STUDENT ATTITUDES TOWARD READING FOLLOWING COMPUTER-ASSISTED READING INSTRUCTION

THESIS

Presented to the Graduate Council of the North Texas State University in Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

J. Roddy McGinnis, B.A.
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The problem investigated in this study was whether students who received computer-assisted reading instruction would display positive attitudes toward reading six or more months after the instruction was completed. A Likert attitude scale was administered to thirteen pre-adolescent and adolescent subjects to assess their attitudes toward reading six or more months after they had received computer-assisted instruction (CAI). In addition, a questionnaire was administered to the subjects' parents to determine their perception of the subjects' attitudes toward reading.

Data obtained from the Likert scale indicated that the subjects' attitudes toward reading were neutral. An analysis of responses to the parent questionnaire revealed that the students' attitudes toward school-related reading were positive as a result of CAI. This study concluded that CAI had no apparent positive impact on the subjects' attitudes toward recreational reading.
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CHAPTER I

INTRODUCTION

In recent years, many of the instructional innovations conceived in the late sixties and early seventies have become unpopular amidst public demands for accountability, cost effectiveness, and efficiency in American education. Typical of educators who once espoused innovation in public education, Neil Postman, who coauthored *Teaching as a Subversive Activity* in 1969, has reevaluated his position on instructional innovation in his latest book, *Teaching as a Conserving Activity*:

The plain fact is that too much change, too fast, for too long has the effect of making social institutions useless and individuals perpetually unfit to live amid the conditions of their own culture (1979, p. 21).

While it is not a panacea for all of the problems facing educators in today's complex society, computer-assisted instruction (CAI) is one instructional innovation that is still highly regarded by educators, administrators, and parents. According to Creative Strategies International, a market research firm, "More computers have been installed in classrooms during the past eighteen months than in the entire preceding decade" ("School Computers Score," 1981). Richard Venezsky's remarks typify the attitudes of many educators: "The question is no longer 'Can computers
teach?' Instead, it is 'Under what circumstances can computers be incorporated into the instructional process?'
(Mason & Blanchard, 1979, p. v).

At present, the majority of CAI lessons developed for elementary- and secondary-age students are in the area of mathematics, but with the growing popularity of the "back to basics" movement, CAI reading courseware is becoming increasingly popular. In order to determine CAI's role in mathematics and reading instruction, CAI evaluators have been concerned primarily with achievement as a measure of instructional effectiveness. Secondary concerns in most CAI mathematics and reading studies have been to determine how much daily CAI interaction is needed for optimum learning, to assess learner attitudes toward CAI, and to assess learner attitudes toward the subject matter being taught. In CAI reading evaluations, the assessment of learner attitudes toward reading is critical and should be a primary concern rather than a secondary one. That CAI reading courseware may motivate the student with on-line games and animation is not enough; in order for a CAI reading curriculum to be truly effective, it must have a positive, long-range impact on learners' attitudes toward reading. Kennedy and Halinski (1975) wrote,

Thus, the development of attitudes precedes the development of interests. For the classroom teacher, this means that a positive attitude toward reading on
the part of the student must be present before the goal of making students lifetime readers can be realized (p. 519).

Follow-up studies designed to investigate the effects of CAI present unique problems to educational researchers. Samples in these studies are often small because some of the subjects have moved to other localities in the interim between the CAI treatment and follow-up research. Also, because they are no longer directly involved with CAI, some subjects may be reluctant to participate in follow-up studies. Despite the aforementioned problems, a follow-up study designed to evaluate a computer-assisted program's impact on learner attitudes toward reading would assist educators and administrators in determining the future use of CAI in the reading classroom.

Purpose of the Study

The purpose of this study was to evaluate a computer-assisted reading program's impact on learners' attitudes toward reading.

Statement of the Problem

This study was concerned with determining whether students who received computer-assisted instruction would display positive attitudes toward reading six or more months after computer-assisted instruction was completed.

A second concern of the study was to determine whether parents of CAI students would perceive their child's
attitudes toward reading to be positive as a result of computer-assisted reading instruction.

A third concern of the study was to investigate the correlation between the number of hours spent on-line in computer-assisted instruction and attitudes toward reading.

A final concern of the study was to investigate the correlation between posttest reading achievement and attitudes toward reading.

Hypotheses

1. Attitude scores on a Likert Attitude Scale obtained from students who received computer-assisted reading instruction will be positive six or more months after computer-assisted instruction has been completed.

2. Responses to a parent questionnaire will show that parents of CAI students perceive their child's attitudes toward reading to be positive as a result of computer-assisted reading instruction.

Ancillary Questions

1. Is there a significant positive correlation between time spent on-line in computer-assisted instruction and measures of attitude toward reading?

2. Is there a significant positive correlation between posttest reading achievement and measures of attitude toward reading?
Definition of Terms

1. **Attitudes.**—The predisposition or tendency to react specifically toward an object, situation, or value; usually accompanied by feelings and emotions; attitudes cannot be directly observed but must be inferred from overt behavior, both verbal and nonverbal (Good, 1973, p. 49).

2. **Computer-Assisted Instruction (CAI).**—Any instruction in which the material to be learned is presented by equipment under digital computer control and in which the students' responses are relayed to the computer for processing. The processing of responses generally includes storage of the responses in the computer's memory system, decision as to reinforcement and decision making as to the appropriate next presentation (Mason and Blanchard, 1979, p. 7).

3. **Drill and Practice.**—A simple linear program which is designed to supplement instruction (Mason and Blanchard, 1979, p. 7).

4. **Tutorial.**—A self-contained course of instruction with machine decisions and branching (Mason and Blanchard, 1979, p. 7).

5. **Strand.**—A major subset of a curriculum with a conceptual thread throughout (Control Data Corporation, 1978, p. 3).

