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ABSTRACT

The California School for the Deaf (CSD) conducted a study to familiarize students and faculty with available programs at Lawrence Hall of Science and to see if the instruction and teaching philosophy used to introduce the programs was adequate for students with impaired hearing. The pilot study was positive, so objectives were formed to adapt current computer programs. Objectives included: (1) improvement of teacher attitude and ability concerning the computer, (2) improvement of student attitude and ability through training, and (3) an evaluation of the results of the year's project. The program was determined a success since there was a significant increase in the use of the computer by students and faculty at CSD. Appendixes include a survey of student and teacher opinion, samples of lessons, graphs indicating usage, and teacher opinion surveys. (Author/DS)

COMPUTER EDUCATION FOR DEAF YOUNGSTERS: A Mutual Effort by the University of California and the California School for the Deaf in Berkeley

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August, 1975

Table of Contents

INTRODUCTION

Good morning! How many of you here today recognize the fact that a computer program at any school should satisfy the needs of students and instructors alike? And be flexible enough to adapt as those needs change? How many of you have also recognized the crying need for computer models that are programmed specifically for deaf youngsters? I would imagine that all of you in attendance for this special interest group today have at some point encountered these and other related problems. The California School for the Deaf (CSD) in Berkeley had also encountered these problems, and has been very busy during this past year solving some of them. The school had used computer-aided instruction in a demonstration mode through the Department of Health, Education and Welfare and Stanford University since 1970. This earlier emphasis had been on math and language drill, and its use indicated that computers were a useful tool in instruction of hearing impaired children. However, most of the computer-aided instruction programs available consisted of math and language drill and practice program packages, and seemed to be directed only at one small portion of the student population. The staff at CSD wanted to expand the computer program to include science and social studies, as well as math and language arts, with adapations where needed for the hearing impaired. There was also a need to develop a more positive attitude toward the computer. It was clear that drill and practice alone was fine for some instructors, but the majority felt that it was too limiting. The computer, at this point, was thought of as a mandatory activity that forced

children to do lessons that many times did not relate to the curriculum in the classroom.

It was then that CSD began to work with the Lawrence Hall of Science (LHS), part of the University of California at Berkeley. Being a rather unique science education center, LHS had a wealth of educational resources available, and a computer operation that had been in existence for some time. LHS encouraged a positive attitude toward computers by offering a period of creative play, which makes use of games and simulations, before using the computer for drill and practice exercises or programming. LHS was also able to offer computer time-sharing, the development expertise to write programs to complement the CSD curriculum, and a proctor for the Computer Resource Center at CSD.

In cooperation with CSD, LHS conducted a pilot study in May of 1974. The purpose was to familiarize students and teachers with currently available programs at LHS, and to see if the instruction and teaching philosophy used to introduce the programs were adequate for hearing impaired students. The brief pilot study was positive, and from it the objectives for the CSD Computer Resource Center in the 1974 to 1975 academic year were identified.

The objectives were:

1. First, to adapt current LHS computer programs and develop new programs with content and instructional techniques optimally suited to the CSD curriculum and the needs of hearing impaired students. Programs were to be developed for

all subject areas taught at the School for the Deaf, for all children, slow or advanced, for all grade levels.

2. The second objective was to develop a functional catalog of all of the computer programs available to CSD. Further, to develop a catalog that would be closely related to the extensive and on-going curriculum development occurring at the School for the Deaf.

3. The third objective was to institute teacher training and to improve teacher attitude using orientation sessions and workshops. Moreover, to help the teachers become more sophisticated in the varied uses of a computer within the field of education.

4. The fourth objective included increasing student interest and reinforcing attitudes of independence and positive self image by providing students with successful computer activities.

5. And the fifth objective, of course, was to evaluate the effectiveness of the project.

To summarize, the objectives were: to adapt current computer programs and develop new ones for the School for the Deaf; to develop a functional catalog of these programs; to improve teacher attitude and ability with the computer; to improve student attitude and ability through training; and to evaluate the results of the year's project.

THE PROGRAM

At this point, let me tell you a little bit about the computer education program itself and the personnel involved. The Computer Resource Center is located in the high school building at the California School for the Deaf, and contains twelve hard copy computer terminals (KSR 33 TTY's) which are connected by telephone lines to the HP 2000B time share computer at LHS. Also in this room are a proctor and as many as 120 students daily coming in at scheduled times during class periods with their teachers throughout the day. The usual procedure is to have teachers schedule themselves for use of the room and then bring in their classes, of usually 9-10 students, during their allotted time. Very often, teachers also send students in for independent work or play so that, for instance, if there are only nine students originally scheduled for the room at a certain time, all 12 seats would probably be occupied. This happened with increasing frequency toward the end of the school year as the students became more proficient in the use of the computer and also as the teachers became more comfortable with it. There was a great deal of non-scheduled use also throughout the year, making the project as flexible as possible for the students. This "non-scheduled" use included usage by students during their lunch period, after school, independent study during class time, the "Wednesday evening" program (which will be discussed later) and usage by students in the Computer Science class itself. Due to the increasing demand for computer time, several guidelines did have to be developed for this

non-scheduled use of the computer. For instance, during lunchtime and after school hours, students were only alloved to come to the Computer Resource Center if they had first obtained a pass from the proctor in the room. The precipitating factor for these guidelines was an incident that happened after school one day, when the computer room at CSD was full of students working at the terminals. It had already become a matte of routine that several elementary school children would arrive daily to see if there was any space in the room. But we hadn't counted on the high level of ehtnusiasm exhibited by these children spreading as far as it did. On this one particular day, the usual four children arrived, and were immediately followed by eight other youngsters (all of elementary school age), who had been able to procure passes from their counselors and teachers. Two other boys had been told that they could not come to the computer room, so they had seen fit to forge their own passes. We found it very difficult to ignore such enthusiasm, so we set about developing guidelines that would hopefully enable everybody to use the computer at least once a week.

I mentioned before a "Wednesday evening program". The residence hall counselors approached us with the suggestion that we might open the Computer Resource Center once a week in the evening for junior high school and later elementary school students who lived on the campus. This was done, and the entire responsibility for the evening program was eventually turned over, with the proctor's guidance, to one of the residence hall counselors. Toward the end of the year, however, we began to realize that one evening a week may not be enough for the coming year. It may also be interesting to note that while many of the students

used this non-scheduled computer time for play activities, many others used this time to study for their individual classes. We tried not to structure it too much for them so they could use this time as they chose.

PERSONNEL

Three people were directly responsible for the maintenance and development of computer education at CSD. They were a full-time proctor, half-time programmer and half-time coordinator. The proctor's duties consisted of the following:

1. Providing guidance to students and teachers in the use of the computer;
2. Instructing faculty, counselors and students how to program in a computer language known as PILOT;
3. Helping teachers create their own lessons for the computer;
4. Speaking with numerous visitors to CSD about the project and giving demonstrations;
5. Entering teacher-authored lessons on the computer;
6. Communicating the needs of students and teachers to the programmer at LHS; and
7. Effecting routine maintenance and repairs of the TTY's.

The half-time programmer who spent time working on this project directed most of his effort to program development, according to feedback received directly from the teachers and the proctor. As much personal contact and communication as possible was utilized in an effort to learn more about the special learning problems encountered at a school for the deaf, and this information was incorporated into the development of programs.

