Computers in Elementary Reading Programs


An Honors Thesis (ID 499)

by

Jeanne A. Mathews




Thesis Director

*Rebecca Swearingen*

Ball State University

Muncie, Indiana

April, 1990




Expected date of graduation

May, 1990

" The computer is simply a tool to more efficiently provide
the kind of instruction decided upon by educators"(Balajthy 62).
There is no question about the fact that computers are found in just
about every elementary school in the United States. Computers can
function in a variety of educational and administrative areas within
a school. However, one of the most important areas is in the reading
program. Reading is seen and has traditionally been seen as an
essential aspect of education. Therefore, the mass influx of
computer programming related to reading should come as no surprise.
The use of computers is becoming commonplace in many elementary
schools. The question now is just how these computers are being used
to teach reading and how effective they have proven to be in reading
programs.

The computer is the latest instructional innovation. Computer
based reading instruction must be founded on a solid understanding
of computers and reading instruction. Programs that ignore one or
the other are less than fully effective. The teaching of reading by
computer or any other means is not to be taken lightly. Expert

opinion and research studies to date seem to support the use of computers in teaching reading. Computers are used widely; therefore, there is a need to understand why they are generally seen as effective teaching tools (Geoffrion 10).

Why should educators use computers as a teaching tool? Many valid reasons exist to support such use. If nothing else, a computer is seen as a novelty to students. It transforms dull tasks into adventures. Children are eager to use a computer, regardless of the task. Computers are dynamic. The contents of the program can be adjusted to the interest of the reader. Large quantities of information can be stored on a computer and explored by the reader. Computers are also able to print text that is easier to read. Words can be printed larger than in textbooks and can be highlighted for emphasis (Geoffrion 6).

In addition to these functions, computers provide a variety of others. One example is the integrated presentation of graphics and text. As a result of publication costs, books must keep illustrations, diagrams, and tables at a minimum. Additional graphics add little to the production costs with computers because graphics are stored in the same way as text. Computers can produce multi-colored illustrations at a fraction of the cost for similar illustrations in a book. Illustrations can be animated for

continuous movement. The steps can be accelerated, reversed, or decelerated to emphasize important changes (Geoffrion 9).

Another computer function is the use of on-line reading tools. Computers have the ability to display a definition in the corner of the screen without interrupting the text. It does not interfere with continuity as does looking in a dictionary. Computers have great speed. They can locate, record, and sort information quickly and perform calculations in millionths of a second. Also, computers provide text manipulation tools such as word processors which build connections between reading and writing. The variety of computer functions more than explain the excitement over the use of computers in the reading programs (Geoffrion 10).

The idea that computer instruction is effective is widely accepted. There is no doubt that computer based instruction is effective. It has proven to be effective for a wide variety of reading skill and concept areas. There is also no doubt that computer based instruction is more effective than other methods. However, this statement must be qualified. To determine the effectiveness of computer based instruction one must ask three questions:

1. What kind of computer based instruction?

2. What kind of other methods?

3. What is meant by effective?

A host of computer based instructional techniques exist. These vary from behavioral, rigid computer assisted instruction programs to free-flowing, holistic "computer-as-a-tool" approaches. An innumerable number of other methods exist to which computer based instruction can be compared. Effectiveness can be defined in a host of ways. By taking all of these considerations into account, one can decide the actual effectiveness of computer based instruction (Balajthy 56).

Many educators believe that computers are more effective than workbooks for drill and practice in word recognition and other reading skills. The basis for this statement is the fact that computers give immediate feedback. Teachers can give immediate feedback only if the class size is small enough. There are some who say computer based instruction is not better than other techniques. It is just different. The computer provides one more tool for teachers to teach more effectively and students to learn more effectively. If the teaching quality is the same no matter what the medium is being used, the achievement results will be similar (Balajthy 55).