6. **Cluster.**—A single lesson in the Basic Skills Learning System. A cluster consists of a pretest, a
tutorial, a drill and practice exercise, a tutorial review, and a mastery test.

Limitations

1. Subjects in this study were referred to Control Data Dallas Learning Center for CAI remedial instruction by public school personnel or by the subjects' parents. The subjects' parents purchased the CAI reading lessons from Control Data Corporation. Because the CAI reading lessons were expensive, students may have felt obligated to excel in the reading program so as not to waste their parents' money. This may have had a negative effect on student attitudes and achievement.

2. Although they were instructed to let their child work independently, some of the parents of CAI students occasionally sat with their child at the computer terminals during reading instruction. This may have had a negative effect on student attitudes and achievement, because the nonthreatening learning environment provided by CAI was disturbed.

3. Although they were instructed to begin each CAI lesson with a tutorial activity, some CAI students occasionally began lessons by taking a built-in pretest. If a student passed the pretest, he or she was moved on to the next lesson in the curriculum. This may have had a negative effect on student attitudes and achievement, because some
students may have missed the beneficial skills practice provided by tutorial activities.

Basic Assumptions

1. The correlates of attitude development and maintenance include achievement, self concept, parents and the home environment, the teacher and classroom environment, instructional practices and special programs, sex, test intelligence, socioeconomic status, and student interests (Alexander, 1976, p. 3).

2. Subjects responded to the Estes Attitude Scales and the parent questionnaire as honestly as possible.

3. An increase in the amount of time spent engaging in free reading activities is an indication that attitudes toward reading have become more favorable.

4. Pre-adolescents and adolescents are able to learn from individualized, self-directed computer-assisted reading programs.

5. The Basic Skills Learning System inventory and mastery tests are valid measures of reading achievement.
CHAPTER II

SYNTHESIS OF RELATED LITERATURE

An extensive review of the literature of computer-assisted applications in reading produced a relatively small number of truly "experimental" research studies. This synthesis of related literature will focus on the field evaluations of CAI reading programs which have been developed either commercially or under the auspices of colleges and universities. The synthesis will be divided into three sections:

1. The effectiveness of CAI reading programs,
2. Instructional approaches in CAI reading programs,

The Effectiveness of CAI Reading Programs

In recent years, studies of computer applications in reading have attempted to show that computer-assisted instruction (CAI) can be instructionally effective in a variety of learning situations. The majority of these studies have measured instructional effectiveness in terms of achievement gains, time spent in instruction, and changes in learner attitudes. Attempts have been made to implement CAI reading programs in elementary schools, basic education
centers, vocational training centers, and correctional institutions.

Evaluative studies of the Stanford reading project (Fletcher and Atkinson, 1972) showed that a CAI initial reading program could be successfully implemented in elementary schools. Fletcher and Atkinson's study paired twenty-two first-grade boys and twenty-two first-grade girls on the basis of the students' scores on the Metropolitan Readiness Test. Half received computer-assisted instruction in reading while the other half received traditional reading instruction. Unlike the majority of recent CAI evaluations, the Stanford studies provided correlations between two standardized tests, the Stanford Achievement Test and the California Cooperative Primary Reading Test. In addition, a test (DF) developed at Stanford and tailored to the goals of the Stanford CAI curriculum was administered individually to all subjects. Another unique aspect of the Stanford study was that the Stanford and DF tests provided such subskill data as word reading, paragraph meaning, vocabulary, and word study. Finally, the evaluation studies at Stanford were significant because follow-up studies were conducted as an additional measure of the program's instructional effectiveness.

Results of Fletcher and Atkinson's study indicated that the CAI group showed significant posttest gains over the non-CAI group. The differences between CAI and non-CAI
groups in estimated grade placement ranged from .4 to .7 school years on the Stanford Achievement Test and the California Cooperative Primary Test. In addition, the researchers found that reading improvement for the CAI group was not limited to the phonics-oriented goals of the computer curriculum. The CAI students performed significantly better on paragraph items than did the non-CAI students. A follow-up study conducted by Atkinson (1974) revealed that the achievement gains of the CAI experimental group were maintained one year after the initial study without any intervening computer-assisted instruction.

The Penn State Computer Assisted Literacy Development Program (Lite) demonstrated that semiliterate adults can learn literacy skills and career information via the IBM 1500 computer (Golub, 1974). Unlike previous studies, the Lite studies evaluated achievement gains in terms of the number of hours spent in CAI instruction time, as well as pre- and posttest scores. Golub (1974) reported that students' reading showed improvement after only ten hours of CAI instruction time.

Mason and Blanchard (1979, p. 93) labeled Caldwell's evaluation of the Lite program (1973) as "one of a kind" in CAI reading studies. Instead of comparing CAI students to non-CAI students, Caldwell compared CAI students with students who received programmed instruction (PI). While both groups showed equal achievement gains on a
criterion-referenced posttest, an attitudinal survey revealed that "students using computer-assisted reading materials were overwhelmingly more positive in their attitudes toward that medium than those students using the programmed text" (Caldwell, 1973, p. 73). The lack of correlation between achievement and attitude may be explained by the fact that the CAI group was restricted to once-a-week exposure to the instructional program, while the PI students had the advantage of using the programmed text every day until they finished. Also, the CAI students were hampered by mechanical failures which may have upset the learning environment.