The coordinator of the project provided the major link between not only LHS and CSD but also between the teachers and the Computer Resource Center. She designed and refined the incredibly difficult scheduling process, did all of the data collection and chaired the bi-weekly meetings between LHS and CSD personnel involved in the project.

EVALUATION

Let us now return to those objectives which were stated earlier. The first objective was to adapt current LHS computer programs and to develop new programs. As was stated, this was done and programs were developed which allowed for the addition of lessons in all subject areas; language, math, science, social studies, reading, even driver education. These programs were developed for children at all grade levels at CSD, and were adaptable to the bright children as well as those with acute learning disabilities.

The second objective, which was to develop a functional catalog of all of the computer programs, was also successful. This computerized directory consists of a complete listing of each lesson and independent program available to CSD. Great care was taken to construct the directory to correspond to CSD's new curriculum guidelines, so that if a central educational resource center should develop at CSD, all computerized resources could easily be incorporated into the central resource library. In the meantime, the directory facilitates retrieval of programs and the sharing of them between teachers. As a matter of fact, a very interesting and unusual phenomenon occurred increasingly throughout the year in the resource center itself. It became a place where teachers and students alike, on all grade levels and of varying abilities, met and exchanged ideas. It seemed that our computerized directory was not only a great organizer but also acted as a catalyst for information exchanges.

The third objective was to provide training for the teachers at the California School for the Deaf. The teachers became familiar with the

programs and learned to provide information needed for adaptation of programs used as a supplement to classroom instruction. As a direct result of these training seminars and orientation sessions, there was a growing interest among the teachers in learning how to program their own courses. A programming class was organized with college credit and was offered through the University of California Extension in Berkeley. In the spring of 1975, approximately 25% of the teachers from all departments at CSD became students of computer programming. Activities included:

1. The learning of basic concepts of software and hardware on a modern time sharing computer system;
2. The use of author programs to prepare fixed-format lessons (so-called models) and the sharing of these lessons through a lesson catalog system;
3. The use of games, simulations, and drill and practice programs in the computer library to supplement typical classroom learning experiences;
4. And an orientation to PILOT, a simple computer programming language, to prepare unique lessons for the classroom and to teach children in turn the elements of computer programming.

Feedback from participating teachers was uniformly positive. The level of enthusiasm at the end of the course was very high. The goals of the in-service workshop were met, and many of the participants reached a fairly high level of proficiency in programming. There was significant expression of interest for a fall 1975 in-service workshop, both from

participants and from those unable to participate in this most recent workshop.

Another part of objective number 3 was to develop a more positive attitude on the teacher's part toward the computer. In the initial states of the project, use of the computer was mandatory for teachers in junior high and high school. A survey in December 1974 showed that the computer was still being used mostly as a glorified ditto machine, and the teachers were divided as to what effect the computer was having on the students. A second and third survey were taken in February and May, 1975, showing a higher level of sophistication and an increasing enthusiasm in all users for possible future uses of the computer.

Four factors seemed to account for this upsurge in enthusiasm and sophistication. The first is that Junior High School usage is no longer mandatory. The second factor is that the new directory had made possible easy accessibility to materials written by others, hence an exchange of ideas between teachers and between CSD and LHS. A third major contributing factor to this upsurge in enthusiasm seemed to be the availability of local programming to meet the changing needs of the faculty at CSD. Teacher-suggested changes in the system were incorporated whenever and wherever possible, thus allowing more flexibility in the program and also opportunity for feedback on the system. The fourth and final contributing factor seemed to be that the in-service computer education course gave a greater number of teachers insight into the realm of possibilities that computers provide in this field. By the end of the year, this renewed enthusiasm and sophistication was seen in the increased usage by teachers of computer time, and also by the increasing number of lessons that were authored by teachers. Thirty teachers, or 65% of the faculty at the School,

were consistent users of the computer by the end of the year. Of these 30 teachers 21 were authoring their own lessons. It became increasingly evident that the project had made many friends, and I would like to tell you about just one of them. He was a teacher who had a classroom full of students with learning disabilities. He had no desire to use the computer as it had been used previously, because it seemed that none of the available programs were adaptable enough to fit the needs of his students. He, like many other teachers in the field of deaf education, mourned the lack of educational materials and, in this instance, computer programs that were specifically designed to meet the needs of deaf youngsters, especially those with learning disabilities. At the end of the school year, however, there was a new series of lessons on the computer specifically designed for the type of student that he had in his class, and he became one of the most consistent and enthusiastic users of the computer. The resultant changes that occurred in his students' attitude and behavior in the classroom were remarkable, and he has indicated an eagerness to assist us in the coming year in development of new programs for students with learning disabilities.

The fourth objective for this school year was to increase student interest and reinforce attitudes of independence and positive self image in the students. We hoped that we could provide some students with minimal programming abilities and all students with successful computer activities and experiences.

In speaking of the students at CSD, it is important to note that the school, which accommodates grades K-12, is broken down so that the

three major segments (Elementary, Junior, and Senior High School) are actually physically set apart from each other. In this section I have chosen to speak of the elementary school first, and then of the Junior and Senior high schools together.

Initially, there were not very many materials available for elementary school children. The problem was not a lack of interest, but rather a lack of programs. This began to change when a small number of elementary school students began to come to the resource center after school. Their obvious delight in discovering the computer was quickly communicated to their comrades, who quite vociferously communicated the same to their teachers. The teachers began to schedule their classes for computer time, and as the students began to show their teachers what they had learned on the computer, the teachers began to have ideas for new programs of their own. These new programs were developed as quickly as possible and the elementary school became a large part of our population of consistent users. The teachers repeated again and again how excited the children were, and how much they looked forward to coming to the computer center. One week a teacher forgot to come to the computer room, and her students were so dismayed that they had missed their computer time that she hurried over on her lunch hour to arrange for a special time slot that week for her class. One little boy, who was a fairly hyperactive youngster, could not come to the computer center with the rest of his class because he had a speech class at that time. He was extremely upset and we finally settled on a time slot when he could come over and use the computer independently. This worked well because his teacher, who operated her classroom on a contract basis, stipulated that unless he did his work in class he would not be allowed

to come to the computer room. The transformation that occurred in this child was encouraging: he only missed his computer time once because of misbehavior in class.

The other students (junior and senior high school students) made extensive use of nonscheduled computer time as well as appearing frequently at the door with requests for independent programming or lesson work. It was the junior high school students who created the need for the Wednesday evening session, and it was the high school students who created the need for open scheduling during lunch hours. In fact, before guidelines were set for lunch hour usage, it was not unusual to see a large group of students gathered about the door to the computer center waiting for an empty seat at one of the terminals. Their obvious enthusiasm delighted us but their presence in the hallway disturbed other classes in operation at that time, hence the guidelines.

Student interest in the computer also prompted one of the science teachers to obtain approval for a new elective, called Computer Science. It was offered for the first time in the second semester of the school year 1974-75, and eight boys and girls took the course. They learned how to program in both PILOT and BASIC programming languages and in one semester authored 80 to 100 "mini" programs along with one major independent program, a basketball game called BASKET, which they rewrote for our system.

