understandings. Linda remarked that after reading the story on-screen, two students discussed the story and were able to fill in missing gaps in their comprehension of the text.

In both classes, students developed an understanding of story schema. One follow-up activity was to develop a map of the story that included the characters, setting, problem and solution. Such an activity enabled the students to retell the story and thus consolidate meaning.

### Summary

The teachers in the study demonstrated sound instructional techniques in presenting the computer software programs. The introduction set a purpose for reading and established or activated prior knowledge. The actual reading and the response to the reading enabled the students to develop an understanding of the story. Students were encouraged to use various reading strategies and sign systems to convey their knowledge about the story that became a focus for writing experiences.

### **3. Did these programs reflect the literacy philosophy of the teachers?**

The intent of this question was to determine the congruency between the teachers' views on literacy acquisition with the use of the interactive computer software programs. By focusing on this question, the teachers were able to articulate their philosophy regarding emergent literacy and thus make their tacit knowledge explicit. The broad aim of the question which required the teachers to consider the reading and writing invitations they made to their students was to encourage practitioners to become discerning software consumers and to reflect upon the compatibility between their beliefs and those underlying the use of the computer software program in regard to their expectations of students.

The data collected and analyzed to answer this question were obtained by: (a) administering the Theoretical Orientation of Reading Profile TORP (DeFord, 1979) to each teacher, (b) observing teacher practices in the classrooms, (c) interviewing the teachers together and individually, and (d) facilitating both reflection and the articulation of instructional beliefs and practices during the interview process. One teacher maintained a journal in which she shared her thoughts and observations during the majority of the research project.

The Theoretical Orientation of Reading Profile (TORP) (DeFord, 1979) classifies teachers into three clusters or orientations to reflect their beliefs about the reading process and reading instruction. The three clusters, as described in Chapter 3, are the need to focus instruction on: (a) Phonics (smaller than word emphasis), (b) Skills (whole words with



multiple skills for dealing with this unit), and (c) Whole Language (larger than word segments). The TORP was administered to each teacher to obtain a comprehensive view of their theoretical orientations.

Linda. Linda scored 109 out of a possible 140 on the TORP, which places her at the borderline between the Skills and Whole Language cluster. As previously noted, she completed the questionnaire with a focus on grade one.

*Some of the comments I've made if I was teaching at a different grade level they might change somewhat - now I still believe that students should be learning in a meaningful way. I don't believe in teaching phonics by themselves, I don't believe in teaching sight words by themselves. I like them integrated but I do believe in having lessons -- I don't believe that you just go ahead by just presenting the children with reading and they are going to go ahead and do it.*

Reading strategies. Linda teaches phonics through her morning message. As Morrow (1993) relates, this is an important opportunity for primary teachers to model print, to develop various concepts of print, and to emphasize specific words, letters, and phonic generalizations. At this time, Linda teaches reading strategies -- "*Looking at the initial letters, Skip the word and let's go on and read, What do you think they're trying to tell you, Can you figure out from the meanings.*" When we discussed the transcripts of students' reading, it was noted that when asked "What do you do when you have trouble reading?" many students responded "Sound it out." Linda indicated that it would be necessary to reinforce some of the other strategies and "*that's one thing we're doing in the morning message -- we*

*very seldom sound them out -- I say to think of little words, do you hear that word in it?"*

Linda was concerned that the parents of her students were encouraging the "sound out" strategy. She sends a newsletter home each month, and suggested in her January newsletter that sounding out should be left to the last. Her message must be coming through, for when I interviewed some of her students in March, Jerry emphatically responded the *"las thing was sond it out" [last thing was sound it out]*.

Linda believes that children learn to read through repetition of material presented in a meaningful way. At the beginning of Grade 1 she continues:

*They will memorize the book and that's fine and then I start asking them to point to the words so when they've got the book memorized then we can go ahead and see what the word was.*

She senses that the parents of her students do not understand that memorizing is a first step in learning how to read and they expect their student to be able to read every word. She speaks of parents who want her to assign harder books because the child knows all the words in the books. She telephones the parents to explain and says *"you can tell that they [the parents] are not happy and they're thinking what are you teaching my child to read when you do that"*.

Linda understands the significance of making the reading/writing connection. Following her reading of the first part of A Beautiful Feast for a Big King Cat she invited the children to tell what might happen next "to

write your own prediction." The students went right to their tables and began to write. The atmosphere in the room was quiet, everyone was busy and directed. (See Appendix B for a copy of the students' predictions.) As the adults in the classroom mingled, they stopped to listen to the stories, encouraged children to use invented spellings, and to use the vast amount of print available in the room.

Linda recognizes the importance of children sharing their ideas and talking as a rehearsal prior to writing. One morning, an invitation was extended to the students to write the next episode of the story (Appendix C). First the class met on the carpet and shared their new accounts of the story. When they felt comfortable, went to their tables to record their thoughts on paper.

At another time, the students constructed finger puppets to retell the story. Working in groups, the students described other animals not in the story The Fox and the Crow, and decided what the animals would say. The students then wrote their retellings of the story.

Linda found that the transfer of vocabulary to writing was greater than she had noted in previous years and she indicated that she did not always do follow-up writing of the stories read. After observing her students writing she felt that this type of activity "*could be something that I have to consider.*"

Linda decided that next year she will use these interactive computer programs earlier. She feels that by the time the students have seen the Big Book and had opportunities to read the story on screen and off-line, the

students will be familiar with many of the words. She suggests that she will probably use different tactics for different types of students, but does predict that by using the program at the beginning of the year "*top kids*" would really take off and the weaker ones, by repeating the stories, "*could feel they could learn a book they can feel good about it*".

Sally. Sally, the other teacher in our study, scored 120 out a possible 140 on the TORP. Many of her responses fell in the Whole Language cluster although observations suggested that she used a balanced approach in integrating skills instruction into pragmatic activities.

*Kids can learn in different ways -- well, maybe not in different ways -- but they use different methods, different things to help them, and that's why I try to use a variety of approaches with kids so they have whatever will work for them and they will be able to pick up on in school, whether it be sight words, initial consonants, whether it be the shape or words, the patterns in words, orally, that's why I begin with nursery rhymes -- auditorially they know it, they can say it, and then you can point out to them that what they hear and what they say and what they see in print -- the little marks -- and this was what you say.*

Sally believes that children learn from each other and points out to her students "*that I'm not the only teacher in the room.*" Her classroom was set up with large tables and it appeared that there were no assigned spaces, but rather seating (and help) occurred randomly. Sally and the Grade Five teacher had established a "computer buddy" system in which the grade 5's worked one-to-one with a younger student helping them to print stories on the computer.

The school division's primary teachers have developed a testing program based on reading passages from graded books, and Sally has put this on the computer which enables her to keep a record of students' work that she can share with parents. She wants to know if her students understand the story structure, some sight words, word attack skills, and what strategies are used -- picture clues, context, phonics.

Her classroom was full -- there was a couch, several tables, a large trunk, a storage chest that was once a dresser, tables, pillows, chart stands, and books displays. There were many models of print throughout the room - some published, others student and teacher produced. Sally thinks that it is important to have the love seat " *'cause there are those that gravitate to those areas and then there's the pillows and throw rugs that can go everywhere else in the room -- I think those nooks and crannies are important...*". The physical layout of the room invites many students to snuggle up and read.

Sally uses reading as a basis for many learning opportunities in her classroom. The first day I attended the class the students were in the music room combining the actual words of The Woodcutter's Mittens with musical instruments. Following a performance for their parents, the teacher related to me that several parents were disappointed that the students had not memorized their parts. Sally explained to these parents that the purpose of the experience was to encourage and provide a variety of opportunities for reading.

Sally's students had a variety of views on how she facilitated the development of reading abilities. Warren, one of the students, saw that his

teacher made the students read *"lots of books"* others suggested *"reading stories"*, *"take books home to read to our moms and dads - like practicing"*, *"she points to some words and says read it so that helps us to learn to read them."* Terry suggested that *"First teacher taught us the doozer words" [the high frequency functional words]*; while delightful Danny replied *"Mrs. Smith [the classroom teacher]? She doesn't help kids learn how to read!"* Despite Danny's allegations, Mrs Smith believes that children come to learn:

*In spite of us -- I think they really do -- through modelling, through patterns and watching you, seeing what you do with words. I don't think they learn to read in one way but there are many ways they can use. I don't even know if they are aware of using them.*

Environmental print plays a large part in literacy acquisition. Sally senses that *"the kids are reading whole things before they come to school, just signs and various print in the world"*.

Although the classroom environments were different, the two teachers were similar in that they understood the need for children to learn in a print-rich environment based on meaningful text. Yes, phonetic analysis was taught, but not in isolation, and students were encouraged to use a variety of decoding strategies to unlock unknown words. The meaning of the text and the child's own experiences were used to foster understanding.

4. Did interactive software computer programs enhance the reading proficiency of the students?

This question was asked to investigate the effectiveness of adding CD-Rom computer software to early reading instructional programs. Current literacy theory (Altwerger et al, 1987; Edelsky & Smith, 1984; Goodman, 1982, 1989; and Smith, 1973) suggests that print should be presented in interesting and relevant contexts in which children are able to apply their prior knowledge of topic, knowledge of story schema, and knowledge of word cueing systems, to both facilitate reading and obtain meaning. The question was whether these "talking books", which present interesting and relevant print, enhanced the reading performance of these early learners?

The present data were obtained through analysis of students' running records and writing samples, classroom observations, and interviews with students and staff.

Students' View of the Reading Process

Grade One students indicated that practice was fundamental to becoming a good reader. One student went so far as to suggest that the practice needed to be "*constant*". Brian, perhaps unknowingly, but reflecting the perceived thrust in many classrooms, noted "*that you need to know the words*". Following this vein, Donald cautioned "*that you don't give up on words*". Jennifer, in an holistic fashion, advised reading a "*simpol book frst*" [*simple book first*].

Correlated with their views of good readers are the strategies these students said they employed when experiencing decoding difficulties. "Make a guess" was suggested by two of the thirty-five surveyed students, while four thought it best to ask someone to pronounce the word for them. Twelve students proposed looking into the word for parts known, while fourteen indicated skipping the word and perhaps going back to figure out what would make sense. Looking at the pictures was offered by eight students, and seventeen suggested sounding out the word, but Jerry echoing one of his teachers, wrote that the "*las thing was sond it out*" [*last thing was sound it out*].

#### Instructional Sequence and Student Performance

The method of introducing The Paper Bag Princess, in Sally's class was similar to the organization of lessons using conventional literature (hard copy). Following pre-reading activities to establish purpose and make predictions, the teacher read the original book to the students. The post-reading activities comprised of confirming and/or negating the predictions, as well as a discussion of the story elements.

The students read the stories on-screen and off-line. They read to parent volunteers, their teachers, parents, peers, younger and older students, to themselves, and to the investigator. Their writings were in response to their readings -- they wrote predictions regarding what they thought the next episode of the story would be; they created their own retellings of a story based on illustrations or a known fable; and developed original stories modelling a predictable book.



Powerful words. The prereading activity for the Paper Bag Princess which consisted of making predictions to establish purpose for reading, was followed the next day by the students in Sally's class gathering on the carpet to view a list of words printed on a large brown paperbag. These were termed 'powerful words' and had been selected earlier by the children as *"interesting and powerful words that stood out in their [the children's] minds"*. The selected words were:

beautiful	castle	expensive
princess	unfortunately	marry
smashed	fiery	prince
burnt	huge	banged
dragon	slammed	grabbed
smartest	fiercest	world
fantastic	magnificent	cook
fly	shouted	whispered
cave	tangled	mess
real	pretty	neat

Sally, the teacher, went on to tell me:

*[These] could be vocabulary that could be worked on, [that the] kids [could] use as a reference point in their reading the book or computer [software] program - they have something they can go back to and through whatever method they may use they can recognize the word and that would help them. I didn't have time to develop those words or do anything with them, but I sometimes wonder if you have to do something with them. If using the vocabulary when retelling and reading the original published version isn't enough ... to have the kids make sentences with them and illustrate them --*

*I wonder if that's so necessary. You're pulling it out of context that way, whereas if you leave the list and then to the kids they are strictly their words - they're not words I would point out at all...I realize they are pulled out there [the list] but they can use them in the context of the story.*

As Sally's students read the word list aloud, she drew attention to root words, endings, soft consonants and silent letters.

Story retellings. Small groups of two and three students wrote their retellings based on illustrations in the Big Book. To make the task manageable each group was responsible for retelling only the story part that accompanied each illustration. The following group-created story is the first draft of their retelling (See Appendix A for a copy of the children's actual writing):

Princes RonolaD and princess Elsabth (missing segment)  
 a dragon cum and smashed doon The castle and He Brt all hre  
 close and He flo of woe pro rond and hre har was rele mose and  
 hae hab noing to wore  
 The only Thing that wasn't burnt was a paper bag, So the  
 princess Put it on. Princess Elizabeth followed the trail of Horse  
 bones to find Prince Ronald.  
 At lasT THE Princess foud THE dragebs casl. SHe NocT on THE  
 dor aND THE dragen sToc His Had ouT of THE dor He SaD I like  
 To eet Prinss Bot I aLLraTeeet a casl He CLOsaTHE dor SHE  
 NocT on the DoragaN  
 Princess Alalibis sib are yuo the Fierscest and the srong's dragon  
 150 folts in 1 Firt BRetH?is it tRue that you CAN BLoe DOWN  
 is it allso true tHat you CAN Fly ARoud the WOR LD iNN 10 ses.?  
 ater the dragoN burnt 150 forests out he didnt have enough fire  
 to roast a meatball.

Elizabeth said to the dragon "Is it true that you could Fly ARoundthe WORIDiN 10sec?" "Why, Yes," and he jumped up and flue araod the wrild.

The dragonflew arod the world in ...soKs. WeN He got Bak He coDiNT moov a masl

She saw Prince Ronald. he waved to her. hey dragon" Princess elizaBeth said. The dragon did not move. She shouted again "Hey dragon!" the dragon was so tired he did not move at all.

Princess Eliabit your har is taglD you smal like asise your wrg a parBHg. WaY prince RoNiID you have niS lokg Bat you are a BuM

And They didn't get marrd afterall!

The edited version of the students' retelling is a follows:

Prince Ronald and Princess Elizabeth lived in a castle together. Princess Elizabeth wanted to marry him; but Prince Ronald did not want to marry her.

Princess Elizabeth had very beautiful clothes.

A dragon came and smashed down the castle. He burnt all her clothes.

The dragon flew off with prince Ronald.

Princess Elizabeth's hair was really messy; and she had nothing to wear.

The only thing that wasn't burnt, was a paper bag. So the Princess put it on.

Princess Elizabeth followed the trail of horse bones to find Prince Ronald.

At last, the princess found the dragon's cave. She knocked on the door and the dragon stuck his head out of the door. He said "I like to eat Princesses, but. .. I already ate a castle." He closed the door. She knocked on the door again.

Princess Elizabeth said, "Are you the fiercest and strongest dragon in the world?" "Yes," said the dragon.

Princess Elizabeth said, "Is it true that you can blow down 50 forests in 1 fiery breath?" "Yes", said the dragon.

After the dragon burnt 100 forests out, he didn't have enough fire to roast a meatball.

Elizabeth said to the dragon, "Is it true that you could fly around the world in 10 seconds?" "Yes," and he jumped up and flew around the world.

The dragon flew around the world in 20 seconds. When he got back, he didn't move a muscle.

The Princess saw Prince Ronald.

He waved to her. "Hey, dragon," Princess Elizabeth said. The dragon did not move. She shouted again, "Hey dragon!" The dragon was so tired he did not move at all.

Princess Elizabeth your hair is tangled. You smell like ashes. You're wearing a paper bag," said the Prince.