Funded by the National Science Foundation, the Computer-based Education Research Laboratory (CERL) of the University of Illinois sought to develop and demonstrate computer-assisted elementary reading lessons in classroom settings. Delivered on the PLATO system (Programmed Logic for Automated Teaching Operations), the PLATO Elementary Reading Curriculum (PERC) utilizes a tutorial format in most of the reading lessons. Senior author and programmer Robert Yeager (1977) reported that the PERC studies were unique because the curriculum was field tested in the actual classrooms. In previous studies (Fletcher and Atkinson, 1972), terminals were placed in centralized locations in the public schools.
From 1971 to 1974, PERC system and curriculum development took place simultaneously. Conducted by the Education Testing Service (ETS), "initial year" and "demonstration year" evaluations took place in the 1974-75 and 1975-76 school years, respectively. ETS evaluated reading achievement with pre- and posttesting using standardized measures (The Metropolitan Achievement Test) and specifically developed curriculum-referenced tests. As in the Lite studies, evaluators developed instruments to measure learner attitudes toward CAI but, unlike previous studies, however, the PERC evaluators assessed learner attitudes toward reading. ETS also obtained evaluative information from individual classroom case studies which included post-interviews of teachers, classroom observation checklists, and teacher logs.

Results from the PERC evaluation showed that PERC had a negative impact on kindergarten reading readiness achievement in the first semester of the demonstration year. Swinton (1978) summarized affective outcomes from the PERC study:

Although attitudes toward PLATO were clearly positive among the children in both years, there was no evidence that these positive feelings transferred to the activity of reading (p. 23).

Results from the case studies indicated that although teachers and students had positive attitudes toward PERC, integration of PERC with classroom activities was a major problem. ETS evaluators identified hardware and routing
problems as factors contributing to the disappointing outcome of the PERC evaluation. Finally, ETS evaluators felt that PERC failed to demonstrate measurable outcomes because the curriculum developers seemed to lack a sense of direction.

The reading development group worked according to an a-priori hierarchical theory of reading acquisition which kept curriculum development on its initial path long after it became clear even to most of the reading developers that the approach was not reaching its goal (Swinton, 1978, p. 24).

Relying heavily upon the CAI research and development conducted at Stanford University, Computer Curriculum Corporation (CCC) of Palo Alto, California, developed five CAI drill and practice curricula. CCC's field evaluations resemble the Stanford studies because results from individual studies were often correlated with more than one standardized measure of achievement. As in previous studies, CCC evaluations placed emphasis on the correlation between CAI instruction time and achievement gains. Researchers were also interested in obtaining longitudinal data to demonstrate the effectiveness of the CAI curricula.

In an evaluative study conducted in Shawnee Mission, Kansas, (Poulsen and Macken, 1978) 121 students in grades three through six were enrolled in CCC's reading curriculum during the 1976-1977 school year. Correlation coefficients between time and gain for these students seem to indicate a significant relationship between time and gain for three
grade levels. CCC reported that the scatterplot and regression line for CAI grade-placement gain for students in grade three shows an expected gain of 1.2 years for students spending 1500 minutes in the CCC reading curriculum. Standardized test results (Woodcock Reading Mastery pretest and posttest) indicate that students in grades four, five, and six were brought from over a year below grade level to almost grade level, while students in grade three were brought from slightly below grade level to almost fifth-grade level. CCC researchers reported that the Shawnee Mission data show a significant relationship between CAI grade placements and standardized test grade equivalents. While achievement gains in a CCC study in Southern California were less impressive than those reported at Shawnee Mission, a significant relationship existed between CAI grade placement and standardized test grade equivalents on the Comprehensive Test of Basic Skills (CTBS).

Poulsen and Macken (1978) reported positive results from CCC evaluations in Seattle, Washington. Researchers reported high gains in reading as measured by the CTBS in 1974-1975 and by the Stanford Achievement Test in 1975-1976 and 1976-1977. Researchers reported that gains made by CAI Title I students exceeded those made by non-CAI Title I students. While the majority of CCC evaluation studies have explained impressive results, none of the researchers reported how the CAI programs have been integrated in the
traditional classroom curricula. Since CCC recommends that students spend only ten minutes a day working at the CAI drill and practice lessons, one would assume that CCC's reading lessons serve as a supplement to traditional classroom instruction.

Field studies of Control Data's Basic Skills Learning System (BSLS) demonstrate that a single CAI remedial "package" can be successfully implemented in a variety of learning situations. Unlike the Stanford, PERC, and Lite programs, the BSLS is a modularized network of tutorials, drills, tests, and "off-line" materials for young adults. BSLS combines the graphics and animation developed in PERC with the career-oriented materials of the Lite program. The BSLS evaluative field studies were similar to those conducted in the Lite program. Achievement was measured by the Adult Basic Learning Examination (ABLE), and attitudes toward learning were measured by attitudinal surveys. In addition, instruction time was used as a measure of achievement.

Field studies (Rizza and Hunter-Walker, 1978) of BSLS in adult education programs in Baltimore, Maryland, and St. Paul, Minnesota, showed positive results. In Baltimore, the mean growth for twenty-four adults was 0.8 grade levels after approximately fifteen hours on a PLATO terminal. The mean growth for eight adults at the St. Paul site was 1.8 grade levels after approximately eleven on-line hours. Control
groups were not used in the adult education center evaluations. Attitudinal surveys administered at both sites showed positive attitudes toward learning. Student attendance at the Baltimore site was used as an additional measure of attitudes toward instruction. Attendance was good, with only a 6 per cent drop-out rate.

Results from BSLS field studies (Rizza and Walker-Hunter, 1978) in correctional institutions in Minnesota and Texas were less encouraging. Students at the Minnesota State Prison showed a mean gain of 1.6 grade levels after approximately seven hours of instruction. At the Willow River Camp (Minnesota) and the Bexar County Detention Center (Texas) test sites, students showed no significant gains in reading. In all three test sites, control groups receiving individualized instruction showed no significant gains in reading. Lack of significant gains in reading by the CAI groups was probably due to the fact that students at the Willow River and Bexar County sites spent most of their time working in the BSLS mathematics curriculum. Diem and Fairweather (1979) reported that the majority of the inmates at the Bexar County site considered Spanish their native tongue, with English as their second language. Attitudinal surveys administered at the two Minnesota sites showed that students had very positive attitudes toward CAI and education in general. While attitudes toward CAI learning at the Bexar County site were favorable, Diem and Fairweather
(1978) reported that "several inmates, anxious to attain their GED, viewed the Basic Skills materials as somehow 'babyish'" (p. 2).