The fifth and final objective for this computer education project was to evaluate the effectiveness of the project itself. Attitude surveys were given to teachers and students several times throughout the year. Close inspection was made of the amount of student and teacher usage

of computer time, and solicited and unsolicited testimony was given by teachers and students. The survey sheets, as well as the results, are included in the appendices of this paper, which is available upon request. There were, of course, those teachers who decided not to include computer-related activities in their lesson plans. These were mostly teachers who operated within self-contained classrooms and felt that the computer at this point did not fulfill their needs. There were, among the School's faculty population of 46 (excluding vocational instructors), only two teachers that had distinctly negative feelings toward the computer program, and it is hoped that with the continuing development of new programs and on-going idea sharing that these teachers may be persuaded to try the computer again.

SUMMARY

The success of the computer program at CSD was demonstrated by a significant increase in its use by the students and teachers. Also significant was the fact that what started out as mainly a senior high school activity reached down into the junior high and elementary schools, where a great deal of enthusiasm and interest was generated. The increased usage coupled with the attitude of students and faculty toward the computer made 1974 to 1975 the beginning of computer education at CSD. As the faculty became more involved with the computer, it became a larger part of the on-going, changing curriculum. Initially, the computer had been considered an expensive media for drill and practice. The people involved in our computer education project wanted to expand beyond drill and practice, to find more creative uses for it.

We feel that the computer, as it is for the child of today, will be more than just an instructional tool for the adult of tomorrow. It will be a necessity.

The knowledge of computers that these children are acquiring today, from elementary school all the way through college, can and does lead to very realistic employment opportunities in the adult, hearing, work environment. We are all committed to seeing that these children begin with at least equal opportunities as adults; think of how much farther ahead they will be with this kind of knowledge!*

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* We will gladly share any and all information and/or materials at our disposal. Please contact Mr. Jacob Arcanin, Assistant Superintendent, California School for the Deaf, Berkeley, California.

APPENDICES

The directory was organized in the following manner. A subject code was developed giving each subject area--reading, language, math, science, social studies, and miscellaneous--a code letter. Then the model code showed what particular model that lesson was in. A level code indicated whether the lesson was appropriate for elementary, junior high, or high school students. Finally, each item included a one line description of the lesson. Following is a brief portion from the directory:

SUBJECT CODE	MODEL CODE	LEVEL CODE
R - reading	M - MAIN	E - Elementary
L - language	Q - QUE	J - Junior High
M - math	H - HANG	S - High School
S - science	D - DRILL2	
W - social studies	G - GAMBO	
X - miscellaneous	C - COPYX	
	S - $SPELL	
	V - VOCAB	
	K - $SCRAM	
	I - INDEPENDENT	

L 1 C J ARBUTH 10 COPY PROGRAM: 3- to 6-letter words

This line would tell a teacher that it is a language program in COPYX for junior high students. The teacher is Ms. Arbuthnot who has written a series of lessons and this is lesson number ten where words with three to six letters will be crossed out as students attempt to learn how to spell these words.

CAI TEACHER EVALUATION

1. How often do you use CAI? Never 15% Once every two weeks 2%
   1-2 times a week 52% 3 or more times a week 20%
   As often as possible 3%

   Comments:

2. Did you find the extra time involved in CAI preparation worthwhile or an added burden to your present schedule?
   Worthwhile 95% Burdensome 5%

   Comments:

3. Did you use CAI to teach new concepts or as a supplement to to concepts previously taught in the classroom?
   New Concepts 15% Supplement 85%

   Comments:

4. Do you have any comments, suggestions, criticisms, etc.?

CAI ELEMENTARY EVALUATION

1. Pick one picture and tell me which is the best way to learn.
(See pictures, appendix iii (2 of 4)

1 - 45% ("CAI")

2 - 24% (Drawing or Writing)

3 - 18% (Teacher)

4 - 0% (Peer contact)

5 - 12% (Reading)

2. What do these faces mean?
(See pictures, appendix iii (3 of 4)

How do you feel when it is time to go home on Friday?

How do you feel when your teacher sends you to Miss Shellgrain's office when you are being bad?

How do you feel when it is time to go to the computer room?

88% - Happy

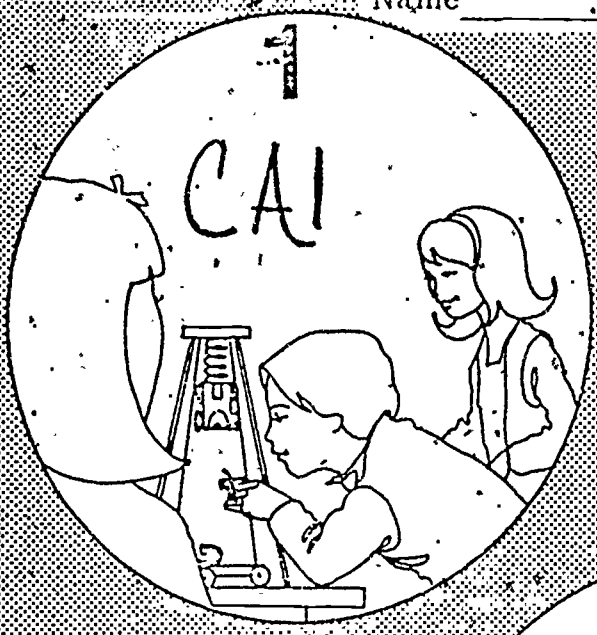
0% - Sad

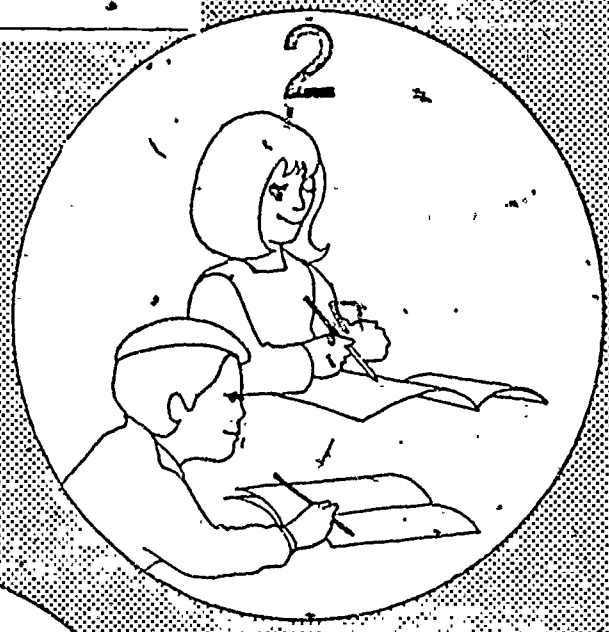
0% - Angry

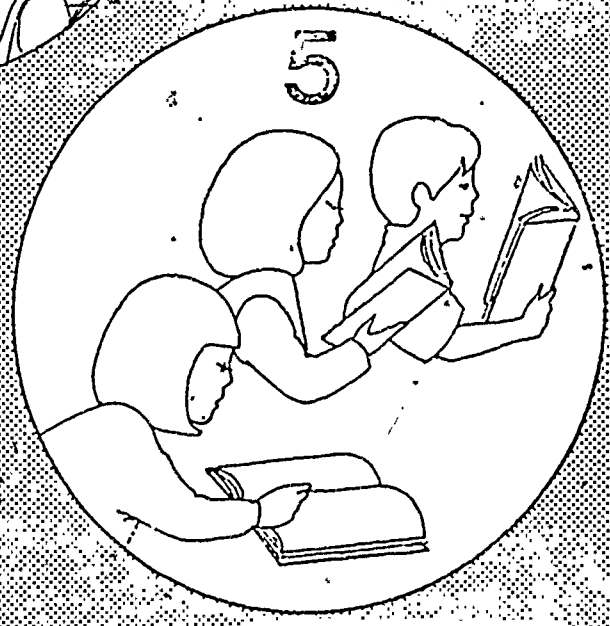
12% - Indifferent

Appendix iii (1 of 4)