"Well, Prince Ronald, you have nice looking hair; but you're a bum!"

And they didn't get married after all!

Morrow (1988) suggests that a retelling makes it possible to determine the form of comprehension evident in the children's sense of story structure. Well formed stories have structures that include setting (time, place, characters), theme (an initiating event that causes the main character to react, form a goal, or face a problem), plot episodes (events in which the main character attempts to attain goal or solve the problem, and a resolution (attainment of goal or solution of problem and ending of the story). The students were aware of the beginning, middle and ending elements of stories, and their retelling reflects this knowledge. Their retelling follows the sequence of the original story and indicates that they have a good sense of the story structure.

As their writings suggest the students conventionally used seven of their previously identified powerful words. They chose not to use seventeen words from the list (there were thirty words in total). Six words (and/or their derivatives) were functionally spelled. The students invented a further sixty-three words to tell their stories and used conventional spellings for one hundred thirty-five running words. Their retellings were made into a book which they shared with other classes in the school and/or read at home. They also maintained a copy in their personal binders which they could read during independent reading periods. By the time the students were exposed to the CD-Rom, on-screen version of The Paper Bag Princess, they were familiar with the story and many had memorized their retellings.

#### Reading On-Screen and Running Records

After several on screen readings, running records were obtained from ten students. Three running records (those of Ray, Trinkka and Danny) and an analysis of the on-line behaviors of Anita and Richard that are representative of students' performance are included in the text; the remaining are located in Appendix D. The coding for recording the miscues is included in Appendix D.

Roy. As indicated by examining the running records, most students had few miscues and did not require the 'click on' support of the computer. Roy was representative of this group of students. His running record suggests that the miscues (five repetitions, two insertions, four omissions and three self-corrections) were not significant and did not alter the

meaning of the story. Five of his miscues were based on the class's retold version of the story.

*Roy's running record:*

The Paper Bag Princess

Elizabeth was a beautiful princess. She lived in a castle and had expensive princess clothes. She was going to marry a prince named Ronald.

Unfortunately, a dragon smashed her castle, burned all her clothes with his fiery breath, and carried off Prince Ronald.

Elizabeth decided to chase the dragon and get Ronald back. She looked everywhere for something to wear but the only thing she could find that was not burnt was a paper bag. So she put <sup>it (so)</sup> on the paper bag and followed the dragon. He was easy to follow because he left a trail of burnt forests and horses <sup>ET</sup> bones.

Finally, Elizabeth came to a cave with a large door that had a huge knocker on it. She took hold of the knocker and banged on the door. The dragon stuck his nose out of the door and said, Well a Princess! I love to eat Princesses, but I have already eaten a whole castle today. I am a very busy dragon. Come back tomorrow. He slammed the door so fast that Elizabeth almost got her nose caught.

Elizabeth grabbed the knocker and banged on the door again. The dragon stuck his nose out of the door and said, Go away. I love to eat Princesses, but I have already eaten a whole castle today. I am a very busy dragon. Come back tomorrow. Wait, shouted Elizabeth. Is it true that you are the smartest and fiercest dragon in the whole world? Yes said the dragon. Is it true your fiery breath?, said Elizabeth, that you can burn up ten forests with your fiery breath?

Oh yes, said the dragon, and he took a huge deep breath and <sup>breath/burnt</sup> breathed out so much fire that he burnt up fifty forests.

Fantastic, said Elizabeth, and the dragon took another huge breath and breathed out so much fire that he burnt up one hundred forests. Magnificent, said Elizabeth, and the dragon took another huge breath, but this time nothing came out. The dragon didn't even have enough fire left <sup>to lift up (so)</sup> to cook a meat ball.

Elizabeth said, Dragon, is it true that you can fly around the world in just ten seconds? Why yes, said the dragon and <sup>he (RT)</sup> jumped up and flew all the way around the world in just ten seconds. He was very tired when he got back, but Elizabeth shouted, Fantastic, do it again!

So the dragon jumped up and flew around the <sup>RT</sup> whole world in just twenty seconds. When he got back he was too tired to talk and he lay down and went straight to sleep.

Elizabeth whispered very softly, Hey, Dragon. The dragon didn't move at all. She lifted up the dragon's ear and put her head right inside. She shouted as loud as she could, Hey Dragon! The dragon was so tired he didn't <sup>RT</sup> even move.

Elizabeth walked right over the dragon and opened the door to the cave. There was Prince Ronald. He looked at her and said, Elizabeth, <sup>your hair is (RT)</sup> ~~you are~~ a mess! You smell like ashes, your hair is all tangled and you are wearing a dirty old paper bag. Come back when you are dressed like a real princess.

Ronald, said Elizabeth, your clothes are really pretty and your hair is very neat. You look like a real prince, but you are a bum. They didn't get married after all.

After several exposures to the material, most students either used the "click-on" feature as a support or knew the story well enough that they did not need to use it.

Trinka. Trinka was an interesting participant because she was a recent Romanian immigrant for whom English was a second language. She was intrigued by the click-on feature that named the objects in the illustrations. Her initial reaction to the CD-Rom program was exploration; Anderson-Inman (1993) named this the checking pattern. As this excerpt from the transcript demonstrates she relied heavily on the storyteller for support.

*Scene*. Trinka is reading aloud The Paper Bag Princess on-screen. The coding for this transcript is:

--- word omission	... pause
<i>word</i> added/alterd	(word) computer support
I Investigator	T Trinka

I: Let's listen to you read the story today.

T: The Paper Bag Princess Elizabeth was a beautiful princess. She lived in a castle and ...had expensive --- clothes. she was going to marry ... a ... prince ..named Ronald.

I: Then what happened?

T: Un - that's a long word

I: Yes it is a long word - How did Mrs. Smith tell you how to figure out what the words were?

T: I don't know

I: What did she say when she was talking about the novel this morning?

T: Oh yah! [holds up her thumb]

I: The thumb one is when you are picking out books. What did she say to try when you're reading?..... Did she say to skip it?

T: MMM a dragon --- the castle

I: What else can you do? [T remembers to push on the mouse- although she had been encouraged to attempt other strategies]

T (smashed) the castle burned all her clothes --- --- --- --- and (carried off) carried off Prince Ronald. Elizabeth de (decided)



to (chase) the dragon and get Ronald back. She looked everywhere for ... something ... to wear but the only thing *that* she could find that was not burnt was a paper bag. So ... she ... put ... on ... the ... paper ...bag ... and ... followed ... the dragon. He was (easy to follow) easy to follow because he ... left a trail ... of burnt forests and (horses' bones). --- Elizabeth came to a castle with a (large) large door that a hug (huge) huge (knocker on it). She (took hold of) the knocker and (banged on the door) banged on the door.

I: Let's stop here. [recess bell and T. is fidgeting]

Analyzing Trinkka's reading of 130 words suggests 70% of the words she was unable to read were supplied by clicking on the mouse. Her miscues were omissions (23%), substitutions and insertions (7%). Although her reading was at a frustration level she participated in the classroom discussions and knew what was happening in the story. She said it was fun to read the story on the computer because she *"liked pushing the buttons."*

Three weeks later, Trinkka chose to read Thomas' Snowsuit (Munsch, 1985) on-screen. She began by highlighting many of the objects as she had done previously. She started reading the story with the storyteller and then changed to reading each page by herself and having the storyteller read after her because *"I have to see if I'm right."* The Anderson-Inman study (1993) identified this pattern as reviewing. The teacher and I were amazed by her reading and initially assumed her to be word-calling, but the resource aide later confirmed that Trinkka was able to read the story and retell it in her own words. The resource aide had also

asked her questions about the story, and Trinkka had no difficulties answering them.

Danny. Danny is a student experiencing attention and attitudinal difficulties. He also relied heavily on the computer's enhancement features to read the story. He used few decoding strategies, announcing that the best way to read was to "ask you" or "click on". He required continual adult intervention to encourage predictions and thus used context as a way to decode the words. His guesses were usually appropriate, the result of a variety of prereading invitations. Like Trinkka, Danny spent a great deal of time exploring the illustrations.

The transcript of Danny's running record will be presented in full to enable the reader to obtain a "view" of Danny the learner, his perception of reading, his understanding and use of strategies, and the factors that may be interfering with his learning. The codings used are the same as for Trinkka's, other than the fact that D refers to Danny.

- D: I have some trouble reading  
 I: What gives you the trouble?  
 D: Reading ... 'cause I forget some of the words  
 I: What do you do when you forget some of the words?  
 D: Ask you  
 Elizabeth was a beautiful princess, she loved she ... What's that word there?  
 I: What can you do when you come to a word you don't know?  
 D: Just press it  
 I: Press it and what else?  
 D: Ask you or skip the word out  
 I: What else could you do?

- D: Those are the things I know- I'll press it  
(lived) lived in a castle and had - what's that word there?- I  
forget that word-
- I: Sometimes when you are reading you can leave the word out  
and then read the rest of the sentence and see what would  
make sense?
- D: Yah, (expensive) clothes. She was going a going to marry a  
prince named Ronald [clicks-on objects]- this is a funny page
- I: What happens on this page?
- D: She goes she yells- let's turn this on- I don't know  
all of them
- I: Let's see the ones we do know- that big word
- D: I don't know - (unfortunately -unfortunately) - let's let the story  
teller do it. It's really funny - a dragon smashed-
- I: What did the dragon smash?
- D: The castle
- I: And what else did he do? He smashed her castle and he... -
- D: Burned all her clothes (with) his fiery breath and (carried off)  
Prince Ronald Now that we read that page let's hear the  
storyteller
- I: Let's read it together
- D: That's really funny
- I: Before we start to read- let's look at the picture- what's  
happening in this picture? -
- D: She looks really bad and she's following the dragon - he  
burnt all those trees and left some horse bones
- I: And what is she wearing?
- D: A paper bag - she found it in that story- I want to press that  
and see what it is - oh what is this thing here? -that is a ..- let's  
see what this is
- I: Let's read this page - Who's the story about?
- D: Elizabeth (decided) decided to chase the dragon and get  
Prince Ronald back
- I: Right you read that page What did she do?
- D: She she looked everywhere for -I don't know that word-

- I: Let's think about it
- D: I'll go back - she looked everywhere for
- I: Leave it out
- D: To wear - she was looking for /s/ om/th- something to wear.  
The only thing that she can find was a was a paper bag. Let's hear it [storyteller reads]
- I: Let's turn the page and look at the picture -What happened here?
- D: She got a paper bag
- I: What did she do?
- D: So she put on the paper bag and followed the dragon
- I: There's another sentence you could read all by yourself- good show
- D: She no he was easy to follow because he left a trail of burnt forest and and horse bones
- I: Another sentence that you read
- D: [Clicks-on story teller]
- I: What's happening in this picture? -
- D: She found this castle
- I: What did she do?
- D: She found the dragon, but she didn't meet the prince so (Finally) Finally Elizabeth came to a castle ...
- I: Did the dragon live in a castle?
- D: No a cave- a cave with a (large) large door with a large knocker on it. She she took hold she took -What is this word? (took hold of) took hold of the - I don't know what that word is-
- I: She was at the door- what did she take hold of?-
- D: ...of the knocker and then (banged on the door) banged on the door -- Ooh let's see what this is- (dragon, bandanna)
- I: What did the dragon do?
- D: The dragon stuck his nose out of the door - I don't know what this is (said) and said - what's that word? (well) well a well a princess I love to eat princesses. But I have - I forget this word right here- (already) but I have already eaten a whole

- teller castle today. I am a busy dragon - now let's let the story do it-
- I: Let's look at the next page and you can be the story teller on your own -
- D: Why do you always want to write things out
- I: I can't always remember everything
- D: Come back tomorrow he slammed the door so - I can't figure out that word-
- I: How can you figure out that word? - I
- D: Let's press the thing here
- I: What else can you do beside press on the mouse
- D: Leave it out, but I don't want to leave it out
- I: Well let's leave it out and see what happens.
- D: He slammed the door so
- I: Just say something
- D: Something that Elizabeth almost got her nose caught
- I: So how did he slam the door?
- D: Hard
- I: Could be - that makes sense.
- D: Let the story teller do it (fast) that Elizabeth almost got her nose caught . Elizabeth - I forget what this word is-
- I: Let's try leaving it out and see what's in the rest of the sentence
- D: Elizabeth the... I forget-
- I: Let's look at the picture
- D: Said the (grabbed) the knocker and
- I: What would you do if you grabbed the knocker?
- D: Knock on the door the again and the dragon stuck his nose out of the door and said go away. I already eaten a whole castle today. Let's hear the story teller do it. I am a busy I am a (very) busy dragon. (Come back) tomorrow.  
[It is time for lunch]
- I: Thank you Danny.

At a follow-up May meeting, Mrs. Smith, their teacher reported that both Trinka and Danny appeared more willing to participate in independent reading activities and had shown increased self-confidence towards their learning.

Anita and Richard. Anita and Richard were two students who were initially identified as experiencing difficulties with the reading and writing process. They were seated at the computer set to read A Beautiful Feast for a Big King Cat (Martin, 1993). They had read the Big Book version with their classmates several times and had picked up the beat and rhyme of the story. Their initial introduction to the CD-Rom story was to "echo read" with the storyteller and then to read the sentences by themselves. Their teacher asked them to listen to the storyteller to confirm their accuracy. By the time the investigator observed them, they had read the story twice with the computer. As the running record (Appendix D) suggests, the first twelve pages of the book had many repetitions, common sight words, and frequent rhyming words, enabling the students to read with few difficulties. Richard and Anita relied on the storyteller to assist them nineteen times during the next eight pages and had ten miscues, of which five were meaningful. The last two pages appeared to have been memorized and caused no difficulty. Conversation with the students suggested they understood the events of the story.

A Beautiful Feast for a Big King Cat (Martin, 1993), produced by Bravo, has the capability of recording the words students click-on. These requests can be saved and printed to provide the teacher with a record of each student's difficult words. This classroom did not have a free standing printer, but was part of the school network, so it became more difficult to obtain such data. Data sheets from Richard's second and third reading of

the story on the computer were obtained and indicated that twenty-seven words missed on his second reading compared to eighteen words on the third; of these eighteen, eight words were repeats from the former list. The investigator obtained a running record of his reading on-screen four days later. He continued to do well on the first twelve pages, and missed sixteen words on the following eight pages. Examination of these words indicated that there were seven new words, three words were missed on all readings, four words from the first reading, and two from the second attempt. (This data is included in Appendix E.)

Anita and Richard's teacher indicated that A Beautiful Feast for a Big King Cat was not selected according to the reading ability of many students and wondered if it were "*reasonable to expect Anita and Richard to learn it?*" This problem is a dilemma for many teachers, but other student benefits need to be considered. Anita and Richard were able to participate in the classroom activities based on this book and their writing (as indicated in the following discussion) reflected increased awareness of print.

### Summary

Analysis of the students' running records and their writing samples suggested that using the interactive software programs enabled the students to develop story comprehension; become strategic readers; and increase oral reading fluency.

The enhancement features of the software benefited ESL and students with reading difficulties as it encouraged language development,

and supported comprehension and word recognition. In addition, familiarity with the story line and the predictable nature of the texts enabled these students to participate in classroom discussions and activities.

5. Was writing performance ultimately enhanced by using the interactive software?

Effect on Writing

To set the stage for the initial writing invitation, the teacher read the first fourteen pages of A Beautiful Feast for a Big King Cat and then stopped; the students were to write what they thought would happen next in the story. This was an independent activity.

