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## The application of the computer to writing and reading in the classroom

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## The application of the computer to writing and reading in the classroom

### Abstract

Our society has a long-standing fascination with technology. One marvel of current technological advancements is the microcomputer. Its arrival in school systems has been regarded with awe by some and apprehension by others. When viewed and utilized as an aid, the computer enhances instruction in the language arts classroom and frees the instructor to advise students (Bradley, 1984).

THE APPLICATION OF THE COMPUTER TO WRITING AND READING  
IN THE CLASSROOM

A Research Paper

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Ronette Carnall

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## CHAPTER I

### INTRODUCTION

#### Interest in Computers

Our society has a long-standing fascination with technology. One marvel of current technological advancements is the microcomputer. Its arrival in school systems has been regarded with awe by some and apprehension by others. When viewed and utilized as an aid, the computer enhances instruction in the language arts classroom and frees the instructor to advise students (Bradley, 1984).

With the advent of computers in the classroom, there was a rush by companies to market software. Early efforts in the reading and language arts area concentrated on tutorials, drills, and practice exercises. Software programs which feature rote instruction of discrete skills have disappointed language arts teachers. Some students regard computer drills to be as mundane as paper drills once the novelty of the computer has passed. This is not to say that computerized drills are without merit. Some students may be motivated by the sound capabilities, graphics, and interaction that are possible with the computer but not with paper and pencil (Balajthy, 1985). Other ways of utilizing the computer exist that possibly may be more effective than drill.

#### Potential of Computers

Some possibilities to be considered by language arts teachers are simulations and problem-solving programs, word processing, electronic

mail, and data bases. Computer programs which fall in the realm of simulations and of problem solving present students with realistic reading situations. Simulations foster creative thinking and language growth (Balajthy, 1984; Norton & Resta, 1986; Patterson, 1987). They are another way to develop background information for the reader. Problem-solving software aids in reading comprehension improvement because students are encouraged to read for meaning to compare, to select alternatives, and to evaluate choices.

Combining a search of software catalogues and notations of instructional time use, Kinzer (1986) estimated a breakdown of typical computer use:

1. Learning about.....10%
2. Learning from.....60%
3. Learning with.....20%
4. Learning about thinking with...10%
5. Managing learning with.....0% (p. 231)

He recommended a better apportioning of time use as

1. Learning about.....10%
2. Learning from.....20%
3. Learning with.....30%
4. Learning about thinking with...10% (p. 232)

A capability of the computer which can help develop students who are fluent readers and good writers and aid in learning about thinking is word processing. Word processor programs do not actually teach students how to improve writing skills but encourage them to edit and

revise more than they might if they were writing by hand. It removes some of the chore of editing and revising (Townsend, 1987). Some word processing software contains a dictionary or speller which students can use to check the accuracy of their spelling. Dictionaries and word processors allow the student writer to concentrate on content rather than mechanics.

Electronic mail is the use of computers for interpersonal communication. Purposeful messages can be sent to genuine audiences within the same school or community, as well as nationally or internationally.

The use of computer-based data systems, or data bases, is becoming an important research skill (Patterson, 1987). Research for compositions can be facilitated through the use of data bases. Several students can feed information for a topic into the file. The information can then be organized and compared.

#### Purpose of Paper

The review of literature in this paper serves primarily to delineate the written language development activities possible with word processing, data bases, and electronic mail for a tenth-grade language arts classroom as they relate to the reading needs of students. One of the prime uses of the computer in those approaches is to provide the opportunity for composing activities that are important in developing reading and writing abilities with students.

In conjunction with an explanation of computerized writing activities, examples of existing software programs are described.

Hardware is discussed where appropriate. Ultimately, conclusions are drawn as they pertain to the interaction of writing and reading.

Questions to be explored in this survey of current literature are:

1. What composing activities are possible with a microcomputer?
2. How do computer-assisted writing activities meet the reading needs of a secondary language arts program?
3. In what ways can computers enhance the subject?

## CHAPTER II

GOALS AND ACTIVITIES OF LANGUAGE ARTS INSTRUCTION

Although microcomputers are not new to education, new uses are continually being discovered. Initial programs that limited students to contrived choices may still be a motivation to some students; however, some teachers have become disenchanted with the limitations of drill and practice activities regardless of whether done on paper or a computer. Such activities do not correspond with an interactive model of reading and writing. Desirable computer activities are those that contribute to the goals of the language arts program.