The advantage of using a computer in the reading program lies

in the possibilities of its' power. Also, the flexibility of computers for increased efficiency and cost-effectiveness are important advantages. Human teachers can provide immediate and individualized feedback for drill and practice workbook activities; however, this is an extremely inefficient and expensive practice. Computers can give reality to highly effective learning environments by providing tutorials, word processing, and electronic simulations (Balajthy 59).

The advantages of computer based instruction are not easily refuted. The reason for the effectiveness of computer assisted instruction may lie in the fact that the computer is able to deliver focused instruction at the level of individual students. Another advantage is that the computer is able to generate problems in random order. Students encounter a fresh sequence of problems each time they run the program. Computers force learners to take an active role in learning. The students must interact with the computer because they are place in a one-on-one situation. Computers provide continuous feedback, keeping students abreast of their progress. Computers also provide an opportunity for learning in an almost private environment. Computers can build a child's confidence. The child is not forced to perform in front of the whole class, only for the computer. This is just another example

of the effectiveness of computers (Rude 7).

One of the most common related concerns of educators has to do with the effectiveness of computer based instruction and the appropriateness of the many possible roles computers can play in reading instruction. The effectiveness of computer based instruction has been discussed, but what are the roles of computer based reading instruction?

One role is that of teacher tool. Teachers can free themselves to spend more time in actual teaching. The computer can be used to manage grading, construct tests and exercises, and maintain student records. Another teacher oriented role is the management role. Computers greatly facilitate the administration and grading of reading subskill criterion tests. Grouping on the basis of test results can be carried out automatically. These roles are mainly for the benefit of the teacher (Balajthy 62).

Computers also have roles that are more student centered. One role of this type is using a microcomputer laboratory for drill and practice. Groups of students can be sent to the computer lab with an aide. This gives the students extra practice, while it frees the teacher to deal with higher level instructional matters. This role provides benefits for both the teacher and students. A role that is mostly student centered is using individualized microcomputer

"learning centers." These are used to provide instruction to individual students. The major educational application of computers in the next few years will be as tools (Balajthy 62).

There is no doubt that supplementing classroom instruction with computer based instruction is effective. Increased time on task equals increased achievement (Balajthy 55). Increased achievement is especially important for students with reading problems. Many of the most innovative computer based reading programs were first developed for and tested with remedial students to alleviate reading problems. Students can practice on an identified skill in isolation. This can help strengthen that skill (Geoffrion 145).

Computers help make reading instruction enjoyable. Computers can make interesting and amusing visual displays. Rewards become comparable to the personal effort involved. Students are getting immediate feedback. This is a one-on-one learning situation. It is simple for the student to realize that he is solely responsible for his achievement on the computer. Observations show that students work longer and more diligently during computer lessons than during traditional lessons (Geoffrion 145).

A computer can be a reinforcer itself to keep students on task. Many computer reading programs provide pictures and cartoons

as visual reinforcers for correct responses. The reinforcement is incorporated into the activity itself. These reinforcers help students develop reading skills. Immediate feedback can also be a reinforcer. The feedback keeps the students motivated and working. Computer reinforcement is a powerful tool in helping students learn (Geoffrion 146).

Other ways of facilitating learners are possible. One way that computers assist in learning is through repetitive action. The mechanistic, repetitive action of a machine is a valuable resource for some students. Predictability is important. Many remedial students need repetition for successful learning. Another way that computers help students is through learner control. Learner control is viewed as a positive distinction of computer based instruction. With learner control, learners can proceed at their own rates. Students can be provided with choices as to format and content of instruction. They can monitor their own learning and request computer based assistance with problems. Learner control is seen as a mode of improving students' decision-making abilities in learning how to learn (Balajthy 15). Computers provide many forms of assistance; however, there are some guidelines for using computers in the reading program.

The guidelines for using computers are really very basic to

all learning. Computer instruction in reading should focus on meaning and stress reading comprehension. Understanding is most important. Learners should have opportunities to work with whole, meaningful texts. They should have opportunities to work with word recognition programs that stress the use of word meanings in conjunction with phonics and structural analysis. Learners need opportunities to apply the skills being taught in some meaningful way. They should have opportunities to work with comprehension materials that use content and language that are within the students' range of conceptual development (Strickland 9).