An additional evaluation of the BSLS reading curriculum (Sandman and Welch, 1978) was conducted in three Minnesota correctional institutions under the auspices of the Minnesota Educational Computing Association and Title I. The experimental design for the evaluation resembled those used in Control Data's evaluation of the BSLS reading curriculum, except that researchers utilized attitudinal surveys to determine student attitudes toward reading.

Although BSLS reading students did show progress at each evaluation site, results did not clearly support CAI's effects on achievement. While inmates at all three institutions showed improvement in attitudes toward reading, only the results at St. Cloud were significant. At St. Cloud, researchers reported "a slight positive relationship between attitude gains and total hours of instruction, and a somewhat stronger positive relationship between attitude gains and use of the computer to study reading" (Sandman and Welch, p. 41). Student attitudes toward CAI were generally positive at all three evaluation sites.

Future sites for BSLS field testing include government, business, and industrial training centers. The field tests probably showed more dramatic results at the adult education centers because the participants were determined to get a
wide variety of instructional approaches. The Stanford and Penn State (Lite) CAI programs are based on the decoding emphasis approach to reading instruction. According to Fletcher and Atkinson (1972),

Reading instruction may be divided into two basic tasks variously referred to a decoding and communication. . . . The major emphasis of the Stanford CAI program is on decoding skills, although work on word and sentence comprehension is also included (p. 597).

The Stanford program is made up of six components: reading readiness, letter identification, sight word vocabulary, spelling patterns, phonics, and comprehension.

The Penn State (Lite) program closely resembles the Stanford reading curriculum. Lite I (grades one through three) includes (1) initial sound-to-symbol code-breaking instruction and (2) a pool of reading materials which allows students to utilize their newly developed decoding skills. Lite II consists of career-oriented reading selections followed by literal comprehension questions.

The CCC, BSLS, and PCP programs generally follow the decoding-plus-meaning approach to reading instruction. CCC's "Reading Grades 3-6" program is a drill and practice course consisting of five strands: Word Attack, Words, Literal Comprehension, Interpretive Comprehension, and Work Study Skills. CCC describes the curriculum as "supplementary practice in basic sentence patterns" (1981, p. 3).

The BSLS reading program is composed of five strands: Making New Words, Understanding New Words, Understanding
good education "the second time around." Considering that correctional institutions provide such unstable learning environments, field test results from the correctional institutions should be regarded as encouraging. Follow-up studies similar to the Atkinson (1974) study will reveal the full extent of BSLS's instructional effectiveness.

Similar to the BSLS program, the PLATO Corrections Project (PCP) features a curriculum which offers pre-GED and GED courses in the form of tutorials and drill and practice exercises. Unlike the BSLS program, however, not all of the PCP lessons follow a modular format; many elective courses from other PLATO projects are available (Siegel, 1978). An evaluation of PCP (Alessi, Siegel, Silver, and Barnes, 1980) compared scores on a curriculum-referenced reading test of thirty-six adults who studied reading and thirty-six adults who studied computer-based mathematics for a period of about two months. The PCP reading lessons taught "information finding" and "paraphrasing." Results from the PCP evaluation showed that the PCP reading group improved significantly in pre- to posttest performance on the curriculum-referenced test while the mathematics group showed no improvement. The PCP reading group retained the increased test performance when given another posttest the following month.

Instructional Approaches in CAI Reading Programs

Field tests of the major CAI reading curricula have also shown that computer-based programs can accommodate a
What You Read, Thinking about What You Read, and Judging What You Read. According to Caldwell and Rizza (1979),

Each strand embraces a set of concepts and skills which have been ordered hierarchically according to common and expected patterns for meaningful learning and are translated into precise learning objectives (p. 157).

The PCP reading program is divided into two major components: reading comprehension and vocabulary development. Six major reading comprehension skills are emphasized in this program: information finding, paraphrase, following written directions, synthesis, inference, and logical relationships. Siegel writes,

The strategies we use to develop the reading and vocabulary lessons differ sharply from the more standard cognitive, information processing or psycholinguistic models of comprehension. ... Rather the approach is more logical and analytical (p. 247).

The PERC program incorporates elements from the decoding emphasis, decoding-plus-meaning emphasis, and meaning emphasis approaches. According to PERC Materials Coordinator, Priscilla Obertineo, "Our chief concern was not to prove any presently accepted approach or set of materials superior to others" (1974, p. 9). Although the PERC program remains eclectic in its approach, a "conceptual tree" or hierarchy was developed. Mason and Blanchard (1979) give a survey of seventeen PERC activities. The majority of these activities represent the three major approaches to reading instruction. PERC activities which utilize the decoding emphasis approach include word detail, letter discrimination,
letter sounds, and blending. Decoding-plus-meaning activities include high frequency sight words, enrichment sight words, and timed reading. Meaning emphasis activities include sentence building, picture stories, and stories written by students.

Summary

In summary, several studies of computer applications in reading have shown that CAI can have a positive impact on student achievement. Studies by Fletcher and Atkinson (1974), Golub (1974), Caldwell (1973), Poulsen and Macken (1978), Rizza and Walker-Hunter (1978), and Alessi, et al. (1980), indicate that CAI can significantly raise reading achievement in diverse populations, ranging from elementary school children to adults in correctional institutions.

A few studies reported in the literature, however, have shown that CAI may have an insignificant or even a negative impact on reading achievement. The PLATO Elementary Reading Curriculum project (Swinton, 1978), which produced the most disappointing results in terms of its failure to raise student achievement, probably employed the most complex instructional strategies and technological innovations of any of the CAI programs reported in the literature. This indicates the need for future comparative studies in which reading models and approaches that are best suited to CAI may be identified. It should also be noted that the CAI
program yielding the poorest achievement results (PERC) was one of the few CAI reading programs to be thoroughly evaluated by an independent agency (ETS). This introduces the possibility that "in-house" CAI evaluations conducted by commercial CAI developers may not be as realistic as those conducted by independent researchers. CAI developers should agree upon standard criteria for evaluating CAI curricula, and more independent agencies should be called in to conduct the evaluations.