Anita. Anita's writing consisted of a total of twelve running words of which 17% were conventionally spelled. The students then went to the computer to find out what really happened. By the time of the next writing, these students had read the story several times on screen. Anita's text of what really happened had thirty-six running words and 42% were conventionally spelled. I asked Anita how she knew to write some words (will, cat, he) the way most people do? Anita told me that will "was in a picture that was on the board", cat "was on the computer", and he she "had practiced at home". Her final assignment for this story, to write the next episode, had a total of thirty-two running words of which 53% were conventionally spelled -- all but two of these words were in the story. Her initial writing was characterized by random letters with few mixed upper



and lower cases, and few phonological appropriations (*fsk* /think, *PaiRTE* / pull, *DanTti* / then).

*Anita's first writing:*

I fsk DaT mfammmas will PaiRTE haisn PaRTuiT  
DanTti Sghs hnoosT. noTKuoKRVe

[I think that mother mouse will pull his paws then squeak his nose.]

As indicated in her last story there are vowels in each word, fewer upper case letters present in words, and the words are easier to decode (*maT* /met, *wat* / went, *Pakid* /park).

*Anita's last writing:*

The MasTLi maT The Cat a ganat. The masTLi said Doo  
You wan to Bae mi fandi. The cat said Yes' Dao wat To  
The Pakid.

[ The mouse met the cat again. The mouse said Do you want to be my friend? The cat said yes. They went to the park.]

In April, Anita's writing modeled after the pattern book, A Home in a Tree consisted of a total of eighty-eight running words of which 76% were conventionally spelled. This writing follows:

*Anita's writing:*

A home in The wter  
is a home in the water a houte for me  
yes san the okaas from the water I eta fish all day

is a home in the water a home for you Bat? wach ota for me i  
 like to gt you  
 is a home in the water a home for me  
 yes, seid the fishs i smm AllDay and i eta litte plas.  
 is a home in the water a home for me  
 yes siad The crabs, I ate DaDe animls I like zam and I hav Claz

[A Home in the Water

Is a home in the water a home for me?

Yes said the Orkas, from the water, I eat fish all day.

Is a home in the water a home for you Bat? Watch out for me I  
 like to get you.

Is a home in the water a home for me? Yes said the fish. I  
 swim all day and I eat little plants.

Is a home in the water a home for me? Yes said the crabs. I  
 eat baby animals I like them and I have claws.]

Richard. Richard exhibited similar growth in writing. Both story length and spelling improved after the introduction of the computer programs. His first text had a total of twenty running words and 65% were conventionally spelled.

*Richard's first writing:*

The caT cadnt kach the mouse The Mouse sad do you  
 WMT eat Fish he bNdT WNT To eat Mouses

[The cat couldn't catch the mouse. The mouse said do you  
 want to eat fish he didn't want to eat mouses]

The next assignment had a total of 14 running words and 86% were conventionally spelled.

*Richard's second writing:*

The cat Look in the weNdo and the Mouse Look out of the weNdo

[The cat looked in the window and the mouse looked out of the window ]

Richard's next episode text was composed directly on the computer and had 23 running words of which 70% were spelled conventionally.

*Richard's third writing:*

the mouse wat to the park and ase the cat and sae the mouse to and than a dog kam and than he ran afdr the cat

[The mouse went to the park and saw the cat and saw the mouse too and then a dog came and then he ran after the cat]

His writing in late April was made up of 76 words of which 85% were spelled conventionally.

*Richard's fourth writing:*

Is A home in A cave A home For me  
 yes sied The Bat I Sleep in This cave  
 Is a home in a cave a home for me?  
 Yes sied the wIve I` Look for food outsied The cAve  
 Is A home in a cAve a home for me?  
 Yes sied The SnaK I shrad my sken on rocks.  
 is A home in A cAve A home for me!  
 yes sied The Bear I hibrnat in wainter

[Is a home in a cave a home for me?  
 Yes said the bat, I sleep in this cave.  
 Is a home in a cave a home for me?  
 Yes said the wolf, I look for food outside the cave.  
 Is a home in a cave a home for me?  
 Yes said the snake, I shed my skin on rocks.  
 Is a home in a cave a home for me?  
 Yes, said the bear, I hibernate in winter.]

The production of letters continued to be a difficulty for Richard. He told us that he found it easier to write at the computer. His teacher noted that Richard had "*a hard time writing it down, but on the computer he had it done in no time at all.*" He continued to mix upper and lower case letters, sentences didn't always begin with capitals, but they did end with the appropriate punctuation. His unconventional spellings were readable (*snak /snake, sken /skin, hibrnat /hibernate*).

In May, Richard and Anita were "*just blossoming*" and "*really zooming*" reported their teacher.

The spelling analysis of the writing assignments of Anita, Richard, and four of their classmates are presented in Table 1. The information presented is based on the three assignments relating to A Beautiful Feast for a King Cat and the last was an invitation in April modelled after the pattern book, A Home in a Tree. (See Appendixes B, C, and F for data to support the information presented in Table 1.)

TABLE 1

Spelling Analysis of Students' Writings

RICHARD	FIRST TEXT	SECOND TEXT	THIRD TEXT	APRIL TEXT
TOTAL DIFFERENT WORDS IN TEXT	15	9	15	27
% SPELLED CONVENTIONALLY	60	89	67	61
TOTAL RUNNING WORDS IN TEXT	20	14	23	76
% SPELLED CONVENTIONALLY	65	86	70	85
SHARON				
TOTAL DIFFERENT WORDS IN TEXT	21	14	37	38
% SPELLED CONVENTIONALLY	86	79	89	92
TOTAL RUNNING WORDS IN TEXT	34	27	54	141
% SPELLED CONVENTIONALLY	91	89	91	96
ANITA				
TOTAL DIFFERENT WORDS IN TEXT	12	28	22	38
% SPELLED CONVENTIONALLY	17	32	36	49
TOTAL RUNNING WORDS IN TEXT	12	36	32	88
% SPELLED CONVENTIONALLY	17	42	53	76
ALAN				
TOTAL DIFFERENT WORDS IN TEXT	11	17	17	23
% SPELLED CONVENTIONALLY	64	53	59	57
TOTAL RUNNING WORDS IN TEXT	13	27	38	61
% SPELLED CONVENTIONALLY	70	60	77	77

<b>ANNA</b>				
TOTAL DIFFERENT WORDS IN TEXT	12	14	29	39
% SPELLED CONVENTIONALLY	50	22	76	40
TOTAL RUNNING WORDS IN TEXT	15	17	40	72
% SPELLED CONVENTIONALLY	60	35	83	80
<b>DONALD</b>				
TOTAL DIFFERENT WORDS IN TEXT	15	11	51	38
% SPELLED CONVENTIONALLY	60	46	47	53
TOTAL RUNNING WORDS IN TEXT	18	27	89	109
% SPELLED CONVENTIONALLY	61	71	68	73

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### Summary

The students' writing performance reflected the repeated presentations of the on-screen and hard copy stories. Not only did the students increase the number of running words in each successive write, they increased the quality and quantity of ideas, the number of different words; and increased the percentage of conventionally spelled words.

### **6 In what ways does the introduction of interactive computer software do more than pique the interest of the students?**

In our current technological age, students have the opportunities to do many interesting and exciting things with computers, often unrelated to

academic learning. The investigator and the first grade classroom teachers wanted to find out if the students realized that the computer and, particularly this kind of CD-Rom software, benefitted their learning. The question was whether the students were able to recognize and to articulate the value of such software. The intent was to discover whether the information gained through this study would enable other professionals to provide pedagogically sound, computer-assisted learning experiences for their students.

In order to obtain the data required to answer this question, the investigator observed and interviewed students while they were working on the computer. At the end of the investigation the students completed a questionnaire (Appendix G) to determine: (a) their own decoding strategies; (b) their feelings when they asked for help both from another person and from the computer; and (c) their understanding of how the computer helped them. In addition they shared their perceptions of good readers and the possible benefits of using the computer software for other students. The teachers were interviewed following most observation sessions and several times after the study concluded.

An analysis of the student questionnaires suggested that many students did see the interactive computer software as a useful tool to assist their learning and the learning of other students. Generally, students indicated that the interactive software computer programs would help other students "learn how to read and write" and "practice their reading."

### Reading Stories

Many students responded similarly to Anna, who told us that *"the computer helped me read the first time because I didn't read it well"* and *"if you don't know the word"*. Anita reported, *"You can click on the word and the [voice in the] computer tells you [the word]."* For a student like Danny who has attention and attitudinal difficulties, the interactive computer software enabled him to read The Paper Bag Princess because he decided to *"let the storyteller do it."* Using the computer version of the story enabled Danny to participate more fully in the writing and oral reading activities as well as contribute to the discussions that occurred about the book. As another student noted: *"You could read the whole book with the storyteller, even if you couldn't read it by yourself . . . You get to read a new book."*

Most students were favorable in their comments about the software. They told us that it gave them *"hints about words"*, *"it was fun"*, and *"it helped me, because I didn't feel bad"* [because I couldn't read the story]. Two students were critical of the small print size and preferred the hard copy to the on-screen version (although the print size was adjustable in several programs).

### Writing Stories

Writing stories on the computer was recognized as a desirable activity. Those who preferred to write using the computer usually did so because they found it *"easier to push the buttons"* than to *"have to draw letters or lines"* and *"you can stay on the lines."* Paul explained, *"It's easier*



*to use the machine when I write on the paper I don't have much stuff in my head but when I write on the computer I have lots in my head."* He thought the difference was that *"the computer isn't as hard as writing 'cause you have to print the beginning of the letters and you got to spell out the word and on the computer you just have to spell it without a pencil, just your hand, so it's a lot easier."*

The wisdom of these words has been underscored by Scardamalia and Bereiter (1982) and Graves (1983) who suggest that the physical production of text claims attention and thus interferes with the ability to compose. Smith (1985) maintains that using computers for composing can circumvent such issues as the formation of letters, left-right and top to bottom progression and motor ability.

### Reading Practice

The teachers sent hard copies of the books home with students to share with their families. As Sally, one of the classroom teachers revealed, *"I think it's worthwhile if the parents can see what they [the students] are doing and hopefully they [the parents] are looking at the book and the quality of literature and they will realize what the kids are doing."* She wondered if the true test of the value of the computer-assisted programs would be if the students would pick up other Munsch books and read them. In May, three to four months following the initial exposure to the CD-Rom programs, Sally shared that the Munsch books were still being borrowed from the library and several students were reading a Munsch book as part of their independent reading activities.

Linda, the second classroom teacher, commented that the students in her class were "still going at them and wanting to learn those books." She attributed this interest to the fact that the books used in the CD-Rom programs started out easily, and the students enjoy the repetitive pattern and thus experienced success. As all the students in her class had participated in a shared book experience, the students could pick a partner and read the book to them. Upon entering the classroom following the morning recess, the investigator observed the students spread out on the carpeted area engaged with books. On closer inspection, it was observed that one student was reading the Big Book copy of A Beautiful Feast for a Big King Cat (the current CD-Rom book being used in the class), while two were reading copies of the little book, and two together were reading another copy of the story; clearly indicating the need to have multiple copies of the text under study.

### Summary

The CD-Rom interactive software did more than pique the interest of students. These computer software programs enabled all students, regardless of ability, to read a story and to participate in classroom discussions and activities. Students were motivated to share the books with their families and peers and to search out other books by the same author or similar genres. Students came to see the computer as a tool that made writing easier both in school and at home.

### Software Evaluation

Heald-Taylor (1989) provides a checklist (Appendix H) that enables school personnel to make decisions about whole language materials. Many of the criteria from this checklist are applicable to the interactive software computer program and the findings suggest that this material was effective in realizing a wholistic approach. Heald-Taylor's checklist looks at five major areas: literature, integration, instructional strategies, interpretative activities for students, and student evaluation. The responses include: ineffective, somewhat effective, effective, and very effective. Although not all the criteria apply, those that do, suggest that the computer software provides quality unabridged literature selections representing a variety of genres authored by a variety of children's writers. The program enables the teacher to: (a) integrate all the aspects of the language arts using a variety of sign systems; (b) provide a thematic curriculum; and (c) employ a variety of organizational strategies such as activity centres, book corners, and drama, art and writing opportunities. In addition, the stories encourage the integration of language arts in the other content areas.

These programs provide opportunities for shared reading, book talks, choral speaking and listening activities. Cooperative learning opportunities occur when students are working together at the computer. Follow-up activities based on dramatizations, story writing, and independent reading have been used in the study classrooms. As students read on-line, they were encouraged to use a variety of reading strategies: picture clues, syntactic meaning, context, and phonetics. These

programs encourage students to participate in interpretative activities. The programs are effective in providing data for evaluation whether it be running records, lists of unknown words, and/or opportunities for students to monitor their own reading achievements.

The teachers were comfortable with these materials and indicated that they would use them earlier in the next school year. They hoped that there would be more appropriate titles available that would enable them to regularly integrate the "talking books" into their thematic units. In discussion they felt that these particular programs and the exercise they had been through helped them in their teaching practices.

### Summary

The TORP (DeFord, 1979) conclusions, interview responses, and Heald analysis of the programs, as well as classroom observations suggest that the teachers integrated the CD-Rom interactive software programs into their literacy invitations in ways that were congruent with their pedagogical tenets. The 'talking books' were seen by both the teachers and their students as an integrated part of the program and not as an add on.

## CHAPTER 5

### SUMMARY, CONCLUSIONS AND IMPLICATIONS

The main focus of this investigation was to observe the integration of interactive CD-Rom computer software programs into the literacy instruction of two, grade one classrooms. Questions that emerged through the interactive process of negotiation between the stakeholders and the investigator provided the framework for the research. Study findings will be useful for professionals who wish to use interactive CD-Rom computer software as part of their emergent literacy program.

This chapter summarizes and discusses the research findings, draws conclusions, and suggests implications both for instruction and further research, based on the framing questions. In addition the relationship between instruction and recent theory is considered.

#### Summary, Discussion and Conclusions

Teachers. The two teachers approached the integration of the interactive CD-Rom interactive software in practices that reflected their individuality and the needs of their students.

The teachers did not view the computer as an "add on", but as another tool to develop literacy in all students. Integration was based on the school's established guidelines for teaching reading lessons. Prior knowledge was activated and students were presented with a purpose for reading the materials. There were opportunities to read the whole text either the hard-cover or on-screen version which supported those students

who experienced reading difficulties. Assigned post-reading activities enabled students to respond to the stories using a variety of sign systems, including writing and performing a small play, drawing, and creating a new version of the story.

To move out of the realm of the known and to work with new technology, the teachers needed not only technical support when systems went down, but the support and encouragement of an administrator who was interested in and knowledgeable not only about the technology but also the literacy acquisition of young learners.

Discussions and observations suggested that the two teachers in the study endeavored to: (a) meld past practice with current theory regarding the need to present print in authentic and complete contexts; and, (b) introduce writing as a component to parallel beginning reading instruction and not as something to be deferred until students knew something about words. The teachers knew that there needed to be repeated presentations of meaningful print to develop fluency and word recognition automaticity.

The teachers in the study demonstrated sound instructional techniques in presenting the computer software programs. Their story introductions set a purpose for reading and activated prior knowledge. Actual reading was followed by opportunities for personal response that enabled students to develop an increased understanding of the story. Students were encouraged to use various reading strategies to facilitate decoding and use a number of sign systems to convey their knowledge

about the story. The literature selections then became a focus for writing experiences.

The computer software enabled the teachers to integrate all aspect of the language arts program. The use of interactive computer software seems limited only by the professionals' understanding of the reading process and the ability to integrate the programs into their instruction.

Social Constructivism One of the assumptions of a social constructivist view of learning is that knowledgeable members of a culture help others to learn (Rogoff, 1984). In this study, children worked together at the computer to read the story. They helped each other and the storyteller on the computer helped them. There were "computer buddies", older students who helped the grade ones edit their writing and showed them around the keyboard.