Reading-Writing Connection

One important goal is the development of writing ability. Some current research contends that reading and writing are related and develop in similar ways. Wittrock (1983) stated:

When we write with clarity we generate meaning by relating our knowledge and experience to the text. Writing also involves building relations among the words and sentences, the sentences in paragraphs, and the paragraphs in text. In these important ways reading comprehension and effective writing relate closely to each other. (p. 601)

Rosenblatt (1978) and Stotsky (1982) felt it is possible that improvements in one may be reciprocal in the other. In both activities, one is attempting to create meaning. Prior knowledge is applied and predictions are tested as metacognition occurs, not in

discrete steps, but in a continuous process (Boiarsky & Johnson, 1983). When reading, the reader is the audience as attempts are made to interpret an author's intended message. The student-author's job is to achieve some degree of congruence between his/her intended message and that which is put to paper.

It is important that computer activities not only address the goal of writing improvement, but also provide writing experiences in formats found to be most productive for the development of effective writing. Students must be provided with writing experiences which lead them to understand that the author should have an audience other than the teacher in mind. Several sources feel activities must present students with the idea that writing has a real purpose. Rude (1986) stated, "To practice writing, students need multiple opportunities to put thought to paper. Meaningful writing assignments require an interested audience ready to read the aspiring author's work" (p. 96). Goodman (1986) and Strickland, Feeley, and Wepner, (1987) concurred with those views and emphasized the need for whole language activities which give students opportunities to create text, experiment with relationships among sentences and paragraph units, react to meaningful text, and receive reactions from others.

Some current writing theories espouse students processing text through several stages with emphasis placed on the flow of ideas and revision, while the instructor acts as a facilitator rather than as an assessor. In reality, students focus on spelling, neatness, punctuation and capitalization, content, and organization in that

order. An instructor must emphasize ownership of writing if the generation of thoughts is to become the child's focus when writing (Graves, 1982).

These theories support computer activities which encourage students to respond to language, formulate and try out predictions, analyze information, and manipulate language. This paper will concentrate on computer activities which enhance literacy skills through modeling of those activities and student-manipulation of language rather than through assessment.

## CHAPTER III

## APPLICATION OF COMPUTER TO LANGUAGE ARTS GOALS

Word Processing

Some sources refer to two categories of computer programs as tutors and tutees. Tutors teach, often through drill and practice, and sometimes provide an opportunity for the user to interact. Tutees allow the user to learn while being the computer's teacher (Balajthy, 1986; Kinzer, 1986; Strickland et al., 1987).

One type of tutee is a word processing program. Sometimes called text editors, they are programs that allow the user to enter text, manipulate language, and correct errors through a series of commands. Those commands vary somewhat from program to program, but the functions made possible are similar. The user can insert information in previously entered text, delete information no longer desired, and move words, sentences, or entire paragraphs to new locations. Adjustments in margins, spacing, pagination, font size, and numbers of copies can be made at any time (Balajthy, 1986). Text is stored in files on the diskette for future retrieval.

Dudly-Marling (1985) surmised that students may be reluctant to write "because good writing requires editing and editing requires recopying, which is tedious and may even be viewed as punishment" (p. 390). The underlying philosophy of process writing is to encourage students to write for a reader, that is to work a piece of writing through several revisions into a readable text. In a study of

teachers who used word processors, Daiute (1982) found that children writing on paper discarded sheets when errors were made, were concerned about neatness, avoided lengthy writing, and in some cases found handwriting physically difficult. In 1984, Miller mentioned an Ontario survey by Canale, McLean, and Ragsdale (1983) showing that, although there is a call for improved computer writing software, teachers continue to use grammar drill software. He highlighted a drawback of such software as leading students to think only one approach to writing exists. Word processing software removes this limitation.

Many word processing programs exist and range from the very simple for elementary children to the complex for older students and adults. Eiser (1985) made the point that powerful programs may be purchased and students can be exposed to different aspects as they mature and move through school.

A wide variety of composing activities is possible with word processing. One activity is a language experience approach (LEA). A traditional LEA activity begins with the instructor providing a stimulus, perhaps a picture, and then writing a child's story on chart paper as it is dictated. As students become proficient at doing an LEA activity, group stories might be created and recorded without teacher help. Eventually, individual students are capable of carrying out the activity.

Problems sometimes faced with a traditional LEA activity have been the recording by the teacher of different words than dictated by

the students and the tediousness of recopying when revising. Without teacher supervision, students avoid revision because of the monotony associated with recopying (Smith, 1984).