Computer instruction in reading should foster active involvement and stimulate thinking. Learners should have the opportunity to discuss the purpose of the computer task or program as well as its' nature. They should be able to make decisions that control or influence the computer task. Learners should also be able to monitor their own learning. As well as stimulating thinking, computer instruction in reading should support and extend students' range of knowledge of text structures. Learners should have an opportunity to encounter a wide range of text structures upon which to apply and refine their comprehension skills. They should have the opportunity to experiment with text in creative ways to suit their purposes (Strickland 10).

Also, computer instruction in reading should make use of content from a wide range of subject areas. Learners should have the opportunity to use the computer as a means of applying reading strategies to all areas of the curriculum. They should have the opportunity to use the computer in conjunction with other modes of instruction. Computers can be integrated into all curriculum areas. Computer instruction in reading should link reading to writing. Learners should have the opportunity to create text with the computer for sharing and use by others. They should also be able to use computers as an information retrieval system. Good computer practice programs can be used with the existing curriculum (Strickland 10).

Good practice programs have some distinct characteristics. One such characteristic is a computer management system. With this a teacher can track students on assigned tasks. The teacher can keep close track of student progress. Immediate feedback is another characteristic of a good program. Computers can respond immediately to student performance. The programs should include self-paced instruction so that students control the rate of presentation. Varying levels of difficulty is a characteristic of a good practice program which matches difficulty with the learners' needs. Provisions for changes in difficulty level are made so that students can move

automatically to easier or more challenging problems. They need to recirculate problems that were answered incorrectly. These characteristics provide for a more individualized learning experience (Balajthy 74).

Other characteristics exist that are necessary if a practice program is expected to be good. Computer programs need to provide interesting, game-like activities that maintain student interest. Many use a video game format. Programs also use interest-arousing graphics which add color and interest to the program. In addition to the use of graphics, teacher utility is seen as an important aspect of a computer program. Teachers should be able to customize the program to fit the unique vocabulary and language needs of individual classrooms. Programs that do not correspond to the specific needs of the classroom are of limited usefulness. The final characteristic of a good practice program is active thinking and involvement on the part of the student. Students learn better when they are actively involved in the learning and when led to think about what is being learned. Computer programs must contain the previous characteristics if they are to be used successfully in a reading program (Balajthy 75).

When using good computer practice exercises in the classroom some guidelines should be followed. Exercises should be used in an

individualized manner. Progress charts should be kept as motivational devices. Teachers should intervene when necessary as no software is completely self-sufficient. Teachers should always become personally familiar with the program before using it with students. The teacher should try to transfer the computer learning to holistic language exercises in reading. Computer practice exercises should always pertain to the classroom learning environment (Balajthy 77).

The characteristics of a good computer practice exercise have been explained; however, one needs to know what kinds of computerized exercises there are available. One type of exercise is mainly reinforcement oriented. This is designed to promote accuracy of performance. The goal is one of teaching as opposed to practicing. Drill exercises are used to provide a lot of practice and emphasize fluency. Another type of exercise is with a randomly ordered presentation of preconstructed problems. This can give some new life to old exercises with a student who is working through a series of problems for a second time. Learning benefits are reinforced from the varying order of presentation (Balajthy 72).

Another type of computer exercise is linear programs. These programs present exercises in an unvarying order to each student. It works best if the order of problems moves from less complex to

more complex. Self-paced exercises are programs developed for instruction or reinforcement. They are most flexible when designed to accommodate themselves to each student's learning rate. One more exercise is one that is timed. With this type of exercise, there is an emphasis on rate improvement. The final type of exercise is a game-like exercise. Game-like exercises increase motivation by presenting drills in a game format. All of these computer practice exercises form the basis of computer educational curriculums (Balajthy 11).