The higher functions of reading and writing develop as a result of social interaction. More knowledgeable individuals begin by modeling desired behaviors and/or thinking aloud what has to be learned and through talk and interaction with others, learners begin to acquire new learning. In both classes teachers modeled expectations, students patterned possible writings and all students had the opportunity to rehearse their thoughts prior to writing

The Vygotskian term, "the zone of proximal development", is integral to the CD-Rom "talking books" in this study. The storyteller in the "talking books" assists students when they don't know a word and the voice provides scaffolding which enables students to read material that may be too difficult. In addition, the storyteller assists learning by providing as

much support as required and does so in a patient and non-threatening manner. As students become more secure, the storyteller is no longer requested to support them and students move to an independent level of functioning. Thus knowledge is acquired by participating in a supportive, social-instructional environment. Readers experiencing difficulties are able to complete whole texts and become contributing members of the learning community in their classrooms.

Straw (1990) suggests that in a social constructivist view, the reading and writing processes are inseparable. Both teachers in the study recognized that these two processes were compatible and provided writing invitations that complemented reading. The students demonstrated that as they acquired skills in reading they transferred this knowledge to their writing. The findings which follow suggest that as the students read and reread the CD-Rom stories, their own writings increased both in the number of running words and the conventionally spelled words they used in their stories.

Students. Analysis of the students' running records and their writing samples suggested that using the interactive software programs enabled the students to become strategic readers; to increase oral reading fluency; and to develop story comprehension.

Students recognized the need for practice and the computer enabled them to read the story as many times as they wished. The computer never ran out of patience. The CD-Rom "talking books" enabled students to rehearse the word recognition strategies their teachers were modeling and encouraging them to use. In addition, the teachers noted the



transfer of strategic word recognition skills to other reading situations. The CD-Rom programs supported the use of context to facilitate word recognition. In turn, meaning provided the scaffolding which enabled students to make sense of the print and figure out the code.

The interactive computer software programs enhanced reading proficiency. There was an observable increase in oral reading proficiency, comprehension, and motivation to read other materials written by the same author or a similar genre.

Comprehension was supported through the development of story structure. The students were able to read the entire story (some with the support of the storyteller on the CD-Rom) and to apply this information in class discussions and follow-up assignments.

The enhancement features of the software benefited ESL students and students with reading difficulties by providing a model of literary language, and supporting word recognition and comprehension development. In addition, the increased familiarity with the stories afforded by reading and rereading the text enabled students to participate more fully in classroom discussions and activities.

Data analysis suggests that with increased reading on-screen and off, the quality of writing increased. Word knowledge acquired through the use of the interactive computer software transferred to expressive writing - those words seen on the screen were also incorporated into writing and were usually spelled conventionally. As students read and reread the CD-Rom stories, the students' writing was also enhanced and showed

increases in both the number of running words and the percentage of conventionally spelled words. The CD-Rom stories provided rich vocabulary and content, contained examples of different genres, and raised students' awareness of the writing conventions -- all important data sources for becoming successful authors.

The CD-Rom interactive software did more than pique the interest of students. These computer software programs enabled all students, regardless of ability, to read a story and to participate in classroom discussions and activities. Students were motivated to share the books with their families and peers and to search out other books either by the same author or in the same genre. Students came to see the computer as a tool that made writing easier both in school and at home.

Exposure to the CD-Rom materials benefited students implicitly and explicitly. Students became computer literate; recognized the computer as a tool that facilitated independent reading and writing; developed confidence in themselves as learners, and exhibited the ability to move out of self and to consider other learners.

#### Connections: Findings and Theory

Literacy acquisition. In a 1987 article, Irwin offered principles for integrating computer programs into the reading instructional program. Such programs need to be integrated "in ways that respect the needs and interests of children, that make use of the unique features of technology, and that build upon current knowledge about reading and writing as interactive communication processes" (p. 38).

Although Irwin's discussions appear to be theoretically based, she provided no empirical data to support her contentions. Her article suggests: (a) Computer materials can read aloud, model, and interact with children; (b) Software programs enable children to engage in activities that foster emerging literacy when as novices they pretend to read and write; and (c) Social interaction and modeling occur when children receive help in developing reading concepts and tips on using the software and/or hardware. This help can be given either by a peer, an adult, or the computer program itself.

Irwin encourages users to select materials that are congruent with their theoretical beliefs about teaching and reading. As well, she stresses the importance of the teacher's knowledge about the writing process and its relationship to reading development.

The present study provides the empirical data to support Irwin's (1987) theoretical presentation and bridges theory and the practice.

#### Connections: Findings of the Present Study with Recent Computer Research

Standish (1992) conducted a study using interactive computer software that was similar to the material used in this study. Although the findings in her study were inconclusive, the present study suggests that her expectation that the interactive software computer intervention would increase the reading achievement of students in the treatment class compared to the achievement of students in the control group, is probably

correct. The present study was not a quantitative one, thus no pre and post measures were taken, nor was there a control group; but observations and running record data suggest that the students in the two classes did improve their reading proficiency with the use of the CD-Rom programs.

Anderson-Inman's (1994) study provided terminology applicable to enhancement software. Students in the present study demonstrated similar behaviors to those exhibited in their research. As in the Anderson-Inman study, students initially used the "click on button" frequently, even when not needed. They liked to review the materials, that is, let the voice read the page after they had read it, seemingly to confirm their own version. Anderson-Inman does not discuss the extent to which students required preparation to learn in hypertext environments. In the present study, other than the basic "how to use the software" no other computer instruction was given to the students.

Findings in the present study also concur with the findings of a study by Blackstock (1989). Blackstock suggested that:

(1) The introduction of new technology can initiate changes in a teacher curriculum and methods of instruction which appear unrelated to the computer. One of the teachers in the present study did change her morning message format to one in which she met with five students at the computer to develop a letter to send home explaining class activities. The other teacher indicated that she would do more writing in her class.

(2) New technology will be successfully implemented only when it is viewed as a natural aspect of the on-going process of adapting the

curriculum to meet the needs of children. In the present study, the teachers saw the computer as another avenue for extending literacy invitations.

(3) Support from colleagues is essential especially during periods of doubt and reflection. This point is critical to the success of introducing CD-Rom programs. The teachers in the present study received technical support and encouragement from the librarian and the library technician. Reflection was encouraged and release time was provided that enabled the teachers to meet with each other and the researcher. The principal provided professional development opportunities for the teachers -- attendance at conferences, appropriate professional articles, and opportunities to share their experiences with other teachers in the school division. Since the administrator was interested in and knowledgeable not only about the technology but also the literacy acquisition of young learners, she was able to develop a milieu which supported professional growth.

(4) Children learn with and about computers without a great deal of direct instruction. "The Subculture of Computers" is developed through: conversations with older siblings; working on available computers in other classrooms; eavesdropping; and consulting with peer experts. The students at this school talked about their parents and computers and the things that they did on their own computers. Peer experts and computer buddies offered support for learning.

Reitsma (1988) suggests that increases in reading fluency are significantly affected by conditions of practice. Both the guided reading condition, in which children had to read on their own and had to correct all

errors themselves but with sustaining feedback, and the speech-select condition, in which students practiced independently but had the opportunity for feedback using a touch pad, were significantly more effective than the control and reading-while listening conditions. The CD-Rom interactive software in the present study parallels the successful conditions in Reitsma's study.

### Implications for Instruction

The study:

1. Indicates to professionals and parents that students see the computer as a tool for learning and not just something to "play on";
2. Provides sound pedagogical information regarding appropriate instructional routines to enable other professionals to provide computer assisted learning for their students;
3. Suggests that CD-Rom "talking books" can be used to enhance literacy acquisition, especially in ESL and students experiencing difficulties with print;
4. Encourages teachers to reflect on the literacy invitations they make to their students and to examine their relevancy, and
5. Provides suggestions how to integrate CD-Rom interactive software into learning programs. As participants in the study, the teachers came to articulate their views on literacy acquisition and became aware that they needed to consider these views both when selecting computer

software to use with their students and when integrating their use with other literacy activities.

#### Implications for Further Research

This study provides purpose, pedagogical substance, and support for integrating CD-Rom computer software programs into beginning reading instruction. Research is conducted not to present final answers but to pose lingering questions that will challenge other professionals to continue the quest for answers. With the increase of technology in conjunction with off-line materials, professionals must determine whether their perceptions of literacy change. As suggested by Santa Barbara Classroom Discourse Group (1994), literacy is a dynamic process in which the meaning of literacy is continually being constructed and reconstructed by individuals as they become members of new groups. Thus the term becomes "literacies" and not literacy, as "no one definition can capture the range of occurrence in everyday life in classrooms, the multiplicity of demands, or the ways of engaging in literacy within and across groups" (Ruddell, Ruddell, and Singer, 1994, p.125). The assignment is to continue to develop and monitor computer programs as tools to facilitate literacy acquisition. Specifically further research could focus on:

1. The extent to which students need specific instructions to learn in hypertext environments;
2. The impact of multimedia software on the language acquisition of students for whom English is a second language and for those who experience language difficulties;

3. The influence that the early introduction of the CD-Rom programs would make on the reading and writing performance of kindergarten and beginning grade one students;
4. The effect of these programs on older students who experience reading and writing difficulties; and
5. Necessary changes to CD-Rom technology that will reflect the current interactive philosophy of literature.

The CD-Rom technology is present in many of our classrooms and on the shelves of bookstores. If teachers are to use these materials, they have to become aware of their educational purposes and values. Time and activities in school are being questioned. Enabling teachers to understand the pedagogical basis of technology suggests that there is educational merit in using computer software programs. It is important that new technology not be viewed as just a babysitting device, a means for filling in idle time, for creating busy work, or becoming the purple sheets of the 21st century.



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Appendix A:

Copies of the students' first drafts of their retelling of the  
Paper Bag Princess

Princes RUDOLPH

and Princess ELISABETH

dragon curd and smashed down the  
castle and he brt all hre close  
and he filo of wee pro rold and hre  
har was reie mose and hae hab nait  
to wole.

Princess Elizabeth followed ~~the~~ <sup>the</sup> trail of ~~the~~ <sup>the</sup> Prince Ronald.  
The Princess was a field who ~~was~~ <sup>was</sup> ~~at~~ <sup>at</sup> ~~the~~ <sup>the</sup> ~~end~~ <sup>end</sup> of the trail.

Just the princess for the dragons cash. She'll open the door and the dragons  
saw her out of the door. He said I like to see princess but I don't like to see cash. He closed  
the door on the dragon.

Princess A Lalibis  
Strong's dragon

Sib are Yao The first east and

is it true that you CAN BLEED DOWN ~~150~~ 150 FEET IN

1 FIBREY BREATH

1100 RISE TRUE

YOU CAN FLY  
10.505.50}

AROUND THE WORLD IN

r the dragon <sup>burn</sup> ~~blow~~ 150 forests out he didn't have enough  
ne to root a meatball.



is it true that you could fly around the world?  
to see why?  
Yes, and he ~~said~~ jumped up and flew around  
the world or around.

Elizabeth said  
to the dragon

The dragon flew around the  
world in 20 seconds

WEN HE GOT BACK  
HE CODINT MOOV @  
MASI

she saw Prince Ronald.

he waved to her.

her ~~her~~ dragon; Princess Elizabeth said.

The dragon did not move.

She shouted again "HEY dragon!"

The dragon was so tired he did not move at all.

Princess Elizabeth your hair is taglo  
our wry a par BHg. Way Prince Romila  
for you have nic kloc  
But you are a bum

You small like as's  
You have nic lora

AND

THEY

MARRIED

DIDN'T

GET

OFFER ALL!

## Appendix B

Copies of the first drafts of the students' predictions of what happens next in A Beautiful Feast for a Big King Cat.

What I predict will happen.

The cat can't  
reach the mouse

The mouse said do  
you want to eat fish

~~The~~ can't want to

eat Mouses

Sharon

What I predict will happen.

I think that

The mouse will

keep on teasing the

cat and the mouse

will have the toy

and she will give the cat

some milk and the little mouse

will get in trouble



What I predict will happen.

I fsk Dat

M fam mas

Will ParTE

haisn ParTE

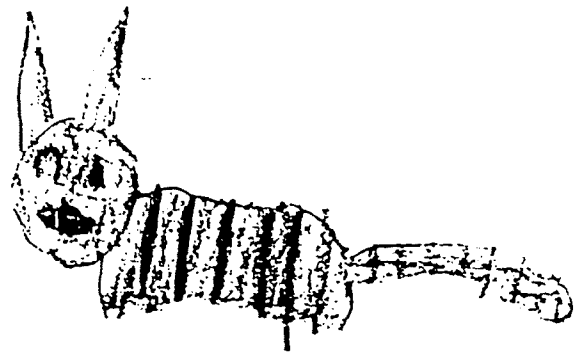
DanTi

Sghs Hoost.

noTKuokRve

What I predict will happen.

I think that The MoM  
will Fidwat and  
the Mice will git in  
Ba



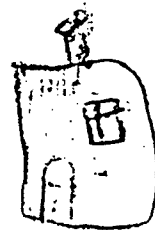
What I predict will happen.

1. MOM = ASTER <sup>Chase</sup>  
The Cat too have

<sup>have</sup>

The MOM will  
All the CATS

have <sup>have</sup>



What I predict will happen.

Thek that  
The cat wat  
at in cherb be  
was thek  
The mom  
will folw her  
son.

## Appendix C

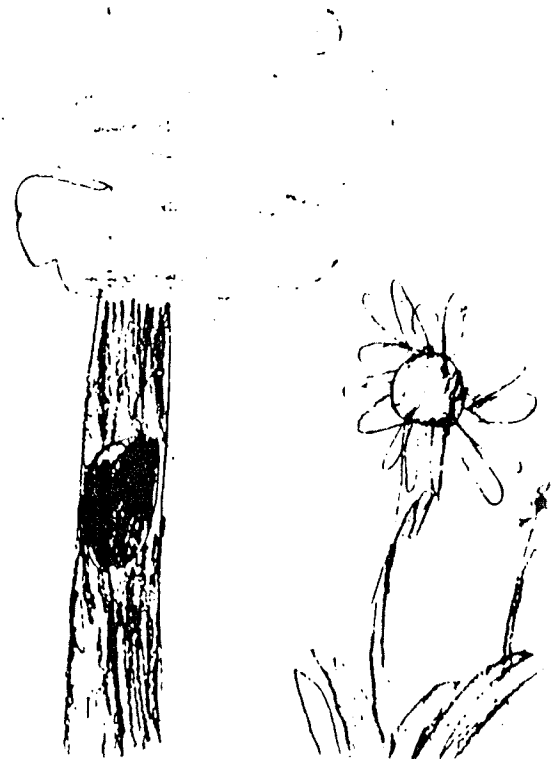
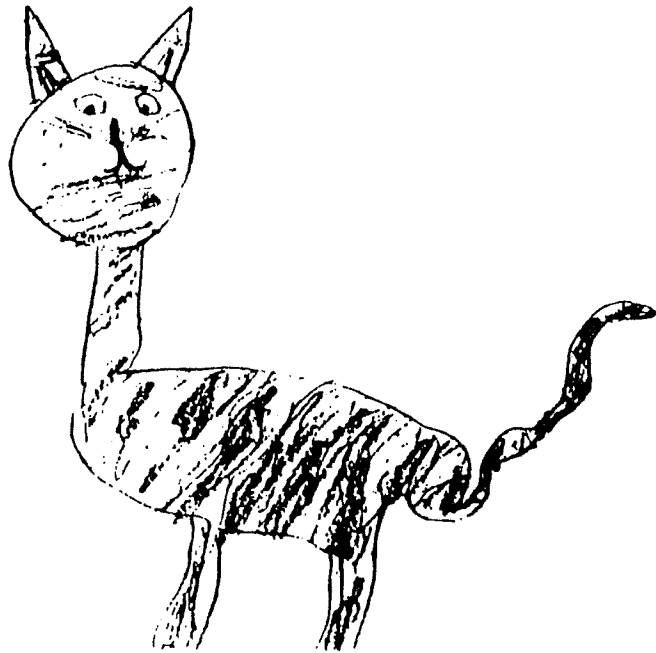
Copies of the students' first drafts of what actually happened in A Beautiful Feast for a Big King Cat.