While CAI reading achievement results may have been somewhat inconsistent, all of the evaluations which measured learner attitudes toward CAI reported positive results. CAI's emphasis on independent, self-paced, nontthreatening instruction probably accounts for these encouraging results. Only two studies in the literature (Swinton, 1978; Sandman and Welch, 1978) attempted to measure CAI's impact on learner attitudes toward reading. Though both studies concluded that positive learner attitudes toward CAI did not seem to result in positive attitudes toward reading, further research in this area should be conducted in order to fully understand the capabilities and the limitations of computer-assisted reading instruction.
CHAPTER III

METHODS AND PROCEDURES

Population and Sampling Procedures

Subjects in this study were pre-adolescents and adolescents who were referred to the Control Data Dallas Learning Center for remedial reading instruction either by school officials or by parents. Remedial reading instruction consisted of lessons from the Basic Skills Learning System (BSLS), a computer-assisted instructional program; the subjects' parents purchased these lessons from Control Data Corporation. Subjects were identified as reading below grade level by the BSLS Reading Inventory, a curriculum-referenced test.

The population consisted of any available Control Data Dallas Learning Center students who met the following criteria:

1. Enrollment in the "Understanding What You Read" strand of the BSLS reading curriculum.

2. Completion of course of study on or before November 1, 1980.

Fifteen BSLS students met the criteria. Fourteen of the students and their parents were contacted by telephone and asked if they would participate in the study, and all agreed to participate. The remaining student had apparently
moved from the city prior to the beginning of this study. In the interim between the first contact with the subjects and the actual administration of the questionnaires, the telephone number for one of the students was changed to an unlisted number. The researcher made two attempts to reach the student and his parents by mail. The student and parents did not respond.

The population consisted of the remaining thirteen BSLS students (one female and twelve males). Subjects ranged in age from ten to fifteen, with a mean age of 12.7 years. Twelve subjects were Anglo and one was black. All subjects were from upper-middle income families.

Description of the Treatment

Before enrolling in the BSLS reading curriculum, each subject took the BSLS Reading Inventory. The inventory determined at which level the subject would enter the five reading skill areas (strands) in the BSLS curriculum. Once the inventory results were available, a learning center employee determined the number of lessons parents would need to purchase to bring the subject's reading up to grade level in each of the five strands. While some were enrolled in more than one strand, all of the subjects were enrolled in the "Understanding What You Read" strand which is designed to teach literal comprehension skills. (See Appendix A.)

It was recommended that subjects work on the CAI lessons at least twice a week, each session lasting no longer
than an hour and a half. Because BSLS is a self-contained program, parents and learning center personnel were to allow each subject to work independently at the terminal.

BSLS lessons were delivered via the CDC PLATO IV terminal, which consisted of a plasma panel (screen) and a keyboard. The majority of instruction in each BSLS lesson took place in the tutorial mode. Once students completed a tutorial activity, they took a mastery test. If the student passed the mastery test, he or she was allowed to progress to the next lesson. Students who failed the mastery test were given the option of completing a drill and practice exercise or a tutorial review. Students were then allowed to retake the mastery test.

Experimental Design

The design used in this study is a "pre-experimental design" described in Campbell and Stanley (1963) as "The One-Shot Case Study" (pp. 6-7).

Instrumentation

**Likert Scale**

The *Estes Attitude Scales* were administered to the subjects six or more months after computer-assisted instruction had been completed. The scale consisted of fifteen statements concerning reading. Subjects were given a choice of five responses ranging from "strongly agree" to "strongly
disagree." Each response was given a numerical value depending on whether the statement was worded positively or negatively. After a subject completed the scale, scores on the fifteen items were summed.

Raw scores on the Estes Attitude Scales may range from 15 (an extremely negative attitude) to 75 (an extremely positive attitude). The Estes Attitude Scales (secondary form) have a reliability factor of .86. Vaughn (1980) comments on the validity of the Estes Attitude Scales,

A review of the literature reveals that few affective scales relative to reading and reading instruction have been investigated and determined to have evidence of construct validity. One is the Estes Attitude Scales validated by Johnstone (p. 18).

Parent Questionnaire

As an additional measure of learner attitudes, a "retrospective pretest" (Campbell & Stanley, 1963, p. 66) was administered to parents in the form of a questionnaire. The parent questionnaire was designed to indicate parental perception of the subjects' attitudes toward reading before, during, and after the CAI treatment. The first two questions on the questionnaire dealt with the subject's progress in school. Questions three and four were direct questions which asked the parent if there were any changes in the subject's attitudes toward reading during and after enrollment in the CAI program. The next three questions asked the parent to estimate the amount of time the student has spent engaging in free reading activities before, during, and after the CAI
treatment. Finally, the last question was designed to assess any general concerns the parent had about CAI.

Curriculum-Referenced Test

While they are admittedly crude measures of achievement, the BSLS Reading Inventory and the number of CAI clusters passed by mastery tests served as pre- and posttest indicators of reading achievement. Along with the number of hours spent "on-line," achievement data were used in calculating correlation coefficients to investigate possible correlations with reading attitudes.

Specific Data Collection Procedures

The subjects and their parents were contacted by telephone and asked to come to the Control Data Learning Center to complete the attitude scale and questionnaire. In an effort to achieve equal testing procedures, the investigator read the attitude scales to the subjects as they completed the answer sheets. While the attitude scales were being administered to the subjects, the parents completed the parent questionnaire in another room.