The reading curriculum consists of various skills. One such skill area includes comprehension skills. The primary reason for learning to read is to gain a deeper understanding of the world in which we live. We can only do this if we have well-developed comprehension skills. Many computer programs are direct copies of workbook exercises. The immediate correction of errors is the only difference. In this case reading is reduced to a memory contest. There is no use of comprehension skills. Comprehension consists of four interrelated elements: vocabulary, language skills, schemata, and manipulative skills (Geoffrion 79).

The first aspect of comprehension is vocabulary development. Understanding the meaning of individual words is the first component of reading comprehension. Vocabulary is an extensive component. The

number of different words that the reader must comprehend is vast. Vocabulary can be developed through vocabulary drills. Multiple choice vocabulary drills are the preferred instructional activity for computer based vocabulary development. In a vocabulary drill the reader selects synonyms for a word from a group of words. Words are not presented in isolation. Repeated presentation of isolated words could lead students to conclude meanings lie in words themselves and ignore the intensive aspect like traditional workbooks. Another method for developing vocabulary skills is through the use of a word processor. This can be the basis for innovative approaches to intensive vocabulary development. Students can use the same word with its' various meanings in text, then replace that word with another and see if it works in any context. Understanding vocabulary is essential to comprehension as is language skills (Geoffrion 79).

Developing language skills involves surface grammar. Computer drills displaying individual sentences on a screen are typical for teaching grammatical skills. One computer program that works with grammatical skills is Reston Publishing's <u>Sentence Maker</u>. This is a motivational game that is instructionally useful. Students enter guesses by typing complete sentences, providing them with practice in sentence formation. Some believe surface grammar activities ignore meaning. They treat grammar as a collection of abstract

sentence patterns. Regardless of these opinions, language skill development is seen as important for comprehension (Geoffrion 83).

Schematic development is also seen as important to comprehension. Few commercial software programs make use of a student's schemata in comprehension development.These programs assume that questions that draw on prior knowledge are inadequate measures of reading comprehension. Students' responses may be correct as a result of general experience rather than reading comprehension. However, there are some activities that are believed to assist with schematic development. These activities are computerized cloze activities. In cloze activities words are periodically omitted from the text and replaced by blank spaces. Readers must infer the missing word from the surrounding text. Exercises such as this help develop students' schemata (Geoffrion 87).

The final interrelated element involves manipulative skill development. Manipulative skills are based on the ability to manipulate language components that include recognizing grammatical structure in a passage, relating the information to internal schemata, and remembering, predicting, and evaluating new information. It is extremely important that students are able to successfully manipulate these components. Drill and practice is the

most frequently used approach to develop manipulative skills. Most drill and practice exercises merely indicate whether answers are right or wrong, while those programs that repeat the information that disproves the answer are more helpful to students. These kinds of exercises are the most beneficial to student development of manipulative skills. When all of the interrelated elements of comprehension are combined what results is a complete comprehension program provided by a computer system (Geoffrion 94).

Computers can serve many functions, one being as a tutor. When computers act as tutors interactive learning is the focus. These computer programs require users to participate actively in the learning situation. This can be done by testing hypotheses, chatting with the computer, creating with language, or engaging in problem solving. In a study done in 1985, MicroSIFT data base was searched for software packages developed for reading and language arts. It was found that seventy percent of the software packages offered drill and practice exercises. Of the one hundred and five programs reviewed, only seven dealt with whole text and interactive learning (Strickland 84).

The largest number of programs were drill and practice programs. This situation developed because this type of workbook style lesson was the easiest to program. Drill and practice software

supplements previous instruction or teaches rules and concepts so that students develop an understanding of the skill or concept provided. The software's objective should be to facilitate learning as an outgrowth of, or prelude to, teacher instruction (Strickland 61). Drill and practice programs do not teach. They allow students to practice what has been taught (Kinzer 227).