Several sources (Balajthy, 1986; Rude, 1986; Smith, 1984; Strickland et al., 1987) described the use of word processing with the LEA to overcome these problems. Newman (1984) and Smith (1984) acknowledged that the LEA can be carried out effectively with paper and pencil, but it can be done more efficiently with a computer. Students can process and change language with a speed not possible when writing by hand. Smith also noted that increased language play was evident when students worked together to create stories.

When the LEA is done in the traditional manner, the finished product is used as a reading activity. The benefits of this stage of the LEA could be increased when carried out through the computer because more reading is taking place in connection with more revision. An awareness of word choice and getting a message across becomes heightened. Strickland verified this by saying, "The text can be read back immediately from the screen" (p. 14). She did admit that in an experiment with a student named Bill, "We cannot report that Bill learned to read better because we used a computer, but we can say that combining LEA with word processing allowed us to do a great deal of on-the-spot teaching, quickly and easily, as we manipulated text" (p. 17).

In a review of articles, Smith (1984) stated:

We nor the authors discussed here concluded that the microcomputer and the word processing/LEA will immediately yield vast improvements in students reading/writing skills. We did conclude, as did the authors, that good reading/writing instruction that occurs without the computer can be still better with it. (pp. 9-10)

Hawisher (1988) reported on an activity called "computer day book." She integrated the teaching of word processing use with writing. Students responded on the computer during in-class writings to questions posed by the teacher concerning word processing and process writing. This is a prime example of learning to use a computer, creating text, and employing reading skills.

Several sources discussed the stages in process writing. Following is an actual lesson plan Balajthy (1986) presented combining process writing with a text editor:

1. Student develops a purpose statement for the writing experience.
2. An informal outline of the composition, one major idea for each projected paragraph, is typed using the WP and printed for reference.
3. Student examines and revises outline for logical order and fulfillment of the purpose statement. Consultation may be held with the teacher or peer advisers for their input.
4. Using the revised outline as a guide, the student composes the first draft, entering and saving the draft in a file.

Little or no attention is paid to mistypings, grammar, spelling, punctuation, or other mechanical aspects of writing. The main purpose is to get the ideas into the file.

5. Close examination of this first draft will reveal shortcomings. The student revises and refines, adding and subtracting to make the point clear. Mechanical changes are made at this point. This step will require more time on task than needed to write the first draft.
6. The teacher or student consultants examine the revised text. Each loads the composition onto a terminal (the draft completed in step 5 remains intact in the file on diskette) and types in comments or suggested revisions. These consultative revisions are then saved onto diskette.
7. The writer examines the consultants' comments and suggestions, incorporating worthwhile revisions into the draft. This final draft is then saved onto the student's personal diskette and, if desired, made available to the class for reading and other activities on a diskette to which all students have access. (pp. 123-124)

Balajthy emphasized that written products must still be read and reacted to by humans, no matter how marvelous the program is.

Newman (1987) reported on an activity which combines response-based literature with glossing. She referred to it as "cocreating a text." The instructor enters a piece of text on the word processor. Then a student works through the piece by inserting reactions in the

form of questions, comments, and interpretations. In one respect, it is similar to a reaction journal. Students may carry out the activity alone or with someone else. Newman concluded, "This activity underscores the fact that reading is an interpretive process as well as highlighting the role of writing for making sense of experience" (p. 113).

An innovation which helps shift student attention away from mechanics and toward ideas is the spelling checker. In some cases, these automated dictionaries are built into word processors. By initiating an appropriate command, a list of words from which the user can choose will appear. New words may be added to and stored in the dictionary for future spelling checks.

Spelling checkers are not a panacea for people with spelling problems since words not in a program's dictionary are identified. Since any word not in a program's dictionary is identified as a possible misspelling, the student-author then must ascertain whether or not the appropriate spelling has been used.

Balajthy (1986) emphasized that by teaching students a process, students learn to write in stages.

"Error-checking programs help students learn a step-by-step approach to revising, concentrating on one problem area at a time. If the student realizes that spelling and grammar will be analyzed later on, he or she is free to concentrate on composing. Focusing on the task at hand makes greater success

more likely because demands on limited cognitive capacity and attention are not overly taxing" (p. 124).