As is often the case in follow-up studies, many of the subjects seemed reluctant to participate in the study. Ten parents said that they would be unable to come to the learning center to complete the attitude scale and questionnaire. They requested that the investigator mail the attitude scale and questionnaire to their homes, instead. In an effort to
obtain the necessary data from the ten parents, the investigator agreed to the parents' request. Parents were instructed to read the items on the attitude scales to the subjects. They also were asked to refrain from influencing the subjects' answers.

On May 30, 1981, attitude scales and questionnaires were mailed to the homes of ten subjects. Two weeks later, the investigator had received only two questionnaires. In an effort to complete the study, it was decided that the remainder of the scales and questionnaires were to be administered by telephone.

Pretest and posttest achievement scores and total hours of CAI instruction were automatically collected by the PLATO computer.

Procedures for Analysis of Data

Hypothesis One was tested by computing the group mean raw score and converting it to the corresponding t-score given in Estes, Estes, Richards, and Roettger (1980, p. 18). The range and the standard deviation of the CAI group's responses on the attitude scale were also computed. (Since a t-score of 60 would indicate "positive" attitudes on this scale, a t-score of 60 or more would indicate "positive" attitudes.) Finally, mean and median responses were computed for each item on the attitude scale.
Hypothesis Two was tested by a comparison analysis of positive and negative responses on the parent questionnaire.

Ancillary questions one and two were tested by computing Spearman rank order correlations between each pair of variables. The resulting correlations were checked for significance at .05 using the table given in Popham (1967, p. 397).
CHAPTER IV

STATISTICAL ANALYSIS AND INTERPRETATION

In this chapter the results of data analysis pertaining to the hypotheses and ancillary questions will be reported and discussed.

Hypothesis One

Attitude scores on a Likert attitude scale obtained from students who received computer-assisted reading instruction will be positive six or more months after computer-assisted instruction has been completed.

To test this hypothesis, the group mean attitude score was computed and converted to a t-score using the normative information given in Estes et al. (1980, p. 18). The range and the standard deviation were also calculated. The mean attitude score for the group was 47.76, and the t-score for raw scores ranging from 47 to 48 was 42. The range of scores was 36 to 67, and the standard deviation was 10.41. The results are summarized in Table I.

Scores on the Estes Attitude Scales may range from 15 (extremely negative attitudes) to 75 (extremely positive attitudes). Scores of 30 and 60 indicate negative and positive attitudes, respectively. Thus, the group mean raw score and the group mean t-scores reported in Table I were
neither negative nor positive, indicating neutral attitudes toward reading on the part of most of the subjects.

Group mean and median scores in an item analysis of the Likert scale are reported in Table II.

Scores on each item of the Estes Attitude Scales may range from 1 (extremely negative attitudes) to 5 (extremely positive attitudes). Scores of 2 and 4 indicate negative and positive attitudes, respectively. Thus, with the exception of item twelve (4.46), mean responses to the Likert scale items were neither negative nor positive, indicating neutral attitudes toward reading. An analysis of median responses shows that on ten items, 4 (positive attitudes) was the most common response. On the remaining five items, 2 (negative attitudes) was the most common response.
Hypothesis Two

Responses to a parent questionnaire will show that parents of CAI students perceive their child's attitudes toward reading to be positive as a result of computer-assisted reading instruction.
To test this hypothesis, parents were asked to respond to a questionnaire which was designed to measure parental perception of the subjects' attitudes toward reading before, during, and after the CAI treatment. Responses to the parent questionnaire were then tallied and analyzed. A tally of responses to the parent questionnaire is reported in Appendix B.

Responses to question one of the questionnaire show that 54 per cent of the parents noticed a change in their child's progress in school while the child was enrolled in the CAI reading program. Eight per cent of the parents responded negatively to question one. Thirty-eight per cent of the parents indicated that the first question was not applicable because their child was enrolled in the CAI program during the summer. All of the twelve parents who responded to question two indicated that they noticed a change in their child's progress in school after their child completed the CAI reading program. All twelve parents responding to question two explained that their children continued to improve in school, especially in reading and language arts.

Responses to question three indicate that 62 per cent of the parents noticed a change in their child's attitude toward reading while the child was enrolled in the BSLS reading program. When asked to explain their responses on question two, the 62 per cent who answered "yes" explained
that their child's attitudes toward reading had become more favorable. Of the eight parents who answered question four, 63 per cent noticed a change in attitudes after the BSLS program was completed. Thirty-seven per cent did not notice a change in attitudes. The majority of the parents who answered "yes" on question four explained that their child's attitudes toward reading had continued to grow more favorable after the CAI program was completed.

Questions five through seven on the questionnaire asked parents to estimate the amount of time per week the subjects spent engaging in free reading activities before, during, and after the CAI treatment. An analysis of questions five through seven is presented in Table III.

**TABLE III**

**AN ANALYSIS OF FREE READING HABITS BEFORE, DURING, AND AFTER CAI TREATMENT**

<table>
<thead>
<tr>
<th>Free Reading Habits</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No change before, during, or after CAI treatment</td>
<td>54</td>
</tr>
<tr>
<td>Increased during CAI treatment and was maintained</td>
<td>23</td>
</tr>
<tr>
<td>Increased during CAI treatment and increased after</td>
<td>15</td>
</tr>
<tr>
<td>Only increased after CAI treatment</td>
<td>8</td>
</tr>
</tbody>
</table>

Question eight on the parent questionnaire asked parents to identify the strengths and weaknesses of computer-assisted reading instruction. The majority of responses indicated
that the subjects' independence and self-confidence had increased as a result of computer-assisted reading instruction. The prohibitive cost of the BSLS program was most often listed as CAI's major weakness.

Ancillary Question One

Is there a significant positive correlation between time spent on-line in computer-assisted instruction and measures of attitude toward reading?