Richard

1  
the mouse wat to the park and sae the cat and sae the  
mouse to and than a dog kam and than he ran afdr the  
cat

FEB 15

The ~~next week~~ the mouse met the cat in  
~~the park.~~ The mouse <sup>said</sup> ~~said~~ maybe we can be friends.  
 The cat wanted to think about it for a while and  
 then the mouse <sup>said</sup> ~~said~~ he would promise the cat he'd  
 be his friend and never leave him again ~~and~~ then the  
 cat <sup>said</sup> ~~said~~ yes. ~~The end.~~



Sharon

FOLLY

FEB 15

The ~~Mastli~~ Mastli

mat The

cat a rat

~~The cat~~ ~~Die~~

No hao he

wasnt The mastli  
said Dao you were

to BAC in farm

Amita





Anna

1000

1

the next week the mouse wase at the park and the mouse see the cat and said do you wate tobe my frand and he said no bekas you did nahing for me all you did was tesde me

The next week the cat <sup>FEB 15</sup> ~~wot~~ to  
 ne matow to rey las in it.  
 e was wodeering wiy the  
 ouse was not coming to ~~the~~  
 he was raisting at. The mouse  
 as the k' ~~ing~~ to de com frus  
 cat a ~~and~~ the mouse was with  
 e the cat. The mouse was ~~to~~  
 un glas he ast the cat if  
 od de his frid. ~~The~~ cathe  
 and one if you dot bod me A  
 got ~~the~~ the mouse didt

by him a ~~an~~ ~~the~~ ~~de~~ ~~can~~ ~~fas,~~  
 he

- Donald

### Appendix D.

The coding system and running records of targeted students' reading performance.

Coding for recording the miscues in the running records

underlined word

repetition

student's word

substitution

~~actual word~~

(parenthesis)

"click on' support from the computer

circled word

omission

T above circle

teacher supplied the word

(RT)

refers to class retelling

Paul.

### The Paper Bag Princess

Elizabeth was a beautiful princess. She lived in a castle and had expensive princess clothes. She was going to marry a prince named Ronald. Unfortunately, a dragon smashed her castle, burned all her clothes with his fiery breath, and carried off Prince Ronald. Elizabeth decided to chase the dragon and get Ronald back. She looked everywhere for something to wear but the only thing she could find that was not burnt was a paper bag. So she put on the paper bag and followed the dragon. He was easy to follow because he left a trail of burnt forests and horses<sup>RT</sup> bones. Finally, Elizabeth came to a cave with a large door <sup>and</sup> ~~that~~ had a huge knocker on it. She took hold of the knocker and banged on the door. The dragon stuck his nose out of the door and said, Well a Princess! I love to eat Princesses, but I have already eaten a whole castle today. I am a very busy dragon. Come back tomorrow. He slammed the door so fast that Elizabeth almost got her nose caught. Elizabeth grabbed the knocker and banged on the door again. The dragon stuck his nose out of the door and said, Go away. I love to eat Princesses, but I have already eaten a whole castle today. I am a very busy dragon. Come back tomorrow. <sup>What, no (sc)</sup> Wait, shouted Elizabeth. Is it true that you are the smartest and fiercest dragon in the <sup>RT</sup> whole world? Yes said the dragon. Is it true, said Elizabeth, that you can burn up ten forests with your fiery breath? Oh yes, said the dragon, and he took a huge deep breath and <sup>i. burned</sup> ~~(breathed)~~ out so much fire that he burnt up fifty forests. Fantastic, said Elizabeth, and the dragon took another huge breath and <sup>i. burned</sup> ~~(breathed)~~ out so much fire that he burnt up one hundred forests. Magnificent, said Elizabeth, and the dragon took another huge breath, but this time nothing came out. The dragon didn't even have enough fire left to cook a meat ball. Elizabeth said, Dragon, is it true that you can fly around the world in just ten seconds? Why yes, said the dragon and jumped up and flew all the way around the world in just ten seconds. He was very tired when he got back, but Elizabeth shouted, Fantastic, do it again! So the dragon jumped up and flew around the whole world in just twenty seconds. When he got back <sup>and</sup> ~~he~~ was too tired to talk and he lay down and went straight to sleep. Elizabeth whispered very softly, Hey, Dragon. The dragon didn't move at all. She lifted up the dragon's ear and put her head right inside. She shouted as loud as she could, Hey Dragon! The dragon was so tired he didn't even move. Elizabeth walked right over the dragon and opened the door to the cave. There was Prince Ronald. He looked at her and said, Elizabeth, you are a mess! You smell like ashes, your hair is all tangled and you are wearing a <sup>RT</sup> dirty old paper bag. Come back when you are dressed like a real princess. Ronald, said Elizabeth, your clothes are really pretty and your hair is very neat. You look like a real prince, but you are a burn. They didn't get married after all.

A Beautiful Feast for a Big King Cat

Big cat, big cat catch me if you can. The mouse teased the cat and ran, ran, ran.

He ran through the meadow and ran through the wood. He ran for home as fast as he could.

Mother, o mother, please save me from the cat! He is bigger than big and fatter than fat!

Mother jumped up, took the cat by surprise, You great big bully, pick on someone your own size!

She pulled the tail of that big fat cat and slammed the door. And that was that!

Big cat, big cat, catch me if you can. The mouse teased the cat and ran, ran, ran.

He ran through the meadow and ran through the wood. He ran for home as fast as he could.

Mother O mother, quick, open the door! The big fat cat is here once more!

Mother jumped up with fire in her eyes, You great big bully pick on someone your own size.

She tweaked the nose of that big fat cat and slammed the door. And that was that!

Big cat, big cat, catch me if you can! The mouse teased the cat and ran ran, ran.

He ran through the meadow and ran through the wood. He ran for home as fast as he could.

But the cat took a shortcut(ahead of) the mouse and got there first at the little mouse house.

His eyes were a-twinkle, his face was a-grin, and he <sup>his</sup>(opened) his jaws to welcome Mouse in.

The little mouse (knew) he had lost the race. There was(nowhere) to go, there was no hiding <sup>spot</sup> place.

But he didn't lose hope, <sup>as</sup> and quick as a wink, that (frightened) little mouse started to think,

O beautiful cat, you wondrous thing, a meal of one mouse is not fit for a king. You should be dining <sup>feast</sup> on silver (sardines) and (slices) of tuna with garden green beans.

You should be feasting from a big golden dish piled (high) as the sky with freshly caught fish and

(fried) chicken bones with (catnip crust) and (plump) juicy livers in (sweet sugar) dust.

The cat <sup>couldn't (sc)</sup> closed his eyes. He couldn't resist (thinking) Yes, it is true! I am (worthy) of this!

And at that very moment, the smart little mouse slipped under the cat and into his house.

Mother, o mother, I learned today that teasing the cat is dangerous play.

And waving good-bye to the big fat cat, he slammed the door! And that was that.

A Beautiful Feast for a Big King Cat

Big cat, big cat catch me if you can. The mouse teased the cat and ran, ran, ran.  
He ran through the meadow and ran through the wood. He ran for home as fast as he could.  
Mother, o mother, please save me from the cat! He is bigger than big and fatter than fat!  
Mother jumped up, took the cat by surprise, You great big bully, pick on someone your own size!  
She pulled the tail of that big fat cat and slammed the door. And that was that!  
Big cat, big cat, catch me if you can. The mouse teased the cat and ran, ran, ran.  
He ran through the meadow and ran through the wood. He ran for home as fast as he could.  
Mother O mother, quick, open the door! The big fat cat is here once more!  
Mother jumped up with fire in her eyes, You great big bully pick on someone your own size.  
She tweaked the nose of that big fat cat and slammed the door. And that was that!  
Big cat, big cat, catch me if you can! The mouse teased the cat and ran ran, ran.  
He ran through the meadow and ran through the wood. He ran for home as fast as he could.  
But the cat took a shortcut ahead of the mouse and got there first at the little mouse house.  
His eyes were a-twinkle, his face was a-grin, and he opened his jaws to welcome Mouse in.  
The little mouse knew he had lost the race. There was nowhere to go, there was no hiding place.  
But he didn't lose hope, and quick as a wink, that frightened little mouse started to think,  
O beautiful cat, you wondrous thing, a meal of one mouse is not fit for a king. You should be dining  
on silver sardines and slices of tuna with garden green beans.  
You should be feasting from a big golden dish piled high as the sky with freshly caught fish and  
fried chicken bones with catnip crust and plump juicy livers in sweet sugar dust.  
The cat closed his eyes. He couldn't resist thinking, Yes, it is true! I am worthy of this!  
And at that very moment, the smart little mouse slipped under the cat and into his house.  
Mother, o mother, I learned today that teasing the cat is dangerous play.  
And waving good-bye to the big fat cat, he slammed the door! And that was that.



### A Beautiful Feast for a Big King Cat

Big cat, big cat catch me if you can. The mouse teased the cat and ran, ran, ran.

He ran through the meadow <sup>he</sup> and ran through the wood. He ran for home as fast as he could.

Mother, o mother, please save me from the cat! He is bigger than big and fatter than fat!

Mother jumped up, took the cat by surprise, You great big bully, pick on someone your own size!

She pulled the tail of that big fat cat and slammed the door. And that was that!

Big cat, big cat, catch me if you can. The mouse teased the cat and ran, ran, ran.

He ran through the meadow <sup>he</sup> and ran through the wood. He ran for home as fast as he could.

Mother O mother, <sup>please</sup> ~~quick~~, open the door! The big fat cat is here once more!

Mother jumped up with fire in her eyes, You great big bully pick on someone your own size.

She tweaked the nose of that big fat cat and slammed the door. And that was that!

Big cat, big cat, catch me if you can! The mouse teased the cat and ran ran, ran.

He ran through the meadow and ran through the wood. He ran for home as fast as he could.

But the cat took a shortcut (ahead) of the mouse and got there first at the little mouse house.

His <sup>I opened</sup> eyes were a-twinkle, his face was a-grin, and he opened his jaws to welcome Mouse in.

The little mouse (knew) he had lost the race. There was (nowhere) to go, there was no hiding place.

But he <sup>did not</sup> didn't lose hope, and <sup>I</sup> quick as a wink, <sup>I</sup> that frightened little mouse <sup>I</sup> started to think,

O beautiful cat, you <sup>should</sup> wondrous (thing) a (meal) <sup>for</sup> of one mouse (is not fit for a king) You should be dining on <sup>some</sup> silver sardines and <sup>some</sup> slices (of tuna with) garden green beans.

You should be (feasting) <sup>I</sup> from a big golden dish <sup>silver</sup> oiled <sup>I</sup> high as the sky with <sup>I</sup> freshly caught <sup>I</sup> fish and <sup>I</sup> fish fried chicken bones (with) <sup>I</sup> catnip (crust) and <sup>I</sup> plump (juicy) (livers) in <sup>I</sup> (sweet) <sup>plums</sup> sugar dust.

The cat (closed) his eyes. He couldn't resist <sup>I</sup> (thinking) Yes, it is <sup>I</sup> (true!) I am <sup>I</sup> (worthy) of this!

And at that very moment, the <sup>I</sup> (smart) little mouse slipped <sup>I</sup> (under) the cat and into his house.

Mother, o mother, I learned today that teasing the cat is dangerous play.

And waving good-bye to the big fat cat, he slammed the door! And that was that.

## A Beautiful Feast for a Big King Cat

Big cat, big cat catch me if you can. The mouse teased the cat and ran, ran, ran.

He ran through the meadow and ran through the wood. He ran for home as fast as he could.

Mother, o mother, please save me from the <sup>big fat</sup> cat! He is bigger than big and fatter than fat!

Mother jumped up, took the cat by surprise. You great big bully, pick on someone your own size!

(She) pulled the tail of that big fat cat and slammed the door. And that was that!

Big cat, big cat, catch me if you can. The mouse teased the cat and ran, ran, ran.

He ran through the meadow and ran through the wood. He ran for home as fast as he could.

Mother O mother, <sup>please</sup> quick, open the door! The big fat cat is here once more!

Mother jumped up with fire in her eyes, You great big bully pick on someone your own size.

(She) tweaked the nose of that big fat cat and slammed the door. And that was that!

Big cat, big cat, catch me if you can! The mouse teased the cat and ran ran, ran.

He ran through the meadow and ran through the wood. He ran for home as fast as he could.

But the cat <sup>+</sup> took a shortcut ahead of the mouse and got there first at the little mouse house.

His eyes were a-twinkle, his <sup>face</sup> face was a-grin, and he opened his jaws to welcome Mouse in.

The <sup>look</sup> little mouse knew he had lost the race. There was nowhere to go, there was no hiding place.

But he didn't lose hope, and <sup>the (sc)</sup> quick as a wink, that frightened little mouse started to think,

O beautiful cat, you wondrous thing, a meal of one mouse is not fit for a king. You should be dining on silver sardines and slices of tuna with garden green beans.

You should be feasting <sup>on</sup> from a big golden dish piled high as the sky with freshly caught fish and fried chicken bones with catnip crust and plump juicy livers in sweet sugar dust.

The cat closed his eyes. He couldn't resist thinking, Yes, it is true! I am worthy of this!

And at that very moment, the smart little mouse slipped under the cat and into his house.

Mother, o mother, I learned today that teasing the cat is dangerous play.

And waving good-bye to the big fat cat, he slammed the door! And that was that.

A Beautiful Feast for a Big King Cat

Big cat, big cat catch me if you can. The mouse teased the cat and ran, ran, ran.  
 He ran through the meadow and ran through the wood. He ran for home as fast as he could.  
 Mother, o mother, please save me from the cat! He is bigger than big and fatter than fat!  
 Mother jumped up, took the cat by surprise, You great big bully, pick on someone your own size!  
 She pulled the tail of that big fat cat and slammed the door. And that was that!  
 Big cat, big cat, catch me if you can. The mouse teased the cat and ran, ran, ran.  
 He ran through the meadow and ran through the wood. He ran for home as fast as he could.  
 Mother O mother, quick, open the door! The big fat cat is here once more!  
 Mother jumped up with fire in her eyes, You great big bully pick on someone your own size.  
 She tweaked the nose of that big fat cat and slammed the door. And that was that!  
 Big cat, big cat, catch me if you can! The mouse teased the cat and ran ran, ran.  
 He ran through the meadow and ran through the wood. He ran for home as fast as he could.  
 But the cat took a shortcut ahead of the mouse and got there first at the little mouse house.  
 His eyes were a-twinkle, his face was a-grin, and he opened his jaws to welcome Mouse in.  
 The little mouse knew he had lost the race. There was nowhere to go, there was no hiding place.  
 But he didn't lose hope, <sup>as (sc)</sup> and quick as a wink, <sup>the (sc)</sup> that frightened little mouse started to think,  
 O beautiful cat, you wondrous thing, a meal of one mouse is not fit for a king. You should be dining  
 on silver sardines and <sup>slice</sup> slices of tuna with garden green beans.  
 You should be feasting from a big golden dish piled high as the sky with (freshly) caught fish and  
 (fried) chicken bones with catnip crust and <sup>1. pineapple</sup> plump juicy livers in sweet sugar dust.  
The cat closed his eyes. He couldn't resist thinking, Yes, it is true! I am worthy of this!  
 And at that very moment, the (smart) little mouse slipped under the cat and into his house.  
 Mother, o mother, I learned today that teasing the cat is dangerous play.  
 And <sup>when</sup> ~~waving~~ good-bye to the big fat cat, he slammed the door! And that was that.