Many other composing activities using word processing have been identified. Possible projects identified by Rude (1986) include newspapers, recipes, letters and messages, lists, diaries, journals, and sentence combining. In any of these activities students are working with real, meaningful language rather than something already programmed. Results of these activities can be saved for future use. The number of activities is limited only to those which can be done on paper; therefore, the possibilities are virtually limitless.

Several points must be made in closing the discussion of composing with word processors and the affect on reading. Miller (1984) found that word processors allow human interaction and the use of teacher talents. They encourage a whole language approach, but it is up to the teacher to assure it is used in that manner.

An interest in the machine and how to use it cannot override its role in process writing. Teachers must model the attitude that the computer is an aid; it is not in control, not a thing doing the teaching (Bradley, 1984; Smith, 1984).

One usefulness of word processing is the ease of reading and responding to papers. For students who have never mastered the motor skills necessary for legible writing, a word processing program removes one obstacle. Printouts are easier for students to read when responding to each other's papers (Blanchard, Mason, & Daniel, 1987; Collins, 1983).

Newman (1987) felt that results of writing activities improvised with a word processor in workshops conducted by her capitalized on the relationship between reading and writing. Strickland et al. (1987) made a strong statement concerning word processors and the reading-writing connection.

It becomes obvious that word processing with computers is highly linked to reading development. Composing one's own text structures is an important way to demonstrate how such structures are understood. While it may be possible to perform many computer activities without thinking about writing, it is virtually impossible to engage in word processing without reading. A great deal of reading occurs during writing, particularly at the revision and proofreading stages, which word processing helps us do more efficiently. (p. 9)

Tierney and Ley (1986) also observed that successful writers integrate reading into their writing experience, and Blanchard et al. (1987) stated that comprehension will be increased "through increased attention to wording and the structure of compositions" (p. 100).

Higher-level thinking skills of analysis, synthesis, and evaluation are encouraged because revision, editing, and publication become easier and free students to concentrate on the effectiveness of the message. "The computer itself doesn't teach this attitude toward revision, but it does make revising a lot easier" (Brannan, 1984, p. 24). Because an awareness of purpose and audience are built, chances of the intended message being the actual written message are improved.

An interesting variation was presented by Marcus and Blau (1983). They suggested improving student writing by dimming images on the computer screen so they become invisible. Their theory is that students will focus on creating if they cannot see what is being typed. No mention was made of any benefit to reading needs if the text is not being read and manipulated during the creative process.

Certain problems unrelated to writing and reading processes may occur in using the computer for word processing. The problems with keyboarding, commands, numbers of characters per line, and printers are inherent because of the mere mechanical nature of the tool (Blanchard et al., 1987; Rude, 1986).

One possible problem noted by Smith (1984) was the position of the screen. Rather than positioning the screen toward the typist, it should be angled toward those dictating the story.

#### Electronic Mail

Another possibility for the development of students' writing and reading abilities with the microcomputer is electronic mail. Questions or reactions to assignments, letters, and any other type of message may be sent, whether it be communications between student and teacher or among students. Some commercial programs exist for the express use of electronic mail; however, purchase of such programs is not necessary for implementation of the composing activities associated with computer messages.

In commercial programs, each student may be assigned a user number or code name. When students or the teacher decide to send a

message, it may be accomplished with relative privacy. When it is necessary or desirable to send notices to a group, a video bulletin board may be set up just for such a purpose. If the expense of the necessary hardware can be shouldered, a school can be linked to national and international electronic bulletin boards. Linking, or networking, is done with a telephone modem. Students' opportunities to create and receive messages are greatly increased.

It is possible to create a simplified system for electronic mail in conjunction with word processing programs. Each student may be assigned a file on a diskette. The process of calling up each student's file may be slightly less efficient than in networking, but the opportunities for communication are not limited. The inefficient aspect of the use of word processing programs is the necessity of each student loading his/her own diskette rather than being able to log on to a central computer.

Dunkeld and Denny (1986) reported the case of a seemingly bright boy, Tom, who for whatever reason was a nonreader. When his parents paid for a hook-up to an international bulletin board with their home computer, the boy became fascinated with sending and receiving messages. He eventually developed a bulletin board system for use by his family. As Tom became more proficient in the use of electronic mail, the recursive skills of reading and writing showed evidence of growth and development.

Unlike some of the artificial exercises assigned in school, Tom's work on the computer required him to generate messages that could be understood and to understand the messages he received....