Name _____



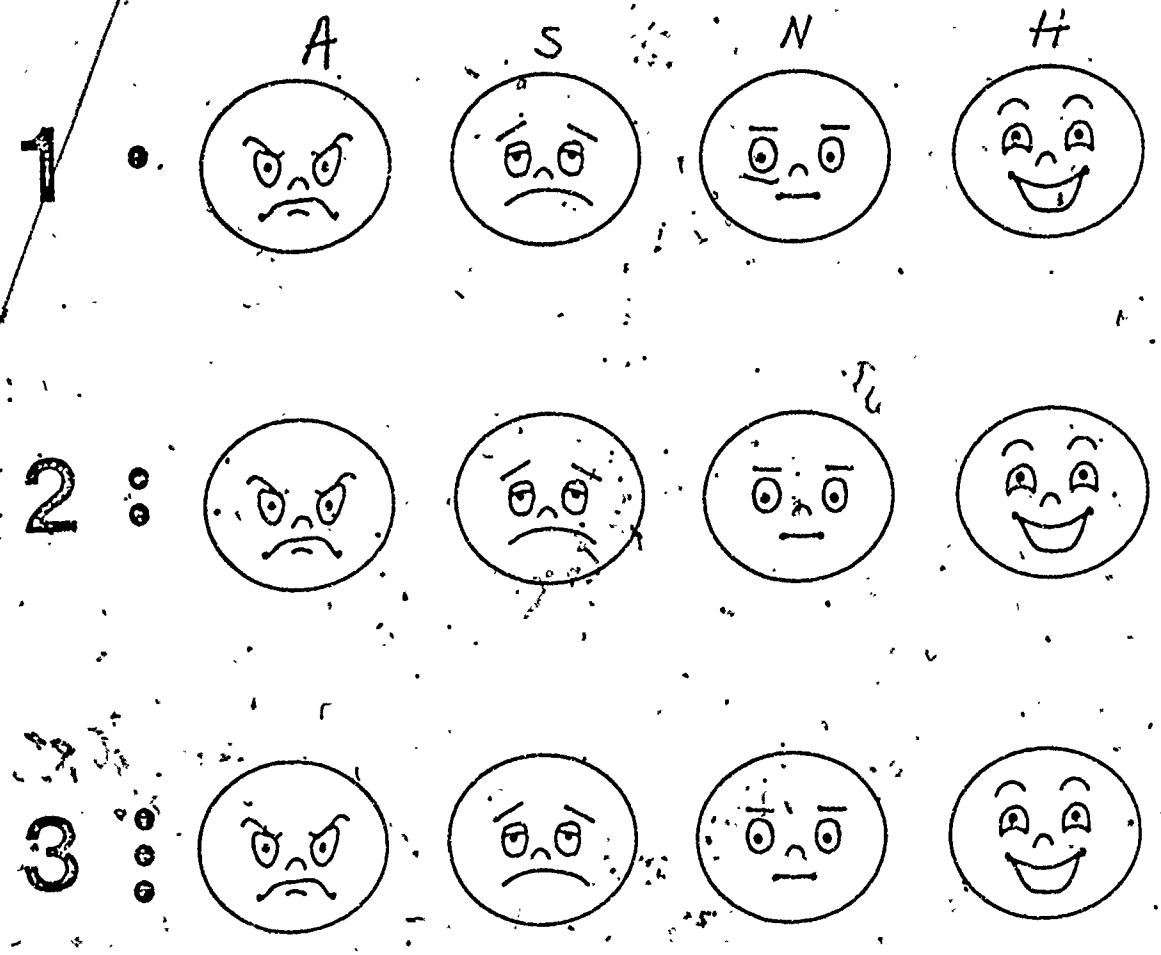




Our Science Class

Appendix iii (2 of 4)

Name _____



Faces

CAI STUDENT EVALUATION

Junior High & High School

(Distributed to 100 students, with 33% return)

1. How many hours a week do you spend in the CAI room?

   None ___ Less than 1 ___ 1-2 ___ (3-4) ___ More than 4 ___

2. Of the time spent in the CAI room, how much was actually spent working on lessons rather than playing games?

   Most of the time ___ (Half of the time) ___ All of the time ___

3. Which of the following do you consider the best way to learn?

   a. Reading about it in a book ___
   b. Listening to a teacher ___
   c. Sharing ideas with friends ___
   d. Working on a CAI program ___
   e. Drawing or writing about it ___

   } evenly distributed

4. How do you feel about each of the ways of learning above?

   a. Interesting - Fair - Boring
   b. Interesting - Fair - Boring
   c. Interesting - Fair - Boring
   d. Interesting - Fair - Boring
   e. Interesting - Fair - Boring

   } directly correlated with question #3

5. Write a brief paragraph explaining how you feel about CAI - a good learning experience, frustrating, exciting, boring, fun, etc.

CAI-CSD DIRECTORY QUESTIONAIRE

1. Does this directory make it easier for you to find programs?

   Yes (circled) ____ No ____

2. How often do you think you will use it?

   -one time a day ____
   -once a week (circled) ____
   -twice a week ____
   -once in two weeks ____

3. How often do you use programs other than your own?

   Often 35% Sometimes 35% Never 30%

4. Do you have any suggestions or comments regarding the directory?

Data: Models, Programs, and Lessons

General Category	Student Programs	Author Programs	Assoc. Utility Programs	Number of Corres. Teacher-Authored Programs	Average Time of Lesson in Min.	System Utility Programs
Models	QUE	QUE*	QTRANS	236	13.9	REPORT
	QUES	QUES*	QDEL		9.7	EDIT
	MAIN	MAIN*	USAGE 2	71	9.6	TAPE
	HANG	HANG*	CRUSH	13	10.6	FSTRUC
	COPYX	COPYX*		61	10.4	
	WWI	WWI*				
	TEXT	TEXT*				
	DIREC	DIREC*				
	SPELLX	SPELLX*		2		
	VOCAB	VOCAB*		1		
	PASSWD	PASSWD*				
Independent Programs	VANISH				5.6	
	DRILL				12.6	
	DRILL 2					
	LINE					
	PASS					
	SEARCH					
	TRAP					
	PALI 6				6.2	
	SUPERO 4				7.3	
	NUMZAP				6.7	
	NUMIOO				11.7	
	GAMBO					
	WALL					
	DRIVER					
	COMUNE					
	PHEMES				3.3	
	STORY					
	BASKET †					
	GRAPHS †					
	GRADES †					
	LETTER †					

† CSD teacher- or student-authored

Data: Models, Programs, and Lessons
(continued)