Unlike drill and practice exercises, interactive software promotes active student participation. It also offers a whole text approach. Interactive software is designed to elicit student reaction to the text presented. It encourages divergent thinking. The computer is seen as a tutor, providing exercises or questions. Tutorial programs are intended to teach, then drill. This type of programming is useful for students who need an alternative presentation or additional instruction. Interactive learning takes many forms (Strickland 61).

One form through which interactive learning can occur is through simulations. Simulations provide students with experiences where learning can take place in ways approximating learning in the real world. Computers can provide interactive concepts through simulations where students can try new concepts, see the consequences, and refine their ideas. Generally with simulations in reading or language arts, students assume the part of a character

within a story. The student then makes decisions that influence the outcome. In simulations, the student is in control of the learning situation (Kinzer 228).

Another form of interactive learning is through word identification activities. This is the most popular type of computer based reading activity. It includes two related components: translating the printed symbols into speech sounds and recognizing these sounds as meaningful words. This is a utilitarian tool used to facilitate comprehension. The advantages of using computers for word recognition practice are evident. Computers are infinitely patient. They do not tire of repetitive instruction like humans and allow students to take their time, providing as much practice as needed. Little ego is involved on the part of students when being corrected by the computer. No personal judgements are made. Students are simply told whether they are correct or not. This does not remove the motivation provided by using computers and interactive learning (Geoffrion 63).

Other activities that provide interactive learning can include those that involve isolated words. Spelling games are useful for word identification. Students are made more aware of the internal structure of words. These programs are most successful when reading is combined with spelling. Combinatorial games are those in which

students are presented with two or more lists containing word parts.
Students combine parts from each list to create whole words. In some
programs students can direct the computer to display clues and move
the cursor to build words from the parts. When a correct word is
formed, the computer merges the two parts and displays a definition.
Isolated word exercises lay the basis for comprehension of text
(Geoffrion 68).

Phonic drills are used in somewhat the same way as isolated
word drills. They concentrate on single words; however, unlike
other word drills phonic drills concentrate on word sounds. These
drills give students practice focusing on sound-symbol regularities.
Computers rely on non-oral phonics instruction. One type of phonics
drill displays a picture on the screen along with four letters. One
letter represents the beginning sound of the picture's name. Other
programs include sound matching activities in which students pick
from a group of words the one containing the same sound as the
target word. This type of program can be used for practicing initial
word sounds, ending sounds, or rhymes. Activities must truly be
sound matching. In another drill, readers are asked to discriminate
between alternative sounds for a given letter. These drills must
take into account semantics and context clues to be useful. These
drills do involve the student in an active role (Geoffrion 64).

Various types of computer programs can be used for interactive learning. One such program is computer mail. This program is very popular among students. Students enjoy reading and writing letters. This is an extremely motivational way to get students interested in reading. Dialogue programs are similar to computer mail. With these programs two users converse directly by typing messages on terminals. Messages are transmitted as they are typed. Students may converse with the computer itself which simulates human conversation. Reading and writing are used to communicate. This is another way to motivate students to read. Students can see the necessity of reading to communicate (Geoffrion 107).

Another avenue of interactive learning is through adventure games. Adventure games can serve a valid reading function. They are highly motivating and very challenging. An adventure game is a high interest reading activity for a number of reasons. One reason is that there is an absence of wrong or right answers. Error messages are friendly and non-threatening. This is important for reluctant readers or children with poor reading ability. Significant freedom of response exists which makes the games accessible to even students with poor writing and reading skills. The adventure game concept makes a nearly infinite variety of exciting stories from a small set of commands. Adventure games are particularly useful for children

with limited reading and language skills. They provide the needed diversity by changing the plot each time the program is run. Adventure games for school reading programs need to be developed especially for school use. The games must have less violence with simple narratives and relatively easy solutions. Adventure games can provide a valuable resource in getting students interested and involved in reading (Geoffrion 111).