The total number of hours spent on-line was automatically collected by the PLATO IV computer. The mean number of hours spent on-line was 26.9; the range was 11.7 through 50.2. The Spearman Rank Order Correlation Coefficient was used to calculate correlations between time spent on-line and measures of attitude toward reading. The results are reported in Table IV.

<table>
<thead>
<tr>
<th>N</th>
<th>SROCC</th>
<th>Significance at .05</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>-.070</td>
<td>.481 n.s.</td>
</tr>
</tbody>
</table>

The correlation between hours on-line and attitudes toward reading in this study was near zero, indicating that there was little or no relationship between the two variables.
Ancillary Question Two

Is there a significant positive correlation between posttest reading achievement and measures of attitude toward reading?

The number of clusters in the BSLS reading curriculum passed by mastery test served as a crude measure of posttest achievement. The mean number of clusters passed by mastery test was 17.30; the range was 9 through 27. Correlational data resulting from the Spearman Rank Order Correlation Coefficient are reported in Table V.

| TABLE V |
|---|---|---|
| N  | SROCC | Significance at .05 |
| 13 | .176 | .481 n.s. |

The correlation between posttest reading achievement and attitudes was near zero, indicating almost no relationship between the two variables.
CHAPTER V

RESULTS, DISCUSSION, AND RECOMMENDATIONS

Results

This study was concerned with determining whether students who received computer-assisted instruction would display positive attitudes toward reading six or more months after computer-assisted instruction was completed.

A second concern of the study was to determine whether parents of CAI students would perceive their child's attitudes toward reading to be positive as a result of computer-assisted reading instruction.

Additional concerns of the study were to investigate the correlation between learners' attitudes toward reading and variables such as the number of hours spent on-line and post-test reading achievement.

Hypothesis One

The first hypothesis was that attitude scores on a Likert attitude scale obtained from students who received computer-assisted reading instruction would be positive six or more months after computer-assisted instruction has been completed.

An analysis of the data obtained from a Likert attitude scale shows that although some of the student attitudes were
positive, the group mean raw score (47.76) and the group mean t-score (42) were neither negative nor positive, indicating neutral attitudes toward reading. These findings resulted in the rejection of Hypothesis One.

**Hypothesis Two**

The second hypothesis was that responses to a parent questionnaire would show that parents of CAI students perceive their child's attitudes toward reading to be positive as a result of computer-assisted reading instruction.

Although only .54 per cent of the parents noticed an increase in their child's free reading activities, parents generally perceived their child's attitudes toward reading to be positive as a result of computer-assisted reading instruction. In the explanations section on the questionnaire, the majority of parents noted that their child's attitudes toward school-related reading assignments had definitely improved. These findings supported Hypothesis Two.

**Ancillary Question One**

The first ancillary question was whether there is a significant positive correlation between time spent on-line in computer-assisted instruction and measures of attitude toward reading.

A Spearman Rank Order Correlation of hours spent on-line and reading attitude measures did not result in a
significant correlation between instructional time and attitudes toward reading.

Ancillary Question Two

The second ancillary question was whether there is a significant positive correlation between posttest reading achievement and measures of attitude toward reading.

A Spearman Rank Order Correlation of clusters passed by mastery test and reading attitude measures did not result in a significant correlation between achievement and attitudes toward reading.

Discussion

In this study, it was found that the subjects showed neutral attitudes toward reading six months after computer-assisted instruction had been completed. It was also found that the parents of these subjects perceived their child's attitudes toward reading to be positive as a result of computer-assisted instruction. Although these findings seem to be inconsistent, the apparent discrepancy may be superficial. While the majority of parents reported on the questionnaire that they perceived a change in their child's attitudes toward reading, most of these responses were qualified with statements describing the child's improved attitude toward school-related reading. In several cases, the same parents who reported a positive change in attitudes also reported that little or no change occurred in their
child's free reading habits. It is possible that some of the parents misinterpreted improvement in the child's self-concept as a change in attitudes toward reading. This explanation seems plausible in light of the fact that when asked to list the strengths of CAI, many parents reported that CAI encourages independence and improves self-concepts; research reported in the literature supports this notion.

Assuming that the information collected from the subjects and parents is reasonably accurate, possible explanations for the apparently neutral attitudes toward recreational reading must be considered. It seems plausible that the "skills approach" utilized in the BSLS reading curriculum may be responsible for the neutral attitudes. Because BSLS students are taught reading subskills such as finding the main idea, they may become proficient in some school-related reading tasks. Acquisition of reading subskills does not automatically result in the integration of those skills in the actual reading process, however. Thus, if the BSLS program did not provide enough practice in integrating the newly acquired subskills, it seems unlikely that the BSLS students would seriously consider reading for enjoyment.

Another possible explanation for the CAI students' neutral attitudes may lie in the fact that the mean age of the group was 12.7. When asked if he noticed a change in his adolescent son's attitudes toward reading, one parent
expressed his belief that the BSLS program would probably be more effective in shaping the attitudes of young children. Kennedy and Halinski comment on the adolescent's attitudes toward reading, "His [the adolescent's] attitudes towards his peers, his teachers, learning, and significantly toward the act of reading may have changed dramatically since he left the elementary school" (1975, p. 518). While adolescence may be a period of dramatic change, it is possible that peer influence outweighs the influence of an instructional medium such as CAI.

In conclusion, given the "pre-experimental" nature of this study, a cause-and-effect relationship between computer-assisted instruction and improved learner attitudes toward reading has not been fully established. Preliminary indications are that a computer-assisted reading program based on a "skills approach" instructional model has no apparent long-range impact on pre-adolescent and adolescent attitudes toward recreational reading. While it is possible that CAI reading programs based on instructional models other than the "skills approach" may have produced more favorable outcomes with the pre-adolescent subjects, information gathered from the adolescent subjects and their parents suggests that even the most elaborate CAI program would have little or no impact on adolescent recreational reading habits. The influence of peers or role models may have a greater effect on adolescent attitudes toward reading than
special instructional programs such as CAI. Probably the most encouraging finding of this study was that following CAI reading instruction, parents of CAI students reported that their children regarded school-related reading tasks more favorably. Whether this perceived change is a result of improved attitudes toward reading or strengthened self-concepts should be the subject of future investigation.