General Category	Student Programs	Description of Programs
Existing Games and Simulations Available	AMAZIN	Make a maze of your own.
	AWARI	Ancient African strategy game of seeds sown in pits.
	BATTLE	Sink battle ships given coded coordinates of ships.
	BIOSIN	Plots user's metabolic cycles ('bio-rhythms')
	BLKJCK	Play 'blackjack' with the computer.
	BUFLO	Control the ecology of a buffalo herd.
	BUTTON	Guess who has the button passing around the circle.
	CHARGE	Millikan's oil drop experiment (H_2).
	CHASE	Find the mouse for CRT terminal.
	DRAG	Design a car for the 1/4 mile drag race.
	EQUALS	Number game using simple algebraic sentences.
	FTBALL	Squash the 'computer bugs' offense.
	GIANT	Prints giant sized letters.
	GOLF	Play golf.
	HNGMAN	'Hangman' with choice of categories.
	JACK	Story about Jack and the Beanstalk you help write.
	JOB	
	KING	Direct the economy of an ancient kingdom.
	LANDIN	Land a rocket on the planet of your choice.
	LOCKS	Use deduction to pick locks and open a door.
	LUNAR	Land a rocket on the moon.
	PICTUR	Offers menu of pictures and prints out your choices.
	PILOT	Executes 'pilot' programs (similar to 'nylon')
	POLLUT	Effect of waste on water quality.
	POSTER	Creates large letter posters.
	QUBIC	3-D tic-tac-toe in a 4 X 4 X 4 cube.
	REVERS	Get the numers in the right order by reversing them.
	SCIFI	Writes fantastic science fiction stories.
	SCRAM	
	SCRAM*	
	SIMNIM	Numerical elimination game of 'nim'.
	SPELL	
	SPELL*	
	STARS	Guess a number with stars as clues.
	STICKS	A version of 'simnim' for younger kids.
	STOCKS	
	TESTTY	Tests printing operation of the teletype.
	WFF	Logic game of letter patterns ('wff' and proof).
	WORDS	Guess a secret word given numerical clues.
	ZEROS	Build bridges in number elimination game.

This is an example of a lesson in the model called "MAIN".

It has a multiple-choice format.

STORY 4 STATUS= ACTIVE NO MF CLUES QUESTIONS = 19

```
!01
ON ENTERING THE HOUSE, THE BURGLAR GUESSED THAT THE WIFE WAS -----.
A. PROBABLY ON THE THIRD FLOOR ASLEEP.
B. STILL AWAY ON VACATION.
C. HELPING HER HUSBAND UNDRESS.
!C3B
!02
THE BURGLAR IN THIS STORY WAS ------.
A. A LOW CRIMINAL.
B. AN ORDINARY THIEF.
C. A GENTLEMAN THIEF.
!C3B
!03
THE FURNITURE IN THE HOUSE ----
A. SEEMED TO BE VALUABLE.
B. LOOKED OLD AND WORN.
C. WAS STILL COVERED.
!C3C
!04
WHEN THE BURGLAR WENT UPSTAIRS, HE FOUND THE HUSBAND ----.
A. EATING DINNER.
B. IN BED
C. DRINKING WINE.
!C3B
!05
AT THE BURGLAR'S COMMAND, THE CITIZEN RAISED ----.
A. BOTH ARMS.  B. ONLY HIS RIGHT ARM.  C. ONLY HIS LEFT ARM.
!C3B
!06
RHEUMATISM IS A DISEASE WHICH AFFECTS THE -----.
A. LUNGS.  B. THE BRAIN.  C. THE JOINTS.
!C3C
!07
WHEN ASKED ABOUT RATTLESNAKE OIL, THE BURGLAR SAID -----.
A. HE HAD USED GALLONS OF IT.
B. HE HAD NEVER TRIED IT.
C. HE HAD NO RATTLESNAKES.
!C3A
!08
THE CITIZEN SAID HE HAD ----.
A. SPENT A THOUSAND DOLLARS WITHOUT GETTING ANY RELIEF.
B. SPENT A COUPLE OF HUNDRED DOLLARS FOR MEDICINES.
C. SPENT A MILLON DOLLARS FOR A REMEDY.
!C3A
!09
```

Appendix vi (1 of 4)

This is an example of a lesson in the model "GUE".

It has a fill-in-the-blank format.

LIST OF LESSON
SUBJECT CODE: E2 36 11:34 04/02/75
PTION: S

STIMULUS # 1
CHANGE TO NEGATIVE FORM, USING 'NOT':

HE STUDIES IN OUR CLASS.
ACCEPTABLE RESPONSES
[DOES NOT STUDY], DOES;NOT;STUDY

STIMULUS # 2
THEY GO TO THE MOVIES EVERY NIGHT.
ACCEPTABLE RESPONSES
[DO NOT GO], DO;NOT;GO

STIMULUS # 3
SHE COMES TO SCHOOL BY BUS.
ACCEPTABLE RESPONSES
[DOES NOT COME], DOES;NOT;COME

STIMULUS # 4
I KNOW HIM VERY WELL.
ACCEPTABLE RESPONSES
[DO NOT KNOW], DO;NOT;KNOW

STIMULUS # 5
IT RAINS VERY OFTEN DURING THE MONTH OF APRIL.
ACCEPTABLE RESPONSES
[DOES NOT RAIN], DOES;NOT;RAIN

STIMULUS # 6
THE DOG RUNS AFTER THE CAT.
ACCEPTABLE RESPONSES
[DOES NOT RUN], DOES;NOT;RUN

STIMULUS # 7
OUR CLASS BEGINS AT EIGHT O'CLOCK.
ACCEPTABLE RESPONSES
[DOES NOT BEGIN], DOES;NOT;BEGIN

STIMULUS # 8
IT ENDS AT TEN O'CLOCK.
ACCEPTABLE RESPONSES
[DOES NOT END], DOES;NOT;END

STIMULUS # 9
THE BUSES STOP ON THIS CORNER.
ACCEPTABLE RESPONSES
[DO NOT STOP], DO;NOT;STOP

This is an example of a lesson in the model "HANG".

These new vocabulary words are used in a game of "hangman", with clues.

STORY4 STATUS= ACTIVE CLUES NO.OF WORDS= 14

1 SYMPATHY
THE ACT OF ENTERING INTO OR SHARING THE FEELINGS OR INTERESTS OF ANOTHER

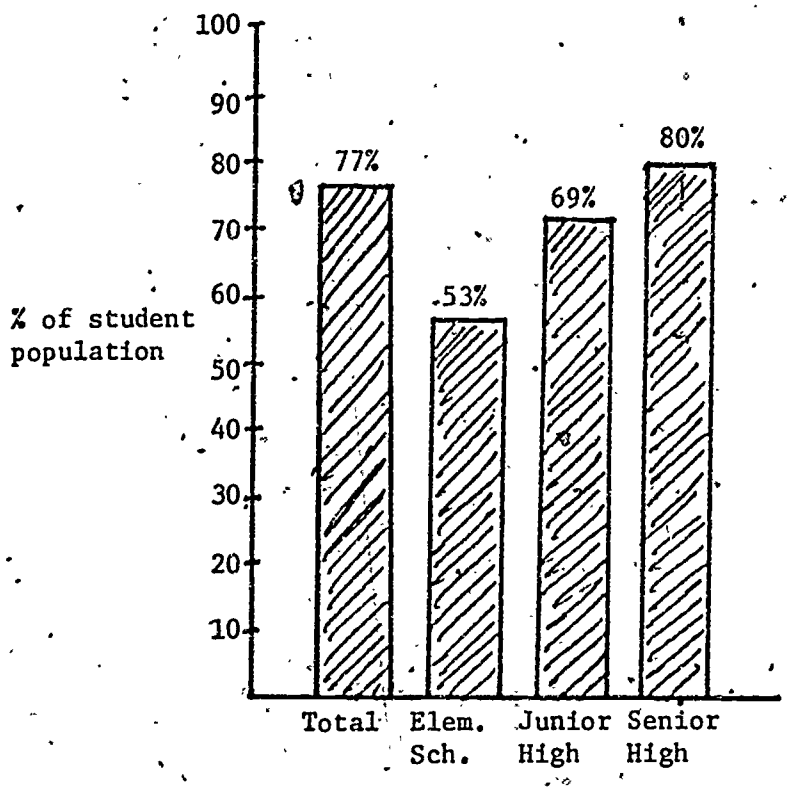
2 BURGLAR A PERSON WHO COMMITS BURGLARY; A THIEF
3 RESIDENCE THE PLACE WHERE ONE LIVES
4 PLAIN CLEAR; OBVIOUS
5 ORDINARY USUAL; NOTHING SPECIAL; COMMON
6 REVOLVER A HANDGUN
7 THREATENING
ACT OF GIVING WARNINGS; EXPRESSING INTENTION TO INFLICT INJURY
8 RHEUMATISM A KIND OF DISEASE THAT AFFECTS THE JOINTS
9 TWIST CONTORT
10 RELIEF REMOVAL OF SOMETHING PAINFUL OR DISTRESSING
11 SUDDEN FAST; UNEXPECTED
12 SWELL TO INCREASE IN SIZE, EXPAND
13 FORECAST FORETELL
14 BOND A TIE OF LOYALTY OR FRIENDSHIP