The final avenue of interactive learning to be discussed here is cloze exercises. Cloze programs require students to use sentence syntax to determine appropriate answers. Some cloze programs give the students a choice of words that could be used to complete a sentence. Other programs require the student to complete a sentence with a word of his own. Either way, the student must be able to use context clues and comprehend the general meaning of the sentence to be able to choose correctly. The cloze technique does have definite advantages. It requires students to integrate meaning across sentences and provides opportunities to understand extended passages. Cloze exercises require the use of a variety of contextual analysis strategies. They provide practice in a number of areas related to reading comprehension. Students must use predictive strategies to carefully complete the exercises. Finally, students develop test taking skills as a result of cloze activities. There

are programs that cover a range of skills like cloze activities and those that are more individualized (Rude 77).

Some computer programs are designed not only for different skills, but for different age groups. Software is designed for primary and upper elementary age groups. Each group has different learning needs and abilities. When selecting software for kindergarten and primary use there are some specific guidelines. Software for this age group must allow the learner to manipulate language symbols in meaningful ways. It must stimulate thinking along with language skills. The programs must be interesting and entertaining enough to inspire practice. The final stipulation is that the instructions must be clear enough for a child at the designated developmental level to follow independently with ease. These characteristics must all be evident for a computer program to be deemed appropriate for use with primary students (Strickland 84).

The criteria for selecting interactive software at this level focuses on the ability of the computer programs to allow children to manipulate language symbols and to use language and thought creatively. One interactive program is <u>Story Machine</u>. It involves children in reading and writing activities. Using a dictionary of forty-five words, the program allows children to write sentences,

paragraphs, and short stories which are animated on the screen. The words include articles, nouns, verbs, prepositions, adjectives, pronouns, and possessive pronouns. The vocabulary is limited; however, beginning readers enjoy experimenting with it. In the process of experimenting with the vocabulary, the students' reading vocabulary is extended and an awareness of sentence grammar is developed (Strickland 84).

Another computer program for primary students is <u>CARIS</u>, Computer Animated Reading Instruction System. This system introduces reading skills to very young students. It uses a whole word approach in which students form brief sentences using words selected from lists of nouns and verbs. The sentences are then animated on the screen. Pictures help reinforce meanings of the words and sentences created. Spelling skills are visually and kinesthetically reinforced. This type of program has a high motivational appeal (Strickland, 86).

Other programs for primary students are motivational as well. One of these programs is <u>Kid Writer</u>. It allows children to create pictures and write stories to go with them. This program is not limited to a certain number of words. There is so much flexibility because of the ninety-nine objects and five or more scenes, objects, sizes, and colors available. The program is open-ended and

stimulates curiosity. Another program, <u>Questions and Story</u>, asks children about their name, favorite color, activity, and friend. The answers are incorporated into a story. Students can create different versions of their own stories. This program is a very motivational program because the program is so personalized (Strickland 86).

As well as the previous programs, the <u>Language Experience Recorder</u> is a program for primary children. This program uses dictated material by students to launch the children into reading. This program also enables the teacher to enter, save, and recall dictation on screen or on a printout, providing an excellent opportunity to model revision and editing for children. The students read their own dictated stories. Another program, <u>Creatures of the Night</u>, is a multimedia package. It consists of a forty-eight page "I Can Read" book, a matching read-along cassette, and a micro-software disk with four learning games related to the story. The software program itself is not interactive. It acts as a stimulus for the students to become involved with the book as a source of information for answering questions in each of the comprehension games. Before using the computer program, children are instructed to read the book or listen to the cassette or use the two together to help with comprehension. These programs help students with

reading and comprehension skills (Strickland 88).

