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ABSTRACT

Presented is the final report of the 3 year reading curriculum development project (funded under Title VI) for 40 educable mentally handicapped children in Wakulla County, Florida, which centered on the development of computer assisted (CAI) instructional materials in a programed format. Described for the first year of the program is formative evaluation of reading materials, all of which were presented by the computer. The second year is explained to have been devoted to converting from the CAI mode to computer managed instruction in which only periodic testing was done by computer while off-line instruction was provided by lesson booklets. The entire system of supplementary instruction is said to have been presented without the computer during the third year. Following are some of the conclusions of the program: additional materials on word attack skills were found necessary, EMR students appeared to need even more repetition and drill than originally thought, significant gains were demonstrated by the 40 students for whom complete data were available, and students who took more time in responding to test items on the computer tended to demonstrate more gains in objectives passed on the posttest. Appendixes include samples of original and revised programed formats, the test used for pretest and posttest, program memos regarding computer procedures, and a project questionnaire. (DB)

Wakulla County Title VI-B

READING CURRICULUM DEVELOPMENT PROJECT

Final Report

June 31, 1973

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FINAL REPORT

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Prepared

by

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SECTION I. INTRODUCTION

This document is a final report of the second year of the Wakulla County Title VI-B Project, Reading Curriculum Development Project. The purpose of the project was to develop reading materials which could be used to supplement instruction in classrooms for educable mentally retarded (EMR) children.

As originally conceived the first year would be devoted to formative evaluation of reading materials in a computer-assisted instruction (CAI) mode. All materials were presented by the computer via a teletype in the classroom. The second year was to be devoted to converting from the CAI mode to computer-managed instruction (CMI) mode, in which only periodic testing was to be conducted via the computer and off-line instruction would be provided by lesson booklets. During the third year the entire system of supplementary instruction was to be presented without the computer.

In this document there is a summary of Year I activities (See Section II), and evaluation of the three project objectives for Year II. In Section III, Evaluation of Project Objective 1, is reported the evaluation of the development of individualized, computer-managed reading materials. This includes determination of a hierarchy of objectives, revision and addition of materials, description of the CMI materials, the branching technique, format of off-line lessons, the pretest, and reliability of on-line lessons.

In Section IV, Evaluation of Project Objective 2, is reported the evaluation of the efficacy of CMI reading materials. This section

includes analysis of the pretest in terms of validating the sequence of objectives and as a diagnostic placement instrument, description of the EMR students, classroom procedures, performance on the posttest, variation between classrooms, and recommendations for improvement of the materials.

In Section V, Evaluation of Project Objective 3, is reported the exploration of an approach to intellectual evaluation of the mentally retarded learner utilizing the continuous monitoring and performance assessment capabilities of CAI-CMI.

In Section VI, Summary of Conclusions, the evaluation of all aspects of the project are reported in brief form.

SECTION II. SUMMARY OF DEVELOPMENT DURING INITIAL FUNDING PERIOD

During the first year of this project a computer-assisted (CAI) reading program was employed in four classrooms of educable mentally retarded (EMR) students. As information regarding pupil performance became available, various experimental prototypes were developed for identified deficiencies in the materials. During the second year the materials were revised and reorganized to meet the demonstrated needs of EMR students, additional experimental prototypes were developed, and presentational format was revised in order to convert from a CAI mode to a computer-managed (CMI) mode.

Description of the Original Reading Materials. The basis for the sequential reading materials for the educable mentally retarded was a set of instructional units developed for computer-assisted instruction. The program was written for a remedial and enrichment reading program, covering grades one through six, with grade one having three levels. It is these first three levels which are of most importance to the Wakulla EMR project. The rationale for their development and the potential for their use with an EMR audience will be discussed briefly.

The origin of the materials was in a study by Hansen and Rodgers (1965), which was concerned with the vocalic center group, or VCG. The VCG is termed the "minimal construct defined over a set of phonotactic rules," and it defines constraints not only between continuous elements (i.e., consonant-consonant, consonant-vowel, vowel-consonant) but over discontinuous elements such as pre- and post-vocalic consonants:

Material development was pursued on the basis of various aspects of given VCG's: the ease of the rehearsal, the ease of association of the phonotactic (sound) pattern to the orthographic (written) pattern, and the prediction of types of errors the initial reader would make in forming pronunciations for a particular graphic segment.