This is an example of a different format used in the model "GUE".

The student must "unscramble" each word and type in the correct spelling.

```
TYPE SUBJECT CODE: [FINTH]
TYPE OPTION CODE:  M
TYPE PASSWORD:  PASS

STIMULUS:
MHA
ACCEPTABLE RESPONSES:
[HAM],


STIMULUS:
MYSA
ACCEPTABLE RESPONSES:
[YAMS],


STIMULUS:
OLEJL
ACCEPTAELE RESPONSES:
[JELLO],


STIMULUS:
LORLS
ACCEPTAELE RESPONSES:
[ROLLS],


STIMULUS:
PALPE EPI
ACCEPTAELE RESPONSES:
[APPLE/PIE],


STIMULUS:
ETSEB
ACCEPTABLE RESPONSES:
[BEETS],


STIMULUS:
EVLIO
ACCEPTAELE RESPONSES:
[OLIVE],
```

Individual Student Usage



NOTE: All students had the opportunity to use the computer at least once during the school year. These data represent only the consistent users, in an average week.

Example of Comments by Students

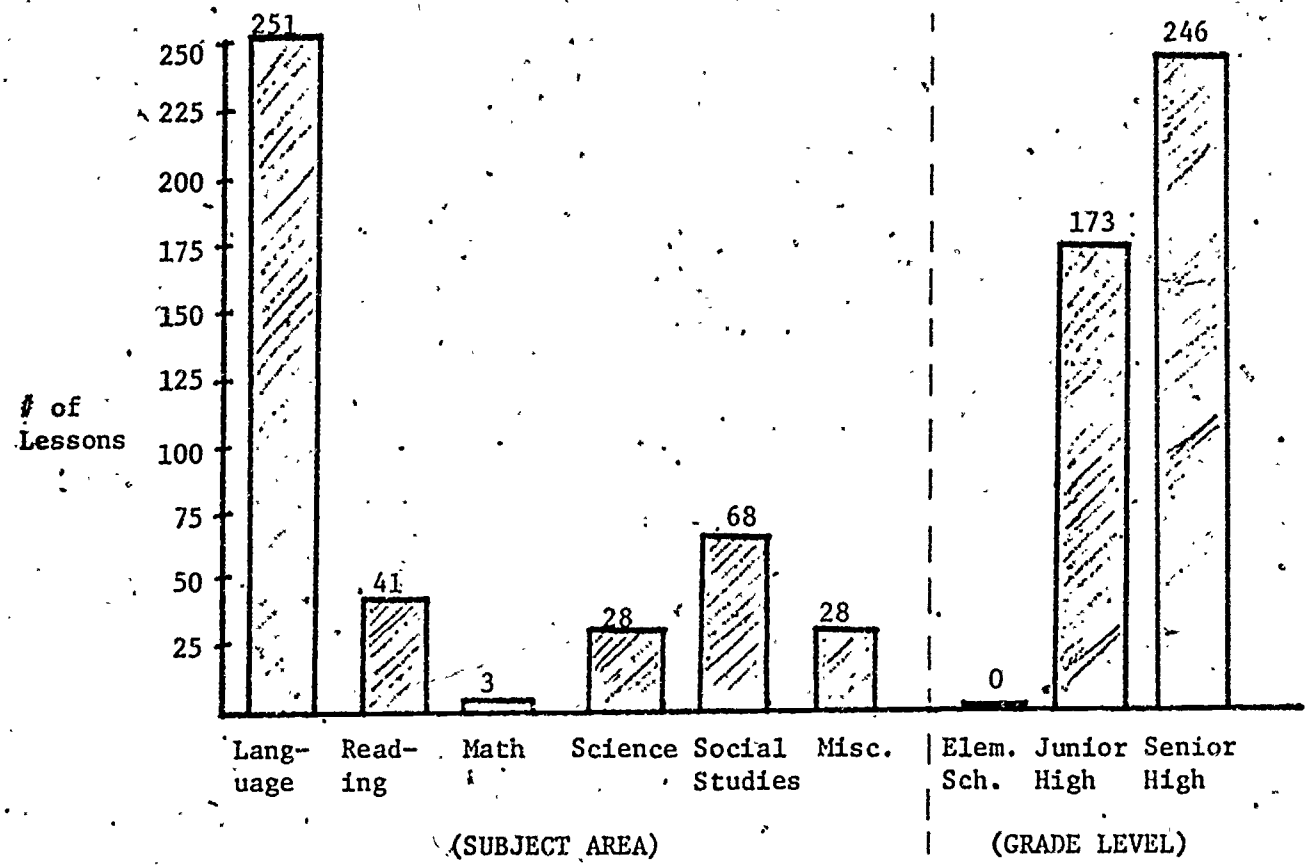
Junior high school:

1. Fun! We love (to use) it. It is a better way to learn new words.
2. More interesting. I am not bored a lot.

High school level:

1. It tells me the right answer fast, it is good.
2. You do your (own) work and no one can copy (it).
3. If the teacher is busy (in the classroom), you need to wait. With CAI you (can) answer your (own) questions.