Yet another computer program that teaches reading skills to young students is the Writing to Read program. It is a multimedia literacy program for young children. Writing to Read teaches students that what they can say, they can write, and what they write, they can read. The program uses forty-two phonemes as building blocks. Students can get onto paper any word they can say. They can write the two thousand words in their speaking vocabulary. The lab time is a total of one hour per day (Vernot 39). Fifteen minutes is given to instruction at the computer. Color images on the computer screen are accompanied by spoken words to help children recognize and type the forty-two phonemes. After each computer session, children listen to the same lesson at a tape recorder as they enter responses in a work journal. They then listen to a tape recorded story as they follow along in a book. The fourth fifteen minutes is spent at the type writer where they can type whatever they wish. Motivation is the key to the success of this program. It is one of the most popular reading programs for primary students (Strickland 66).

Programs for upper elementary students are also motivational and educational. The programs are based on reading concepts to be taught. One type of reading program deals with phonics. This program

is <u>Word Families</u>. It deals with three reading skills: recognition of initial consonants, final consonants, and medial vowels. A word is displayed at the top of the screen with one letter underlined. Below the word are four additional letters. The student must choose the letters that would form other words when substituted for the underlined letter in the target word. As the letters are chosen, the words they form appear at the bottom of the screen. A clown face appears after several correct responses. <u>Fundamental Word Focus</u> is another phonics program in which students identify word endings to form complete words. Both programs deal with the phonic make-up of words (Balajthy 62). To understand phonics, students should know the appropriate sounds that constitute the words. The students should know that decoding is occurring (Rude 69).

Besides reading programs that deal with phonics, there are those that deal with structural analysis. Structural analysis skills include dealing with such topics as contractions, affixes, plurals, synonyms, antonyms, homonyms, and similar skills. These programs include introductory lessons, a review, a word-building activity, and games. Words are presented in sentence contexts. One program is <u>Word Division</u> in which students divide words into morphemes. A word is displayed that must be divided into its' meaningful parts by positioning a cursor at the appropriate spot

in the word. If the word is correctly divided, the next word appears. This is another example of a program that stresses structural analysis (Balajthy 64).

Numerous programs center on structural analysis. Homonyms is a program that contains twenty lessons and includes words like son/sun, hear/here, and knight/night. A short tutorial lesson precedes each drill and practice section. Homonyms in Context is a program where students select homonyms from two levels. Students must choose correct words to complete each sentence. Another program, Word Master, is a game program where eight words are arranged in a circular fashion around a target word. Students are to identify and destroy all homonyms. This is a good practice program; however, it does not use words in context. Another program for structural analysis is Hartley's Antonyms and Synonyms. This program includes twenty-one different lessons from third to fifth grade reading levels. The program first describes synonyms or antonyms. It then shows examples and finally provides practice exercises. Students can analyze their errors. Teachers can add their own word lists to the program. These programs do well in assisting students with structural analysis skills as do the following (Rude 69).

The first program is Prefixes. It provides a substantial

introduction to prefixes before the drill segments. There are seven

lessons on five different prefixes. The program first defines the

prefix, then shows examples, and then gives more instruction. The

computer gives animated illustrations. Students must select the

appropriate word from a sentence context, somewhat like another

program, Contractions. This program covers the use of basic

contractions. It is used as a tutorial. The computer program

requires the student to spell contractions of words on the screen.

Later in the program students are given exercises that require them

to identify in sentence context the two words to be contracted.

Feedback and on screen scoring systems provide a high degree of

motivation. The last program to be discussed in the area of

structural analysis is Sentence Combining. This program has a two

disk package that requires students to combine sentences using

words such as and, but, before, and after. By using the modelling

approach, these lessons introduce the skill to be taught and then

provide a demonstration of how the skill is to be used. Using this

program develops students' sentence sense, sentence fluency,

selected usage, and transcription skills. This program brings a lot

of the skills in structural analysis together. Vocabulary programs

are related to structural analysis programs (Rude 72).