Recommendations

The following recommendations are made in view of the findings of this study and the conclusions reached.

1. This study should be replicated with the following alterations.
   a. A larger sample, consisting of subjects between the ages of six and ten, should be used.
   b. A control group of CAI students receiving mathematics instruction should be added.
   c. Pretest measures of attitudes toward reading should be added.
   d. Reading observation checklists should be completed by parents and school personnel during and following the CAI treatment.
   e. Standardized measures of pretest and posttest achievement should be added.
   f. Pretest and posttest measures of student self-concept should be used.
2. More empirical research is needed to identify which reading models and approaches are best suited to CAI.

3. More research is needed to devise CAI implementation strategies in a variety of learning situations.

4. More research is needed to determine how much daily CAI interaction is actually needed for optimum learning.

5. More research should be done to determine the effectiveness of CAI peripheral devices such as random access audio and plasma panels.
## APPENDIX A

### BASIC SKILLS LEARNING SYSTEM STRAND:
**UNDERSTANDING WHAT YOU READ**

<table>
<thead>
<tr>
<th>Bundle</th>
<th>Cluster Number and Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Locating Basic Facts</td>
<td>1 Noun and Pronoun</td>
</tr>
<tr>
<td></td>
<td>2 Following Directions</td>
</tr>
<tr>
<td></td>
<td>3 Past and Present Tense</td>
</tr>
<tr>
<td></td>
<td>4 Forming Sentences</td>
</tr>
<tr>
<td>B. More Basic Facts from Reading</td>
<td>5 Getting Information from Pictures</td>
</tr>
<tr>
<td></td>
<td>6 Putting Sentences in the Proper Order</td>
</tr>
<tr>
<td></td>
<td>7 Getting Ideas from Pictures</td>
</tr>
<tr>
<td></td>
<td>8 Past, Present, and Future Tense</td>
</tr>
<tr>
<td>C. Understanding the Things You Read</td>
<td>9 Getting the Facts</td>
</tr>
<tr>
<td></td>
<td>10 Finding What Doesn't Belong</td>
</tr>
<tr>
<td></td>
<td>11 Ordering Main Events</td>
</tr>
<tr>
<td></td>
<td>12 Replacing Nouns with Pronouns</td>
</tr>
<tr>
<td>D. Remembering What You Read</td>
<td>13 Reading for Information</td>
</tr>
<tr>
<td></td>
<td>14 Remembering Facts</td>
</tr>
<tr>
<td></td>
<td>15 Finding the Main Ideas</td>
</tr>
<tr>
<td></td>
<td>16 Placing Items in the Proper Sequence</td>
</tr>
<tr>
<td></td>
<td>17 Topic Sentences</td>
</tr>
<tr>
<td>E. Remembering More of What You Read</td>
<td>18 Remembering More Facts</td>
</tr>
<tr>
<td></td>
<td>19 Characters and Events in a Story</td>
</tr>
<tr>
<td></td>
<td>20 Remembering Details</td>
</tr>
<tr>
<td></td>
<td>21 Remembering Story Meanings</td>
</tr>
<tr>
<td></td>
<td>22 Titles and Topic Sentences</td>
</tr>
<tr>
<td></td>
<td>23 Supporting Main Ideas with Facts</td>
</tr>
<tr>
<td>F. Interpreting What You Read</td>
<td>24 Facts Not Directly Stated</td>
</tr>
<tr>
<td></td>
<td>25 The Main Idea of the Story</td>
</tr>
<tr>
<td></td>
<td>26 Placing Events in the Proper Order</td>
</tr>
<tr>
<td></td>
<td>27 Using Evidence to Support Ideas</td>
</tr>
</tbody>
</table>
APPENDIX B

TALLY OF RESPONSES TO PARENT QUESTIONNAIRE

1. While your child was enrolled in the Basic Reading Skills course, did you notice any change in his/her progress in school?

54% yes 8% no 38% n.a.

2. Answer this question only if you answered yes on the first question. After your child completed the Basic Reading Skills course, did you notice any change in his/her progress in school?

100% yes ___ no

If you answered yes, please explain.

3. While your child was enrolled in the Basic Reading Skills course, did you notice any change in his/her attitudes toward reading?

62% yes 38% no

If you answered yes, please explain.

4. Answer this question only if you answered yes on the third question. After your child completed the Basic Reading Skills course, did you notice any change in his/her attitudes toward reading?

63% yes 37% no

5. Before your child enrolled in the Basic Reading Skills course, how much time per week did he/she spend engaging in free reading activities?

77% 0-1/2 hr. 23% 1-2 hrs. 3-4 hrs.

more than 4 hrs.
6. While your child was enrolled in the Basic Reading Skills course, how much time per week did he/she spend engaging in free reading activities?

- 46% 0-1/2 hr.
- 38% 1-2 hrs.
- 8% 3-4 hrs.
- 8% more than 4 hrs.

7. After your child completed the Basic Reading Skills course, how much time per week has he/she spent engaging in free reading activities?

- 38% 0-1/2 hr.
- 38% 1-2 hrs.
- 8% 3-4 hrs.
- 16% more than 4 hrs.

8. In your opinion, what are the strengths of computer assisted reading instruction?

The weaknesses?

Signed ____________________________
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Diem, R. A., & Fairweather, P. G. An evaluation of the effectiveness of a computer assisted instructional program in basic literary skills in a county jail.


Individualize basic skills with CCC's complete CAI system. Palo Alto: Computer Curriculum Corporation, 1981.