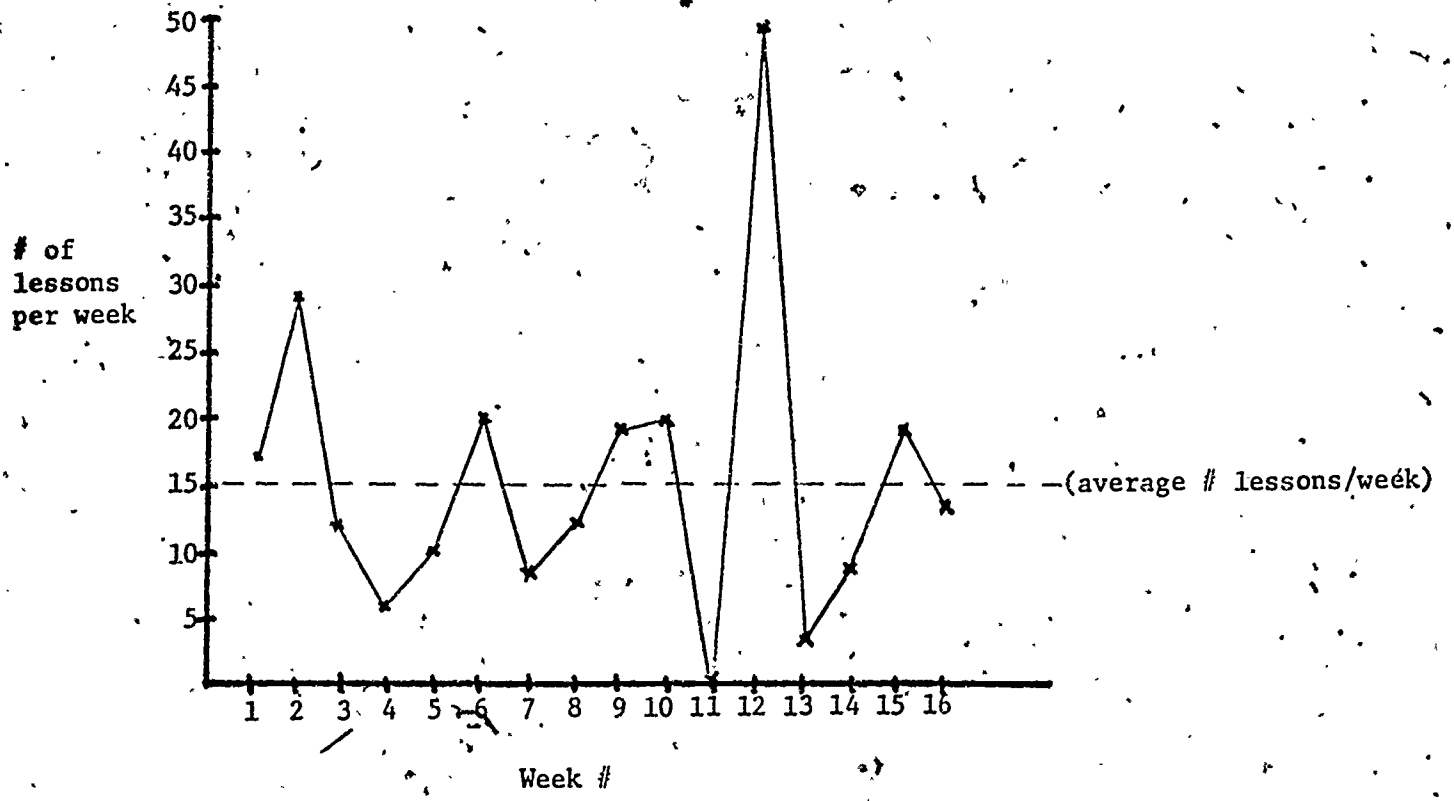
Teacher-Authored Lessons:



NOTE: total number of all lessons in all areas = 419

Appendix viii (1 of 2)

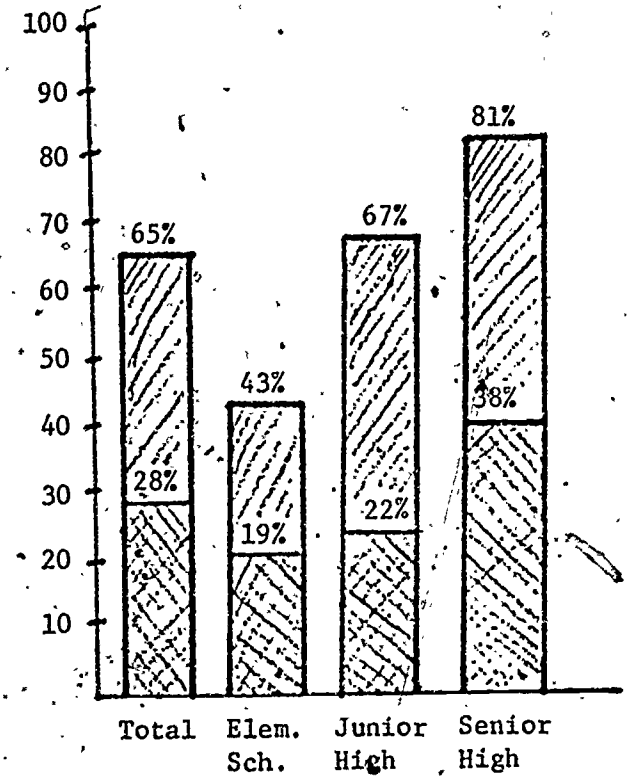
*Number of teacher-authored lessons per week



NOTE: approximately 70% of consistent users authored their own lessons, and 36% entered their lessons on the computer by themselves.

* (See appendix v for complete data on all models, programs and lessons authored in conjunction with this project.)

Teacher Usage



(*) % of staff population

(*) Excluding vocational teachers

Appendix ix

TEACHER OPINION SURVEY
December, 1974

TEACHER	COMMENTS
Mr. Bringer-Dr. Ed.	Feels it's excellent support for the classroom, especially as drill for his students as they study for driver's tests. The hangman game is unnecessary can't the program merely state right or wrong without the picture? Has specific times needs to use it each month and can't get in.
Ms. Tiano-Hst., Dr., Soc. Gu.	Loves it! Testing and drill using CAI is much more motivating that the same thing on a ditto; student may retain more and try harder. Would use it all day if could.
Ms. Swaim-Math	Enjoys it, but so bogged down with paper work as it is that it's hard to find time to write programs. It's easier sometimes to use a ditto.
Ms. Winters-Eng., Wr., R.	Educationally useful in her classes. Likes "main" and hangman' but would enjoy seeing more and new system to offer materials to students-anything that works is fine. Her slow classes especially enjoy the positive reinforcement as they the programs on their lunch hour.
Ms. Curry-Geo., Hst., Eng.	Excellent reinforcement for kids. Feels picks up more than from a ditto. Very time consuming to write programs, but it is worth the trouble.
Ms. Johnson-Math	Enjoys drill 2 - really motivates the kids good competitive tool. Can't get in enough.
Ms. Ford-Eng., Wr.	Great! Gives students instant feedback. It's individual and although not as warm as teacher 1-1 basis it's an answer to the "individualized method." Wish she had more time to write programs because it sure saves on paper work.
Ms. Myers-Lit., Lang.	Opinion limited to not enough usage, but feels it can be educationally beneficial. Difficult sometimes to fore warn not coming at scheduled time due to last minute schedule changes, etc.
Ms. Renzulli-Lit., Lang., R.	Great! Motivating. Classroom materials applied to CAI very useful. Need more morning time (8:15, 9:00).
Ms. Burdett-Science	Has her programs typed into CAI, now just needs more time for it's excellent practice and a good learning (memorizing) tool.