Presently, computer instruction tends to foster teaching of

vocabulary as distinct from other educational areas. The vocabulary must be relevant to the educational setting. Word Attack is a program where words are presented along with definitions and sentences. Once the words have been studied, students are quizzed by a presentation of words and definition options (Balajthy 69). Another program for vocabulary development is Vocabulary-Elementary. This program uses a cassette control device to permit the cassette recorder to supply aural stimuli while the printed word appears on the screen. This assures accurate hearing of the correct pronunciation. Responses are stored on disk. Vocabulary-Dolch is an additional computer program that drills students on 220 Dolch Basic Sight Words using a cassette controlled device. First, words are presented on the monitor. Second, students say the words and third, the cassette plays the words. Students then indicate whether they know the word and their response is stored. This program does not allow for individualization of word lists; however, it does increase the students' background vocabulary (Rude 67).

A program that does consider relevant vocabulary development is Create-Vocabulary. With this program the teacher can add personalized vocabulary to the disk. Included can be basal reader or content area textbook vocabulary. Unlike this program, many vocabulary programs focus on sight vocabulary. These programs teach

the most frequently used words in the English language. One sight

vocabulary program is Fry Instant Words Program in which students

are presented with a target word for study. The word then appears

repeatedly with missing letters. Students must identify the word.

A different kind of program is Word Wise. In this program students

match words with high resolution pictures. The final program for

practice with sight words is Word Radar. This is a matching activity

where common sight words are presented at the bottom of the screen.

Students use arrow keys to move the cursor and reveal hidden words,

then press the space bar when a match is found. All of the

vocabulary programs have the main purpose of building students'

background vocabulary. A strong base of vocabulary knowledge can

greatly influence the level of comprehension (Balajthy 64).

Comprehension skills are also covered in computer programs.

One computer program, Comprehension Power, has a traditional skills

approach to teaching comprehension. This forty-eight diskette

program covers twenty-five major comprehension skills from literal

understanding of details and sequences to identifying mood and

tone. In this program students select a story. After they are shown

the story and have previewed it, they are quizzed on recollection.

Next, they move onto the story segments section of the program. A

pacing option presents words on the screen from between fifty and

six hundred and fifty words per minute. Comprehension questions are presented at the conclusion of each section (Rude 78).

Some comprehension programs are not as traditional as Comprehension Power. There are comprehension programs that follow an adventure-type scheme. These programs are considered interactive. They do not include predetermined skills lists or traditional comprehension exercises. These programs rely on developing comprehension through student involvement. Troll's Tale is an adventure comprehension program. Readers wander through an enchanted land where at each turn they must make decisions as they try to find the sixteen treasures. Students learn map reading skills as well as developing inferential and predictive comprehension strategies. This is a program that promotes development of comprehension skills; however, a fine line exists between programs that provide legitimate comprehension strategies and those that resemble paper and pencil assignments. Teachers must decide the quality of the software and its' usefulness for all areas of reading (Rude 80).

One area of reading in which there are relatively few software programs is study skills. Only six percent of the commercial reading software is designed to teach these skills. There are very few materials on reference skills such as using dictionaries and almanacs. Study Skills: Alphabetization Sequences focuses on how

to teach students to find resources listed alphabetically. Students
list words in alphabetical order by the fifth letter. Data bases
can be used to teach students how to find and retrieve information.
Data bases can list information from reference materials for easy
retrieval. The use of maps, graphs, and tables are also study skills
that need attention. Hurkle is a program that teaches coordinates
on number-letter grids. This is a skill necessary for reading
graphs. There are not many other programs that deal with these study
skills. Although study skills are considered an important part of
the overall reading program, there is not a relative amount of
emphasis placed on computer programming in this area (Rude 86).

All reading programs have the intention of improving student
reading skills in whatever area they cover. We, as teachers, must
decide the effectiveness and usefulness of computer reading programs
in the classroom. Computer assisted instruction is not the panacea
for students' struggle toward literacy. Realistically, it is an
opportunity for a new approach to an old problem (Doyle 239).
Computer reading instruction requires creativity, careful thought,
and effort on the part of dedicated teachers.

"Reading software is improving and will continue to improve,
but we still have a long way to go" (Blanchard 29).

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