Appendix E

Lists of Richard's computer requests for support

①

ahead of  
His  
a-twinkle  
face  
a-grin  
opened  
knew  
had  
race  
There  
that  
started  
O  
wondrous  
thing  
€ golden  
€ piled  
€ high  
caught  
fried  
bones  
catnip  
€ thinking  
€ true  
€ worthy  
€ slipped  
€ waving

□

②

Student Word List:

silver  
sardines  
slices  
should  
\ golden  
\ piled  
\ high  
freshly  
\ thinking  
\ true  
\ worthy  
the  
\ slipped  
learned  
good-bye  
~w waving  
slammed  
tweaked

Appendix F

Students' writing and spelling analyses to support Table 1

WRITING #1  
PREDICTION  
02.08.94  
Richard

**Invented Spellings**

cadnt (can't)  
kach (catch)  
sad (said)  
wnt (want) 2  
hi (he)  
bndt (didn't)

Total different words: 6  
Total running words: 7

Total different words in text: 15  
Total running words in text: 20

**Conventional Spellings**

the 3      cat  
mouse 2    do  
you        eat2  
fish        to  
mouses

Total different words: 9  
Total running words: 13

Conventionally spelled: 60%  
Conventionally spelled: 65%

WRITING #2  
WHAT ACTUALLY HAPPENED?  
02.09.94

**Invented Spellings**

wendo (window) 2

Total different words: 1  
Total running words: 2  
  
Total different words in text: 9  
Total running words in text: 14

**Conventional Spellings**

the 4      cat  
look 2 in  
and  
mouse  
out        of

Total different words: 8  
Total running words: 12

Conventionally spelled: 88.89%  
Conventionally spelled: 85.71%

WRITING #3  
NEXT EPISODE (COMPOSED ON COMPUTER)  
02.15.96

**Invented Spellings**

wat (went)  
  
sae (saw) 2  
than (then) 2  
kam (came)  
afdr (after)

Total different words: 5  
Total running words: 7

Total different words in text: 15

**Conventional Spellings**

the 4  
mouse 2  
to        park  
and 3    a  
dog      he  
ran      cat

Total different words: 10  
Total running words: 16

Conventionally spelled: 66.67%

Total running words in text: 23

Conventionally spelled: 69.56 %

WRITING #4

04.22.94

**Invented Spellings**

sied (said) 4  
wlve (wolf)  
outsied (outside)  
snak (snake)  
shrad (shed)  
sken  
hibrnat (hibernate)  
wainter (winter)

**Conventional Spellings**

is 4            a 11  
sleep            14  
home 7            this  
in 5              look  
cave 6            food  
for 5              my  
me 4              on  
yes 4             the 5  
rocks             bear  
bat

Total different words: 8  
Total running words: 11

Total different words: 19  
Total running words: 65

Total different words in text: 27  
Total running words in text: 76

Conventionally spelled: 61%  
Conventionally spelled: 85%

**PREDICTION WRITING #1 (done after the big book was introduced and part was read by T)**

02.08.94

Anita

**Invented Spellings**

fsk (think)  
dat (that)  
mfammas (mother mouse)  
PaiRTEp (put)  
haisn (his)  
PaRTuit (paws)  
DanTti (then)  
sghs(squeak his)  
bnoosT.(nose)  
noTKuokrve (-)

**Conventional Spellings**

I  
will

Total different words: 10  
Total running words: 10

Total different words: 2  
Total running words: 2

Total different words in text: 12  
Total running words in text: 12

Conventionally spelled : 17%  
Conventionally spelled : 17%

WRITING #2

What actually happened? (written after reading the story with the computer-02.09.94)

**Invented Spellings**

RNa (ran)  
hmawy (home)

**Conventional Spellings**

he 2  
The 4



wsRBh (was)	cat	2
hm (him)		
BhmTD (behind)		
hno		
hem (him)		
masmk (mouse)	little	2
sied (said)	you	
Dat (don't)	to	
wato (want)		
attvw (eat)		
fah (fish)	and	
Bas (bread)	it	
tat (thought)	in	
abat (about)		
masv (mouse)		
sak (snuck)		
has (his)		
haskc (house)		

Total different words: 19  
 Total running words: 21

Total different words: 9  
 Total running words: 15

Total different words in text: 28  
 Total running words in text: 36

Conventionally spelled: 32.14%  
 Conventionally spelled: 41.6%

**WRITING #3**

The next episode (written after several readings of book and on screen-02.15.94

This writing was printed with fancy fonts

**Invented spellings**

**Conventional Spellings**

MasTLI (mouse)	2
maT (met)	
a qanat (again)	
Diunow ( didn't)	
no (know)	
hao (who)	
w.asun (was)	
dao (do)	
wat (want)	
(Bae (be)	
fandl (friend)	
Dao (they)	
wat (went)	
Pakid (park)	

The	6
cat	3
he	
said	2
you	
to	2
my	
Yes	

Total different words: 14  
 Total running words: 15

Total different words: 8  
 Total running words: 17

Total different words in text: 22  
 Total running words in text: 32

Conventionally spelled: 36.36%  
 Conventionally spelled: 53.13%

**WRITING #4**

04.21.94

**Invented Spellings**

**Conventional Spellings**

houme (home)  
okaas (Orcas)  
fram (from)  
eta (eat) 3  
wach (watch)  
ota (out)  
seid (said)  
fishs (fishes)

in 2  
is 7  
  
a 8  
home 7

smm (swim)  
litte (little)  
plas (plants)  
siad (said)  
DaDe (baby)  
animis  
zarn (them)  
hav (have)

in 3  
the 8  
water 5  
for 5  
me 5  
yes 3  
said  
l 7  
fish

claz (claws)

all 2  
day 2  
you 2  
bats  
like 2  
to

and 2  
crabs  
ate

Total Different words 17  
Total running words 20

Total Different words 22  
Total running words 88

Total different words in text: 39  
Total running words in text: 108

Conventionally spelled: 56.41%  
Conventionally spelled: 81.48%

WRITING #1  
PREDICTION  
02.08.94  
Sharon

### Invented Spellings

here (hear)  
som (some)  
trable (trouble)

Total different words: 3  
Total running words: 3

Total different words in text: 21  
Total running words in text: 34

### Conventional Spellings

l think that  
the 6 mouse 2 will 4  
keep on teasing 2  
cat 2 and 3 mom  
she give milk  
little get in

Total different words: 18  
Total running words: 31

Conventionally spelled: 85.71%  
Conventionally spelled: 91.17%

WRITING #2  
WHAT ACTUALLY HAPPENED?  
02.09.94

**Invented Spellings**

teasd (teased)  
thouk (took)  
amost (almost)

Total different words: 3  
Total running words: 3

Total different words in text: 14  
Total running words in text: 27

**Conventional Spellings**

the 8	mouse 3	cat 3
short	cut	and 3
ate	ran	under
in	house	

Total different words: 11  
Total running words: 24

Conventionally spelled: 78.57%  
Conventionally spelled: 88.89%

WRITING #3  
NEXT EPISODE  
02.15.95

**Invented Spellings**

side (said) 2  
minit (minute)  
promes (promise)  
agen (again)

Total different words: 4  
Total running words: 5

Total different words in text: 37  
Total running words in text: 54

**Conventional Spellings**

the 9	next	week
in	park	maybe
mouse 3	met	cat 4
we	can	be
friends	now	wanted
to	think	about
it	for	a
and 3	then 2	he
would	he'd	be
his	friend	never
tease	him	yes

Total different words: 33  
Total running words: 49

Conventionally spelled: 89.19%  
Conventionally spelled: 90.74%

WRITING #4  
04.22.94

**Invented Spellings**

foreste (forest)  
becaue (because)  
its (it's)

pond 11  
me 8  
day  
said 5  
17  
jump  
beaver  
safer  
not 2

**Conventional Spellings**

a 21	home 14	in 13
pond 11	is 7	for 8
me 8	yes 4	all
day	twigs	to
said 5	the 7	frog
17	live 4	this 3
jump	from 2	lily-pad
beaver	get	but
safer	gold fish	tree
not 2	duck	feed

on plants no  
child house

Total different words: 3  
Total running words: 3

Total different words: 35  
Total running words: 138

Total different words in text: 38  
Total running words in text: 141

Conventionally spelled: 92%  
Conventionally spelled: 96%

WRITING #1  
PREDICTION  
02.08.94  
Alan

**Invented Spellings**

thik (think)  
fidwat (find out)  
gitin (get in)  
taba (trouble)

Total different words: 4  
Total running words: 4

Total different words in text: 11  
Total running words in text: 13

**Conventional Spellings**

l that the 2  
mom will 2 and  
mice

Total different words: 7  
Total running words: 9

Conventionally spelled: 63.64%  
Conventionally spelled: 69.23%

WRITING #2  
WHAT ACTUALLY HAPPENED  
02.09.94

**Invented Spellings**

sid (said) 3  
ovrgoin (overgrown) 2  
to (too)  
lit (little)  
an (am)  
hovef (have)  
sifr (silver)  
fith (fish)

Total different words: 8  
Total running words: 11

Total different words in text: 17  
Total running words in text: 27

**Conventional Spellings**

the 4 mice 2 to 2  
cat 3 l eat  
to ow and

Total Different words: 9  
Total running words: 16

Conventionally spelled: 52.94%  
Conventionally spelled: 59.26%

WRITING #3  
NEXT EPISODE  
02.15.95

**Invented Spellings**

**Conventional Spellings**

sae (saw)2  
mouse 4  
chaas (chased)  
rakoon (raccoon)  
caj (cage) 2  
bans  
llit (little)  
hwos (house)

the 9            cat 3  
and 3            at     zoo  
he 2            ran 2  
past 2           into

Total different words: 7  
Total running words: 9

Total different words: 10  
Total running words: 29

Total different words in text: 17  
Total running words in text: 38

Conventionally spelled: 58.82%  
Conventionally spelled: 76.31%

WRITING #4  
04.22.94

### Invented Spellings

laeck (lake) 3  
terbale (turtle)  
seme (swim)  
seds (said) 2  
Beaers (beavers)  
splache (splash)  
fече (fish)  
karp (carp)  
sape (sleep)

Total different words: 10  
Total running words: 14

Total different words in text: 23  
Total running words in text: 61

### Conventional Spellings

is 3            l3  
a 7            home 5  
in 4            for 2  
me 2            yes 3  
said            the 3  
here            cat  
all            day

Total different words: 13  
Total running words: 47

Conventionally spelled: 57%  
Conventionally spelled: 77%

PREDICTION WRITING #1  
02.08.94  
Anna

### Invented spellings

mose (mouse)  
Aste (asked)  
hase (chase)  
too (to)  
Pell (pull)  
hare (hair)

Total different words: 6  
Total running words: 6

Total different words in text: 12  
Total running words in text: 15

### Conventional Spellings

a  
the 4  
cat  
Mom  
will  
cat's

Total different words: 6  
Total running words: 9

Conventionally spelled: 50%  
Conventionally spelled: 60%

WRITING #2  
WHAT ACTUALLY HAPPENED  
02.09.94

**Invented Spellings**

mause (mouse)  
Rana (ran)  
ender (under)  
Bekas (because)  
Ws (was)  
heking (thinking)  
af (of)  
tauna (tuna)  
Opand (opened)  
hs (his)  
Mawthes (mouth)

Total different words: 11  
Total running words: 11

Total different words in text: 14  
Total running words in text: 17

**Conventional Spellings**

The 3  
Cat 2

and

Total different words: 3  
Total running words: 6

Conventionally spelled: 21.42%  
Conventionally spelled: 35.29%

WRITING #3  
Next Episode -  
Composed on the computer  
02.15.94

**Invented Spellings**

wase (was)  
sae (saw)  
wate (want)  
frand (friend)  
bekas (because)  
nahing (nothing)  
tesde (teased)

Total different words: 7  
Total running words: 7

Total different words in text: 29  
Total running words in text: 40

**Conventional Spellings**

the 5            you 3  
next            to  
week            be  
my                he  
mouse 2        no  
at                did 2  
park    for  
and                me 2  
cat                all  
.and 2            was  
said 2  
do

Total different words: 22  
Total running words: 33

Conventionally spelled: 75.86%  
Conventionally spelled: 82.5%

WRITING #4  
04.22.94

### Invented Spellings

side (said)0 shce (shark)  
ded 9dead) fhis (fish)  
there (they're)2 raye (ray)  
che (catch) daid (dead)  
sord (sword) fite (fight)  
ename's (enemies) prtct (protect)  
siff (self)

Total different words: 13  
Total running words: 14

Total different words in text: 39  
Total running words in text: 72

### Conventional Spellings

a 11 home 7 in 4  
sea 4 is 3 for 5  
me 5 yes 3 the 3  
l 4 eat good  
said 2 sting fish 2  
my

Total different words: 16  
Total running words: 58

Conventionally spelled: 40%  
Conventionally spelled: 80%

WRITING #1  
PREDICTION  
02.08.94  
Donald

### Invented spellings

thek (Think) 2  
wat (will)  
got (get)  
cherb (trouble)  
becos (because)  
folw (follow)

Total different words: 6  
running words: 7

Total different words in text: 15  
Total running words in text: 18

### Conventional Spellings

l 2 that  
the 2 cat  
in mom  
will her  
son

Total different words: 9  
Total running words: 11

Conventionally spelled: 60%  
Conventionally spelled: 61.1%

WRITING #2  
What actually happened  
02.09.94

### Invented Spellings

mows (mouse) 3  
  
tes (teased)  
short  
olmo s (almost)  
eta (ate)  
chit (chased)  
undr (under)

### Conventional Spellings

The 8  
cat 5  
and 4  
  
ran

Total different words: 6  
Total running words: 8

Total different words: 5  
Total running words: 19

Total different words in text: 11  
Total running words in text: 27

Conventionally spelled: 45.45%  
Conventionally spelled: 70.37%

WRITING #3  
Next episode  
02.15.94

### Invented Spellings

wat (went)	abea (idea)
matow (meadow)	wot (went)
rey las (relax) thar (there)	
wondeering (wondering)	
wiy (why)	ast (asked)
plas (place)	wod (would)
raisting (resting)	de (be)
theking (thinking)	dot (don't)
haw (how)	bog (bug)
de com (become) 2	sad (said)
fras (friends) 2	mor (more)
cot (got)	dit (didn't)
frd (friend)	bag (bug)
becam (became)	fas (friends)

### Conventional Spellings

The 13	next
week	cat 5
to 6	in
he 6	it
mouse 5	was 5
not	coming
	at
	with
	see
	if 2
	said
	me
	a
	and2
	alas
	his
	you
	him

Total different words: 27  
Total running words: 29

Total different words: 24  
Total running words: 60

Total different words in text: 51  
Total running words in text: 89

Conventionally spelled: 47.06%  
Conventionally spelled: 67.41%

WRITING #4  
04.22.94

### Invented Spellings

jagole (jungle) 6	jogel (jungle)
side (said) 6	arad (around)
arade (around)	flor (floor)
prsin (person)	vinse (vines)
line (lion)	hera (here)
monke (monkey)	eta (eat)
thes (these)	banans (bananas)
thar (they're)	brids (birds)
fliy (fly)	wam (worm)

### Conventional Spellings

is 6	a 15	home 13	in 8
for 7	me 7	yes 6	the 9
snake 16		slither	it
swing		like 2	it's
food		good	tree
here		because	

Total different words: 18  
Total running words: 30

Total different words: 20  
Total running words: 79

Total different words in text: 38  
Total running words in text: 109

Conventionally spelled: 53%  
Conventionally spelled: 72.5%



What actually happened.