His story is also yet another instance of reading and writing supporting and complementing each other's development. (p. 714)

The variety of written language development activities possible with electronic mail is interesting, ranging from the simple to the more advanced. One of the simplest activities is the sending of a note from one student to another. The nature of the note may be quite personal or may be a request by a student to have someone peer-critique a piece of writing.

Collins (1983) described several other activities with message systems. One activity was an "interschool club." He used the examples of dinosaur, book, and joke clubs. Club meetings would essentially be held via electronic mail. As Collins stated, "Club members must make themselves understood in writing, or others will always be misinterpreting them and asking what they mean" (p. 22).

Another suggestion by Collins was the use of computer bulletin boards to electronically post pertinent notices about meetings, events, and assignments. A variation of this would be the sharing and solving of personal problems through a video version of a newspaper column.

A third activity presented was the writing of a "Group Epic." Collins explained the activity as:

A student or teacher starts a story, with a beginning episode that has the potential for leading to a long adventure. Anyone

can add a new episode to what has already occurred.

Announcements would go out to all the Group Epicures whenever a new episode has been added. At any time, anyone can read a group epic, or add to it, or change it. (p. 24)

Newman (1986) used electronic mail as a means of sharing her dialogue journal with students. She would communicate her reactions to assignments and comments about class activities; students reciprocated with their own questions and comments.

As with word processing programs, the use of message systems to aid in writing and reading development makes a creative instructor a valuable and necessary tool. Like any computer resource, there are strengths and limitations. A primary strength is the opportunity for genuine communication that is purposeful and meaningful (Dudley-Marling, 1985; Newman, 1986; Wood, 1985). Other advantages are the focus on clarity of expression necessitated by the nature of communicating with an unseen person (Collins, 1983; Newman, 1986), spontaneity of expression, an increase in the volume of writing, and increased interpersonal communication between student and teacher (Newman, 1986).

Other than costs associated with hardware and software, the main disadvantage in using the computer for electronic mail is for the teacher. Responding to messages from students is time consuming, but a bearable limitation when weighed against the benefits to language development. Strengths and weaknesses highlighted in the discussion

of word processing programs would also be applicable to electronic mail

### Data Bases

Referred to as "electronic filing systems" by Balajthy (1986), "resource banks" by Strickland et al. (1987), and "electronic notecards" by Rude (1986), computer-based data systems, or data bases, accompany some word processing programs. Like word processors, data base programs permit the storage and retrieval of information. Unlike word processors, data base programs have the capability of sorting and categorizing information.

An important aspect of data bases is their potential as information retrieval systems. Hook-ups can be accomplished with a modem or through a cable television service. Modem hook-ups are expensive because students pay for each on-line hour of use. Cable hook-ups are less expensive because school districts can pay a reasonable monthly fee.

Data bases range from the simple to the complex. In simple versions, descriptors may be supplied by the company or the instructor. In more complex programs, students may supply their own descriptors and determine the categorization of information. In the process of labeling categories, organization similar to webbing or mapping is occurring.

A relatively simple but effective employment of a data base is the creation of a video library (Collins, 1983; Rude, 1986; Strickland et al., 1987). After having read a book, students may feed in such

basic information as title, author, publication date, and subject as well as a brief reaction to the book. Other students may then consult the file when in need of an idea for selecting a book to read.

Strickland et al. (1987) provides an example of students retrieving and reading a movie review, the structure of a review is modeled for the readers. She commented, "We could see an excellent reading-writing activity emerging from this specialized use: children writing group-composed and individual reviews of favorite movies after sharing those read" (p. 55).

Strickland et al. (1987) suggested that students might use a data base system as a resource bank when doing research to ascertain references and the kind of information contained therein. She also stated that students could utilize data bases to cross-reference and organize information gained during the research.

The next step after reading information, taking notes, and organizing the information into a data base file is to retrieve the information. A natural progression would then be to utilize a word processor to synthesize the information by writing.

Two familiar points tend to resurface in the literature concerning data bases. Balajthy (1986) felt that the teacher is a key element in the effective application of this computer capability. Rude (1986) stated that "Data base use is limited only by the imagination of the user" (p. 86).

Collins (1983), Levin (1985), Rude (1986), and Strickland et al. (1987) concur that a benefit of data base use is the aid students

receive in classifying, comparing, and organizing their learning. The relationships of pieces of learning may become evident, and facts learned may be integrated. As Strickland stated, "We know the frustration of trying to sift through piles of paper to find the one piece of information needed to complete a thought or support an argument" (pp. 46-47). She summarized the advantages of data bases by saying they "can promote realistic reading, writing, and research opportunities" (p. 55).