On this structure, the reading program was developed to include, in grade one, three major categories with choice of words depending upon the VCG restrictions noted above. First, a set of lessons was devised to cover who-what questions. Second, form classes were covered, and third, synonymy lessons were introduced.

Instructional strategies used in the original CAI program were devised for the average school population, and these were considered inappropriate for educable mentally retarded learners. The skills themselves, however, are considered as suitable to EMRs as to general school learners. The changes made were in methods of instruction rather than in the skills themselves.

Description of the CAI Program (Year 1). The basis for the sequential reading material was the VCG-based CAI program which had been written as a remedial and enrichment reading program for the general school population. The reading program included, in grade one, three major categories with choice of words depending upon the VCG sequencing based on aspects noted previously. One set of lessons was devised to cover, within the vocabulary sequencing requirements, who-what questions. A second covered form classes, and a third, synonymy. All of these were at the entering level, and were preceded in the actual program by a set of lessons in letter matching.

The learner who completed the beginning lessons was moved into the second level, or grade, of reading comprehension. At this level and all remaining levels, each unit was composed of a reading passage of controlled reading difficulty, plus seven to fifteen questions of a similar difficulty level. The passages ranged from approximately 100 words at the lowest level, to almost 300 at the most difficult (grade six) level. Questions were based on three comprehension skills: informational recall, inferential processes, and evaluative processes. Within these categories, a total of 25 different types of questions were repeated, with vocabulary sequenced and restricted by the VCG prescriptions and a reading difficulty formula.

Revisions during the first year occurred at two levels. First, curriculum revisions regarding the increases in difficulty of the reading materials themselves had to be adjusted. Second, the method of presentation via computer terminal required modification to suit the characteristics of the EMR learner.

Three major curriculum innovations were implemented during the first year of operation, adapting the program to the EMR learner's needs for very small steps in the progression of learning tasks, much repetition, and constant reinforcement. The first of these involved the construction of a new level of material within the structure of the original CAI reading materials. The original materials consisted of four levels of reading lessons as described previously. In addition to the stepped increase in difficulty between levels, successive lessons within each level were graded in

difficulty, which provided the student with reading experience in gradations of increasing difficulty. Evaluation from prior administrations of the materials, however, led to the construction of new level bridging a gap between the third and fourth levels. This was a move toward providing smaller steps in learning materials for EMR learners.

The second development was based on the finding that approximately one-third of the students could not do the basic lessons without excessive failure. This called for development of small steps, repetitive units covering simple words and word parts presented for the student to match with one of a set of alternatives. The curriculum was augmented by 50 lessons at this point.

The third major curriculum innovation was implemented during the first year to insure that meaning was being acquired from printed words. Pictures were used to help the students attach meaning to the orthographic symbols they were already successfully matching. The success of the use of these materials, both statistically and by observation, led to the addition of numerous materials during the second year.

Revisions in the presentation via computer terminal involved decisions related to timing and feedback, i.e., how long to allow for a response, how many chances to give a correct response, what type of information is given as feedback following a correct or incorrect answer, etc. The first change in the computer strategies was to eliminate the timing constraints in the original program,

thereby providing the EMR learner with adequate time to respond to a question. First, a one minute time out was tried, and then the program was changed to allow the learner as much time as he needed to respond.

Decisions on feedback for the EMR were based partially on the Noonan and Barry (1967) findings that noninstitutionalized retardates perform better under social reinforcement (that is, positive comments such as "well done," or "good answer"). Consequently, the computer feedback was finally modified so that it no longer contained "Wrong" or "incorrect," for wrong answers, but responded with "The correct answer is ____." The correct answer feedback was developed to provide much stronger reinforcement than the original, containing a number of phrases of praise, special groups of stars for certain correct answers, and for every lesson score of 80% or above, the computer terminal printed out a smiling face at the end of the lesson.

SECTION III. EVALUATION OF PROJECT OBJECTIVE 1.

As stated in the proposal the first project objective was to "develop individualized, computer-managed reading materials based on learners performance on CAI reading materials produced during the initial year of the project."