The cat LOOK  
IN The WENDO  
and The MOUSE  
LOOK OUT of the WEND  
~~and~~ The

What actually happened.

The mouse tease the  
 cat. The cat thought  
 the slight cut.  
 and almost ate the  
 mouse. And the mouse ran  
 under the cat and in  
 the house.

What actually happened.

he Rina

h/mawk

The cat

was <sup>was</sup> BHT had

BhMTD hno

hem

The little

mask

Said dat it you

Wah to

attvw fan and RBC

What actually happened.

The Alice Sid to The Overgain.

cat I am to li' to Eat Sid The

MICE Sid - to the overgain cat

ow' Cat OW. You Cat you cause howeF

SIFM FIT. and MSITS.

What actually happened.

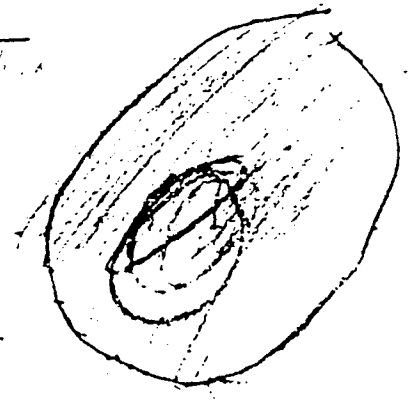
The Mouse Rana

Enter the Cat

Be has the Cat

W's he King

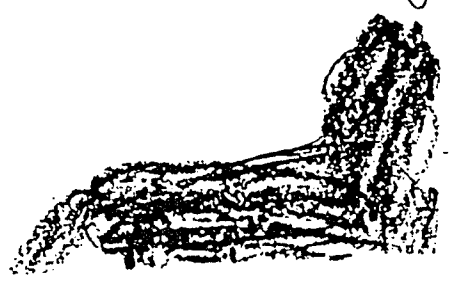
At town



And

Don't

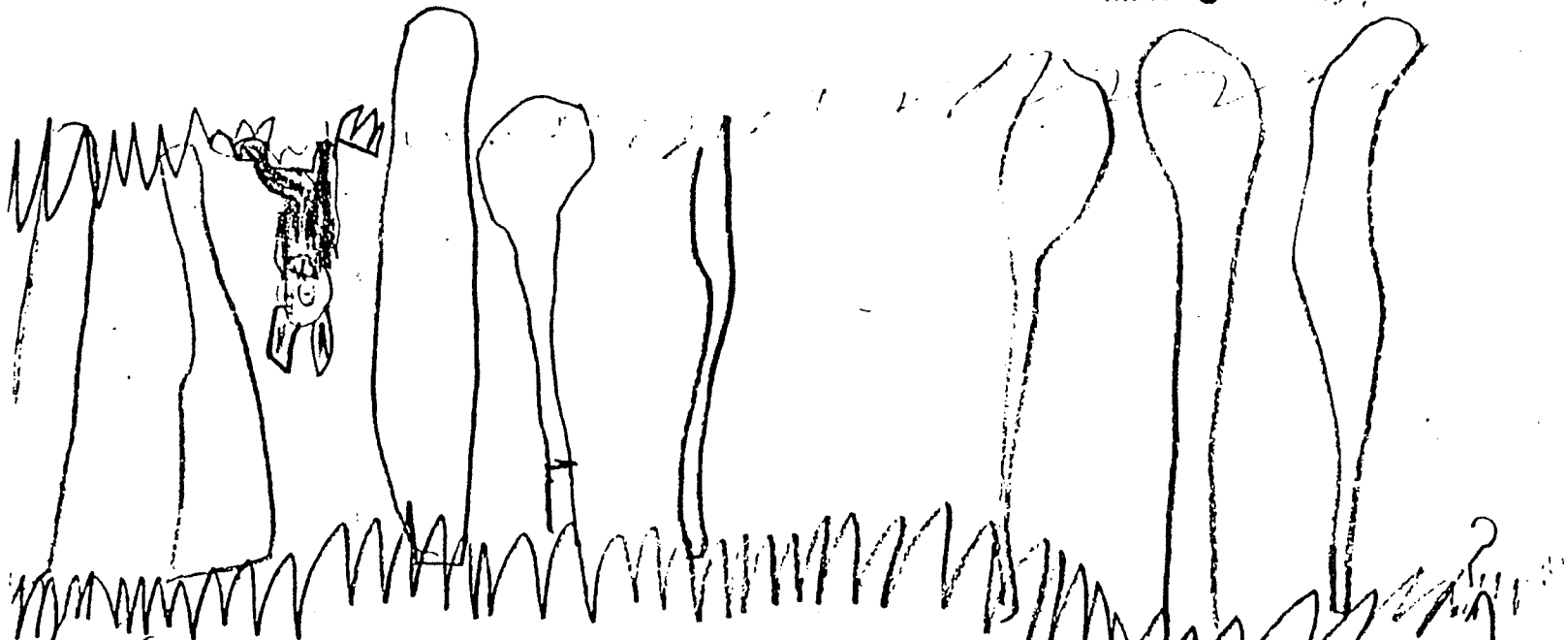
Make



What actually happened.

The mow  
The cat an  
The short c  
and the cat on  
s eta the mow  
and the mow  
chit the cat and  
ran under the a

MAY 5



IS A HOME IN A CAVE A HOME FOR ME  
YES YES THE BAT I SLEEP IN THIS CAVE

IS A HOME IN A CAVE A HOME FOR ME  
YES YES THE WAVE I LOOK AT  
FOOD OUTSIDE THE CAVE

is A home in a cave a home of a man?  
Yes Sled the goat I spread my skin on  
rocks.

is A home in a cave a home of a man?  
Yes Sled the goat I hid in a mountain.



## A Home In A Pond

Is a home in a pond a home for me?  
Yes said the frog I live in this pond. I  
jump from lily pad to lily pad all day.

010001

Is a home in a pond a home  
for me?

Yes said the beaver I get  
twigs from the foreste but I live in my pond because  
its safer for me.

3

Is a home in a pond  
a home for me?

Yes said the gold fish I live  
in this pond. a home in a tree is not for me.

Is a home in a pond a home  
for me?

Yes said the duck / ~~I paddle with my wobby~~<sup>n</sup>  
~~it's good for me~~ / I feed on the plants in  
this pond

~~Is a home in a pond a home for me?~~

~~Yes said the child I live in a house in the pond~~

~~and my friend diggy told~~

Is a home in a pond a home for me?

No! said the child I live in a house a home in a pond is not for me! PPPP  
OOOO

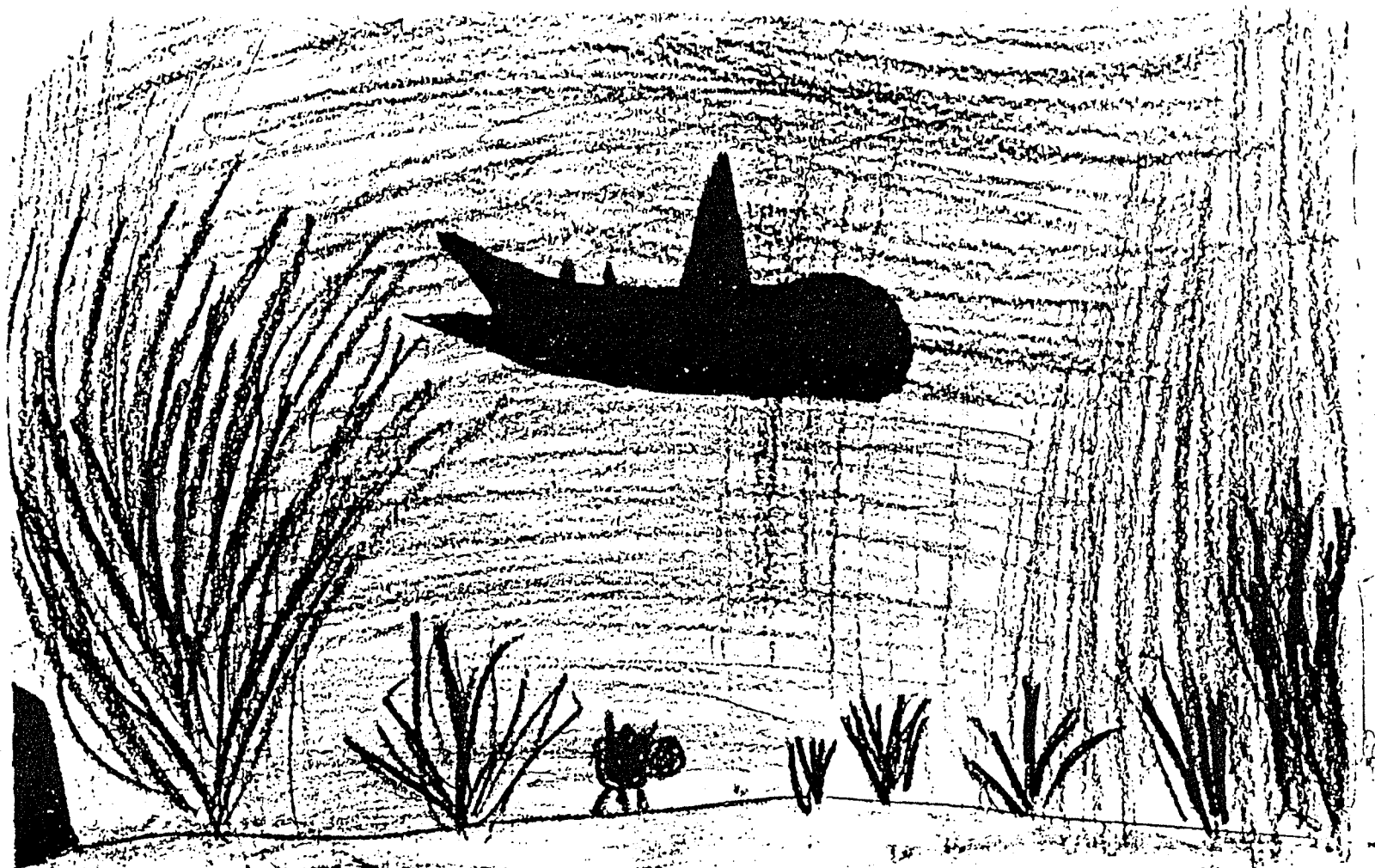


Is a home in The Water a home  
yes son The ok aas  
flam The water I eta fish <sup>all day</sup> ~~sat~~

Is a home in The Water a home  
you Ball watch eta for me i like to

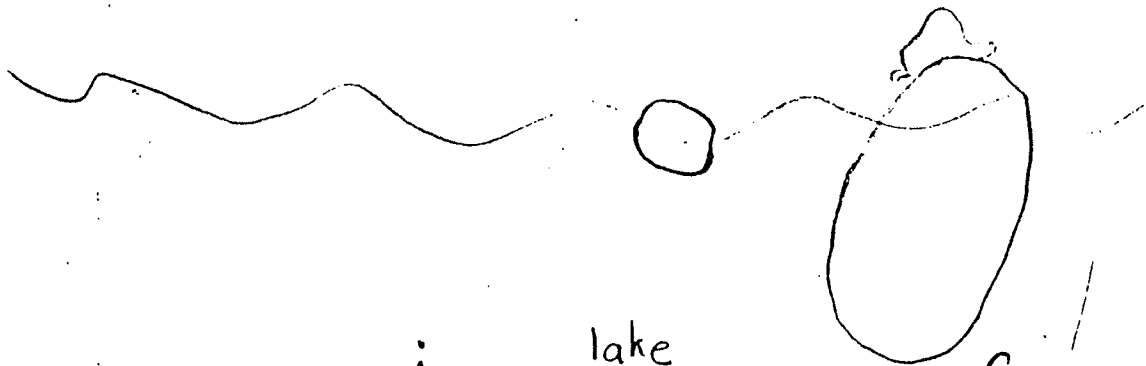
Is a home in The Water a home for me  
yes said The fish is <sup>in</sup> All Day  
and i eta litte plas

Is a home in The Water a home for me



yes. I had The Crabs, I ate  
i Dade animis I like Zam  
and I hav Claz

MAY 5



Is a Home <sup>turtle</sup> in a Lake or Home for me  ~~you~~ said <sup>yes</sup>

The Perbole I <sup>swim</sup> seme in here! Is a Home in a Joek

A Home for me <sup>beaver</sup> yes sed the beaver I spatche All day,

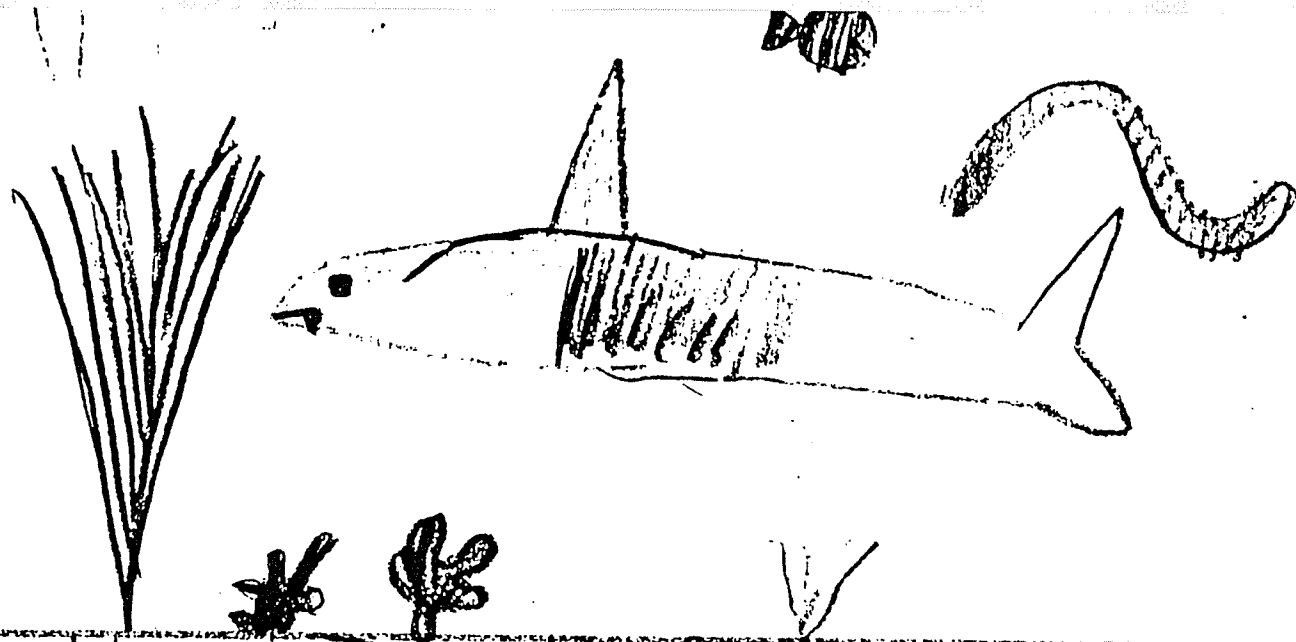
is a Home in a Loeck yes sed the cof-fete I

est All day. is a Home in a kart-fete I sape

All day.