Few limitations with the application of data bases were found. Other than expense, the major disadvantage is the complexity of some programs.

## CHAPTER IV

## SUMMARY AND APPLICATION

Summary

Current theories in teaching the language arts are based on the view that the language arts should be integrated during instruction. Emphasis is on the reader interacting with print, and much credence is given to the connection between writing and reading. The microcomputer is a technological advancement that can help meet the need for an integration of reading and writing experiences. Computer drills and practices do not correspond with these reading-writing theories (Balajthy, 1985). If the computer is to be beneficial to this area, activities must be something more than high-tech worksheets. It should be implemented in the language arts curriculum in a variety of ways to aid in the acquisition of language skills.

Word processors, electronic mail, and data base systems are three possibilities for the development of written language. Word processors are useful in that they ease the physical burden of composing, facilitate the writing process, permit the focus of composing to shift to the creation and synthesis of ideas, encourage a whole language approach, and promote human interaction. Limitations are mainly mechanical in nature.

Electronic mail is useful for functional communication. It encourages the focus on clarity and spontaneity of expression. Frequency and volume of writing and interpersonal communication are

increased. Cost and teacher time in responding to students' messages were two limitations.

Data base systems facilitate the organization and retrieval of information. The processes of sorting, categorizing, and comparing are promoted with these electronic filing systems. Cost and complexity of programs were two limitations.

A recurrent theme in the research on the application of computers in the development of writing and its affect on reading is the potential for providing students with the opportunity to engage in real communication which is meaningful and purposeful. Strickland et al. (1987) summed up the application of these computer capabilities by stating, "By using these tools collectively, a rich, supportive, integrated reading environment is created that invites students to use their schemata in creative ways" (p. 56).

#### Application

In order for the computer to be a viable part of the language arts curriculum, several aspects must be considered. First, the school district must assume responsibility for purchasing computers and educating the staff in their use. Many computers should be available in the classroom. When only a few are available, students must take turns, prohibiting use on a regular basis. The district must also provide inservice programs to instruct teachers in computer literacy, to give opportunities to become aware of available software, and to provide time for teachers to experiment with programs and

develop goals for incorporating the computer into the curriculum (Townsend, 1987).

Second, teachers must be facilitators of the effective employment of this technology. Educators need not be awed by the microcomputer. Computers will not replace the language arts teacher. Software programs are only as effective and as relevant as the instructor enables them to be.

Third, as software is being considered for purchase and use in the language arts program, care must be taken by teachers to obtain a variety of programs. Its use in the language arts program should not be limited to rote instruction. It should be a supplementary educational tool used to effectively and efficiently facilitate the reading, writing, and thinking processes.

The extension and application of the knowledge gained through this review of literature will be possible to the degree dictated by physical and monetary constraints. In my school building, computers are housed in a laboratory accessed by the entire high school student population. Utilization of the computers during class time is dependent on the room utilization schedule and the availability of enough computers. Although the school district is not presently connected to a telecommunications system via a modem, there is a possibility of this occurring in the near future. Computer units in the lab are already linked to each other.

More than one type of word processing program and spelling checker program has already been purchased. Those students already

knowledgeable in the workings of word processing can be utilized as peer tutors to instruct classmates in the use of the programs. Since process writing is already a part of the tenth-grade curriculum, the utilization of word processing should not present a problem.

Sophomores are already asked to complete cards with information about and reactions to self-selected books. The utilization of a data base should streamline the activity and increase the availability of the information to other students for future self-selection.

Another way to implement both a data base and word processing would be in conjunction with the required career research paper. Opportunities for interdepartmental cooperation arise: the teaching of the research skills connected with a data base system by the librarian, the guidance of the computer laboratory coordinator in the use of the hardware and software, and the guidance of the language arts instructor in the writing and reading processes.

The application of electronic mail in the tenth-grade language arts class may be the least feasible since the computers are housed in a facility separate from the classroom. Communication would be limited to within the building, and students and instructor would find it necessary to travel to the lab to send and receive messages.

The review of literature revealed the writing activities possible with a microcomputer to be many and varied with most limitations found not in the activities, but in the machinery or facilities. The reading needs of a language arts program are met through the development of fluent readers and good writers who relate their

knowledge and experience when creating and analyzing text. Computers can enhance the language arts if utilized as a supplementary educational tool.

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