December

TEACHER	COMMENTS
Ms. Hackett-R., Eng., Wr.	Loves it. Students love it. Enjoys writing her own programs because she knows what will be in them. No problems. Would like set times 1 or 2 times a week.
Ss. Wecht-R., Wr., Sp.	Excellent for English, but with Reading (unless vocabulary) it's limited. Loves it. Just wants more time. Flexible scheduling fine with her only want more slots.
Mr. Smith-Lst., Geo.	Hard to find times compatable with his classes, but does want to use it. The idea of writing his own programs is best-although they take time; it's worth it.
Mr. Gastman - 6th gr.	(His class is emotionally-hyper boys.) He feels his class wouldn't benefit as greatest amount of time would be spent supervising. Kids he took before enjoyed it (fun and games) but didn't understand what he was doing. Programs not elementary enough.
Ms. Stevens-6th gr.	Her main concern is programs not being put on the machine in time-she sent them in 1 week ahead. She'd also like to review the program before her students use to check for errors or ideas that might be harder than she expected. Excellent for drill, reinforcement interest. Kids love it and she's trying to sell it to other teachers who have expressed interest in-service sessions for elementary teachers would be great.
Ms. Pollock-6th gr.	Feels the same as Ms. Stevens about previewing programs, especially when a program is not one she specifically wrote herself. (Ex.: Asked for a program on graphing and later found it too hard for her kids). This may have been due to not knowing enough about CAI to ask or give proper instructions for the program she desired. Is it possible to have varying degrees of difficulty in one program? Would like more elementary spiraling type programs for math. Needs more knowledge to write them.
Ms. Lee-6th gr.	Has not used CAI due to illness. Has not used it this year. In past found it motivating to the students - helpful especially in math with the slow students. Programming is a little time consuming.

December

TEACHER	COMMENTS
Ms. Potwin-Lang., R., Art	Would like to use it more, but the time it takes to write a program is the problem.
Ms. Hahn - Math	She's had difficulty getting her programs into the machine. Dislikes games; wants drill only. The time limits the CAI puts on drills excellent practice that classroom can't give as effectively. Stops students from using fingers to count.
Mr. Finneran-Geo., Hst., Eng.	He uses it when possible and really likes. Finds it motivating. (Did not talk with him personally)
Mr. Mikos-W. Cul., R., Geo.	Hasn't used it yet, but wants to in his history class. He would like it once a week from 9:00-9:45 -any day-oh boy!
Mr. Jacobs-Math	Talked about using CAI for a Deaf Culture class. He said maybe, but would like a program written for it. With a set of his objectives, could one be written? Very time consuming to write own programs.
Mr. Srnka-Eng., Wr., Sp.	Feels there's a need for clerical assistance for the proctor in writing (typing) programs into the machine. Also something should be done concerning the erasing of programs. Especially benefical for slow classes prefers specific times consistently 9:00 (20 min.) W./9:45 (40 min.) F.
Zawolkow-Sc., Chem., Phys.	Feels it's motivating to the kids, and good to familiarize students with computer; as they are becoming as an important means of communication, figuring problems, etc. as any of the contemporary techniques. It also is a means of figuring more difficult problems that might be impossible with a ditto-a more sophisticated computing methods. Also- limit the number of times one can sign up a week.
Mr. Baim - Science	He hasn't used it as yet due to the lenght of time required to write a program. Feels it is of benefit educationally.
Ms. Caughrean - Science	Would love to use it, but never found any times open. Hopefully a new system will be helpful to these teachers not able to sign up until later prep times.

December

TEACHER	COMMENTS
Ms. Williamson-Self-contained	Practice drills on materials good for slower students but bright kids get 100% the first time and it's difficult to write a program at various levels of difficulty and still keep all at the same point. For bright ones it's a game (busy work). Feels dittos can keep students at own rate. Machines are hard to make up if student misses, while dittos can be.
Ms. Galvan-English	Hard and time-consuming to write programs. Difficult to get them into machines on time. Good learning tool for students. Would like to know more about programming. Likes cubicles.
Ms. Lundmark-Self-cont.	Has a slow class. CAI good for a change of pace for them but sometimes additional work for the teacher. She prepared a program for CAI and then gives the students a ditto the same as the program; they need this for comprehension. Sometimes programs not ready even when turned in advance.
Mr. George - Self-cont.	Has a very slow class. Doesn't feel its beneficial to them. CAI is merely a different method than a ditto. The students don't seem that motivated! Programming has been a hassle do to erasing.
Ms. Coleman - English	Loves it! No problems, except for one erased program kids really excited to use it.
Mr. Hutchins - Social Science	It gives a great variety in lessons that might otherwise be boring. Would like more consistent use of the machine.
Ms. Arbuthnot-English	Enjoys it extremely well. She has a program she has written that other teachers have also used; Arbuth I hope more teachers try this.
Mr. Clemens - Science	Enjoys it, but too many technical fowl-ups lately. When this occurs it is a waste of class time. Very motivating when lessons are ready to go.
Mr. Jordan - Math	Agent all week - attending conference. Proctor said he uses CAI faithfully for all his math classes.

Teacher Opinion Survey
February, 1975

The second survey showed a little more sophistication in the uses of the computer. Teachers used it for testing purposes, for reviewing units, for improving reading skills, and for increasing proficiency in following directions. Teachers felt that with computer-related activities automatically incorporated into their lesson plans, time could be saved on paper work. They felt it was valuable in that it gave students instant feedback and, although it was not as warm as a teacher's individualized instruction, it was one answer to teaching on a one-to-one basis.

The following general questions were asked in the survey and the accompanying responses received:

1. Is the computer a better means of learning the same material in the classroom?

   . . . It depends upon how the lesson is programmed. With the proper programming skills, it can be a much better means than the classroom.

   . . . Not really better than classroom instruction, but it just gives variety to the way in which to teach the material.

   . . . Immediate reinforcement, more individualized type of learning with the computer, as it is difficult to get to each student individually. The machine "temporarily" replaces the teacher.

   . . . No. I don't use the computer for items I could use in the classroom. CAI is a supplementary tool.

. . . Yes. It forces the students to work at a quicker, regulated pace. Lessons must be finished and not put off until later. Putting things off is easier to do in the classroom than with the computer. (Students don't really want to put it off when using the computer; it's a challenge to "beat" the machine.)

. . . Classroom time often doesn't allow a student a second chance if he errs. With the computer, I feel the option to repeat a program to correct and learn from errors is more readily available.

2. What improvements (or do you see any) are apparent in your students?

. . . Their reading has improved. I feel it's the constant "push" that they have to read a program's instructions or a question in order to complete a lesson.

. . . Follow instructions much better.

. . . More enthusiastic to learn the same materials that they's been learning in the classroom.

. . . None really. Just a "lollipop" for good work or behavior.

. . . A general improvement in drills of basic numbers. Memorization easier and retained longer.

. . . Reasoning abilities progressing.

3. Do you use the computor for teaching things that are difficult or impossible to teach in the classroom?

. . . Few teachers do as many are still at the "glorified ditto" stage due to lack of programming knowledge. (This is why a workshop in programming would be valuable!) Teachers have expressed a desire to use more "sophisticated" programs for lessons, but again lack the skills.

. . . Yes. One to three teachers have progressed beyond the ditto stage and do utilize programs that would be much more difficult to teach in the classroom.

Teacher Opinion Survey
May 1975

The following are examples of teacher comments from the survey in May:

. . . At first I felt I didn't have time to work computer-related activities into my schedule, but after seeing how much the children enjoyed it and what good (and painless) reinforcement it gives them, I wish I had started using it in September. (Elementary teacher.)

. . . The directory and availability of viewing other programs is great; a very well organized operation! The computer resource center is an incentive for teachers to plan well in order to effectively use it in their classes. (Junior high teacher.)

. . . I'd like to use the computer in as many other areas as possible, utilizing other teacher's programs for my classes. (Elementary teacher.)

. . . Could you teach the machine to sign?! (High school teacher.)