Alan

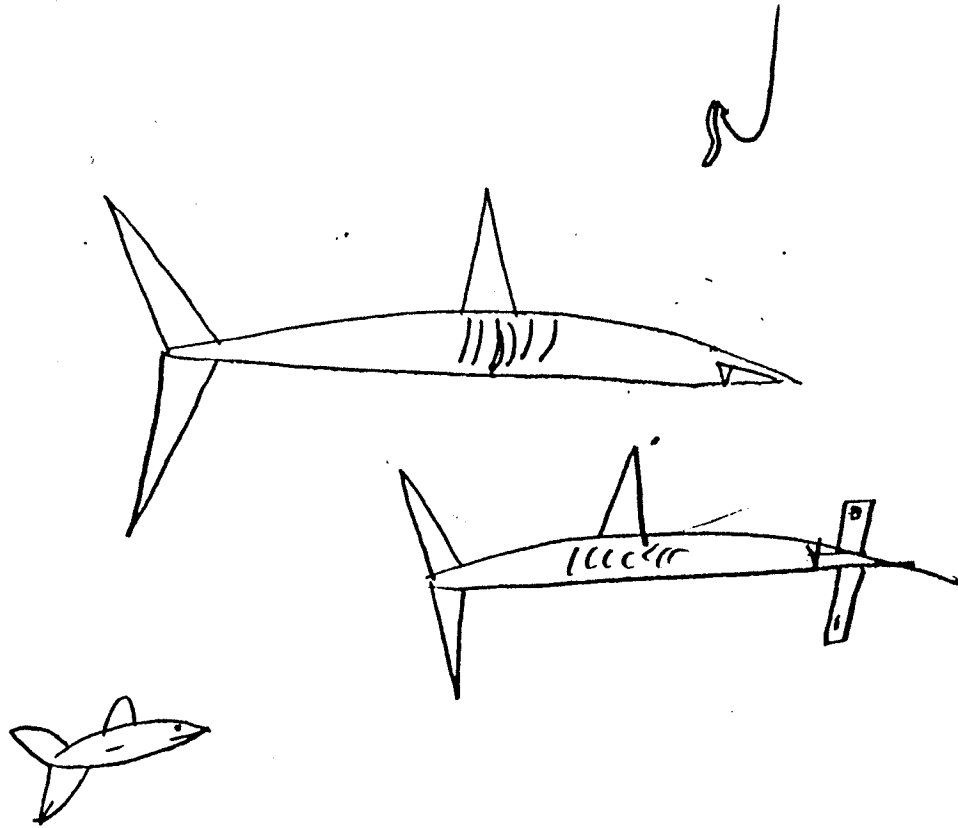




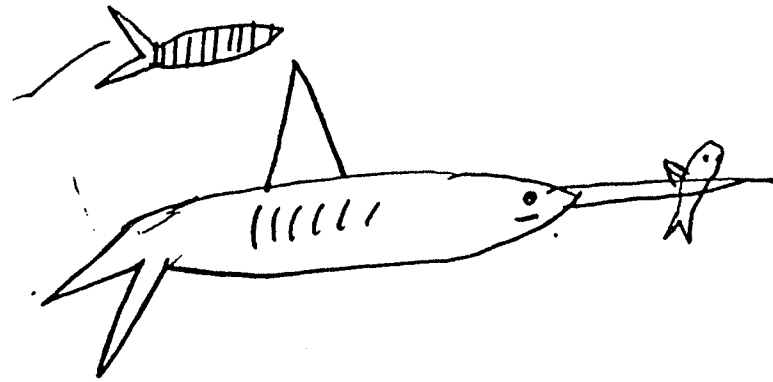
# A Home In A Sea.

~~is a home in a sea a home~~  
~~for me? yes side the shore. I live at the~~  
~~beach. this is my home.~~

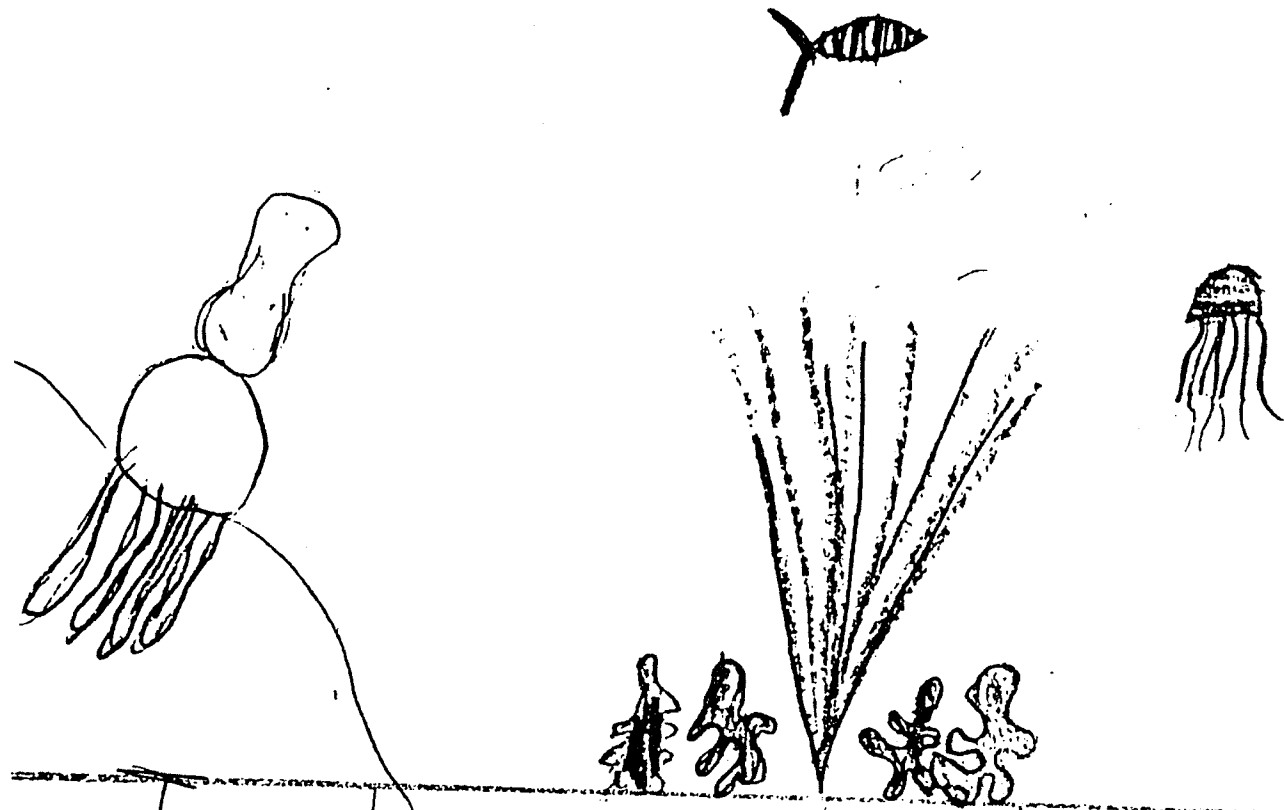
is a home in a sea a  
 home for me? yes side the  
 shore. eat fish  
 there tasty and delicious. there good for me.



Is a home in a sea  
a home for me? Yes said the  
sting ray I cen said fish there good  
for me.



Is a home in a sea, a home for me?  
"Yes" said the shark fish, I bite  
enemies. I protect my self.



Is a home in a sea a home  
for me. Yes said the octopus. I  
Stice on ~~fin~~ rocks all day.



Animals

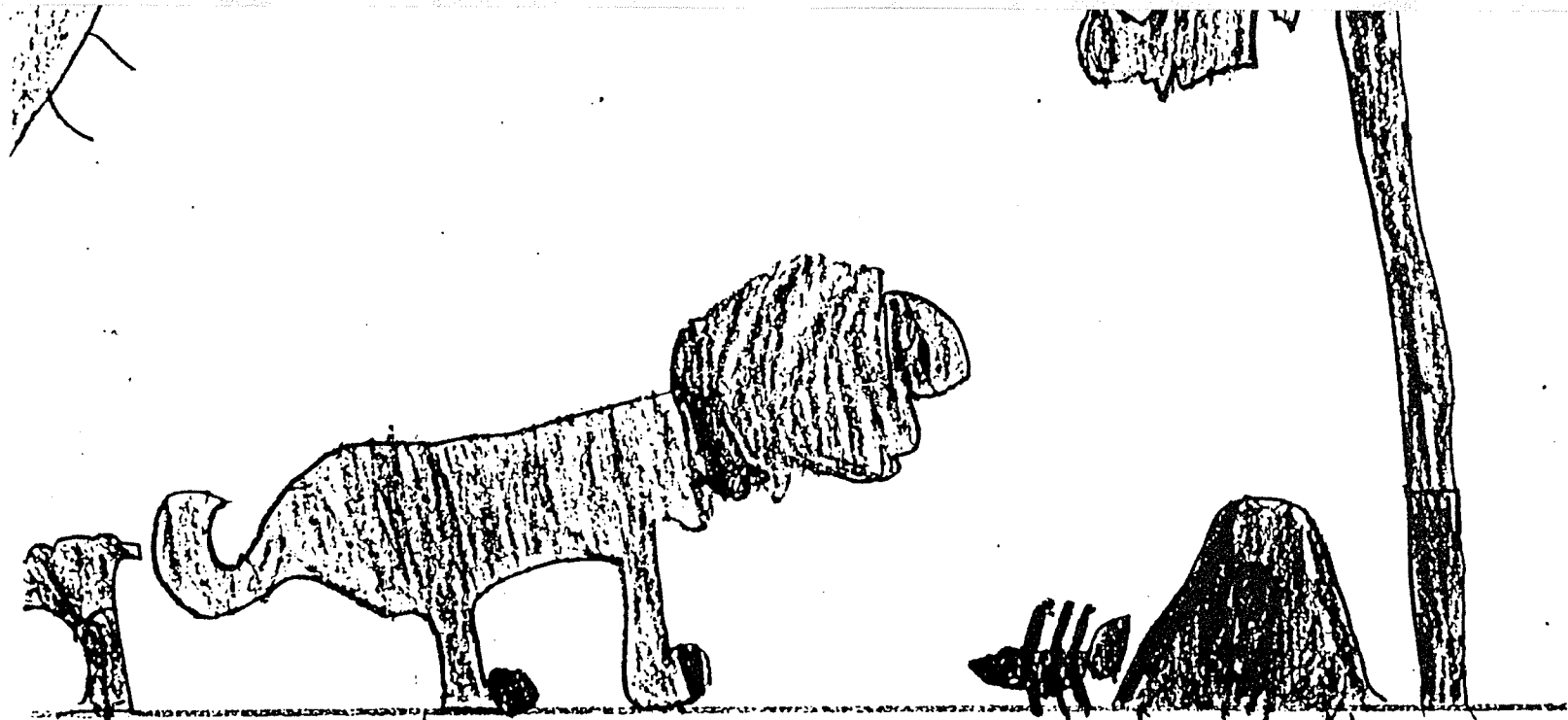
Animals

the 'oj'!

Is a home in a jagole a home  
 or me? <sup>le</sup> jungle  
 Yes <sup>side</sup> the snake I <sup>sither</sup> ~~arad~~  
 the <sup>jungle</sup> ~~jagole~~ <sup>flor.</sup> <sup>joungle</sup> <sup>around</sup>

Is a home in a jagole a home  
 or me? <sup>sayman</sup>  
 es <sup>side</sup> the <sup>Prstn.</sup> <sup>man</sup> I swing in the  
rise  
 vines

Donora



Is a home in a jagole a home  
for me?  
jo jungle

Yes side the line I ~~wacke~~ grad the  
jagole. I like the food here. here

~~Is a home in a jagole a home for  
me?~~

~~Yes side the ante I bite my home  
all day.~~

Jungle

Is ~~a~~ home in a ~~jogel~~ a home for  
me?

Yes <sup>side</sup> the ~~eat~~ <sup>monkey</sup> ~~knocke~~ I swing ~~and~~ the  
~~jogel~~ ~~eta~~ ~~testa~~ ~~thes~~ ~~parans~~ ~~thar~~  
good for me

Is a home in a ~~tree~~ ~~jagote~~ a  
home for me? <sup>for</sup> ~~tree~~ ~~jagote~~ <sup>jungle</sup>

Yes <sup>said</sup> the ~~bird~~ <sup>(bird)</sup> I fly <sup>around</sup> ~~around~~

Is a home ~~jagote~~ a home for me?

<sup>Jungle</sup> ~~jagote~~ I like it here

Yes <sup>said</sup> the tree, I let animals <sup>live</sup> ~~live~~

~~there~~ ~~in~~ ~~me~~ I ~~like~~ ~~it~~ ~~here~~

because it's <sup>warm</sup> ~~here~~



Appendix G

Copies of the oral and written questionnaires administered to students

NAME \_\_\_\_\_  
CLASS \_\_\_\_\_

DATE \_\_\_\_\_

1. When you are reading and come to something you don't know, what do you do?

Do you do anything else?

2. Who is a good reader that you know?

3. What makes \_\_\_\_\_ a good reader?

4. What do you think reading is about?

5. How do you think you learned to read?

6. How does your teacher help students learn how to read?

7. Do you think you are a good reader? Why?

8. What do you like to do on the computer

9. What did you like best about reading/writing at the computer?

10. If you could read a story using the book or the computer which would you choose? Why?

NAME

1. What does someone have to do to be a good reader?
2. When you come to something you don't know, what do you do?
3. How do you feel when you're reading and you have to ask someone for a word?

4. How do you feel when you are reading on the computer and you have to click on a word?

5. Do you think other students would like to use the computer to read and write?

Tell me why?

6. Did the computer help you to get better at reading and writing?

Tell me how it helped.

Do you think we should use the computer with other kids?

What are some things that we need to know that would help kids use the computer ?

Appendix H

Copy of the Heald-Taylor checklist for whole language materials

HEALTH OF WHOLE LANGUAGE BASIS

	Somewhat		Very	
	Ineffective	effective	Effective	effective
<b>Literature</b>				
How effective is this program in providing for: quality literature selections? unabridged literature selections? variety of literary genre (patterns, poetry, informational, fictional)? a variety of authors? biographies of authors? listings of high quality literature, supplemental selections?				
<b>Integration</b>				
How effective is this program in providing for: the integration of listening, speaking, reading, writing, drama, movement, and visual arts? thematic organization of stories and student activities? organizational strategies for the use of activity centers, such as book corners, listening post, drama center, construction area, art station, writing table? the integration of other content areas, such as mathematics, science, social studies, music, and physical education?				
<b>Instructional Strategies</b>				
How effective is this program in providing for: shared reading? book talks? choral speaking? story readings? storytelling? listening activities? co-operative learning? dramatization, such as role play, puppet plays, mime, improvisation? debates? personal dictation? problem-solving activities? individualized reading? encouraging students to use a variety of reading strategies, such as pictures, pattern of the text,				

	Somewhat		Very	
	Ineffective	effective	Effective	effective
meaning, memory, context, and phonetics? student use of writing folders? student use of writing process (pre-writing, writing conferencing, drafting, revising, editing, publishing)? conferencing strategies? peer conferencing? experimentation with spelling, grammar, and usage? revising strategies? publishing strategies?				
<b>Interpretive Activities for Students</b>				
How effective is this program in providing for: interpretive activities, such as drama, role play, improvisation movement? interpretive activities, such as discussions or debates? interpretive activities, such as painting, drawing, cut-and-paste, modeling, and construction? higher level thinking activities? comprehension activities? vocabulary study relative to the literature being read? a variety of reading strategies, such as close exercises, pattern awareness, meaning, memory, picture clues, and phonetics? phonetic activities that relate to reading and writing, oral as well as written? skill activities based on the needs of students?				
<b>Evaluation</b>				
How effective is this program in providing for: strategies for supporting teachers in observing students as they use language? varieties of formats for collecting information such as language samples, checklists, running records, etc.? opportunities for students to evaluate their language growth? samples of typical language behavior inventories? balance between standardized and informal evaluation procedures?				

(Heald-Taylor 1989, pp 88-92)