Computer-managed instruction (CMI), the method of presentation during the second year of the project, differed considerably from CAI. Under CMI only testing was presented via the computer terminal with instruction conducted off-line by programmed lessons. Under the CAI mode all instruction had been presented via the computer terminal and a student was branched to a more or less difficult lesson on the basis of his score on each lesson. Under CMI mode, a pretest via the computer terminal was given for a number of lessons and the individual was assigned the amount of instruction which appeared necessary on the basis of that pretest score.

In order to convert the reading materials from the CAI to the CMI format, the order of presentation was restructured, the materials were reorganized and revised, new materials were developed, a branching system for the computer prescriptions was developed, and a written pretest covering all objectives in the CMI curriculum was prepared.

Under CAI the lessons had been arranged by level of difficulty in two dimensions as shown in Figure 1. During CAI it was possible to use the two dimensions of difficulty (difficulty of skills and difficulty of content level) in the branching procedures; however, it was apparent that such a complex system would not be feasible

under CMI. It was, therefore, necessary (1) to deduce the hierarchy of skills from the CAI date, (2) to name the objectives in the

Increase in Difficulty of Skills

Increase in Difficulty of Content by Level					
1110	1111	1112	1113		1180
1210	1211	1212	1213		1280
1310	1311	1312	1313		1380
1410	1411	1412	1413		1480
2110	2111	2112	2113		2180

Figure 1. Matrix of Lessons Showing Increases in Difficulty under CAI mode.

hierarchy, and (3) to regroup and revise materials in accordance with the objectives.

An examination of the materials and of the student evaluations from Year I revealed several deficiencies. In each lesson a student might work with any number of objectives. Sometimes, he might work with the same objectives for several lessons in succession, but sometimes each successive lesson might involve different objectives. Many of the items were far too difficult or inappropriate for EMR students. Some questions were vague, and some had more than one or no clear answer. It was difficult to discern the pattern for including objectives in the lessons. Some apparent objectives were represented by two or fewer items. It was also difficult to discern by inspection the criteria used to determine the difficulty of particular items, since identical items could be found on several difficulty levels. Low scores of EMR students in level 1200 seemed to

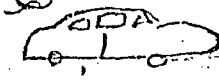
indicate a shortage of materials of lesser difficulty, although the data might have been due to the branching system used under CAI presentation.

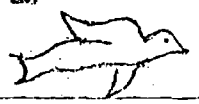
Feedback from teachers of EMR students indicated that more objectives in the area of decoding skills were needed. The picture-word matching study performed during Year I suggested a technique for simulating an oral response to printed materials.

Hierarchy of Objectives

The objectives which were deduced from the Year I materials are shown in Table 1 in their assumed hierarchical order.

Table 1. Objectives for EMR reading Materials

Objective	Sample Item
Objective 100 Given a stimulus letter, the student will choose from a list the letter which is the same as the stimulus. (Source: WAK-2)	A . . . . . 1. C 2. B 3. A
Objective 200 Given a stimulus word, the student will choose from a list the word which is the same as the stimulus. (Source: WAK-2)	CAN . . . . . 1. MAN 2. CAN 3. CAR
Objective 300 Given a stimulus word, the student will choose from a group of puctures the picture that illustrates the stimulus. (Source: WAK-3)	CAT . . . . . 1.  2.  3. 

Objectives	Sample Item
Objective 400 Given a stimulus letter, the student will choose from a group of pictures the pucture that illustrates a word that includes the sound of the stimulus. (Source: New)	B . . . . . . 1.  2.  3. 
Objective 500 Given a stimulus phrase, the student will choose from a list the phrase which is the same as the stimulus. (Source: WAK-2)	THE FAT CAT . . . . . . 1. THE BIG PIG 2. THE FAT CAT 3. THE LITTLE KITTEN
Objective 600 Given a stimulus phrase, the student will choose from a group of pictures the picture that illustrates the stimulus. (Source: New)	THE RUNNING BOY . . . . . . 1.  2.  3. 
Objective 700 Given a short stimulus sentence, the student will choose from a list the sentence which is same as the stimulus. (Source: New)	SAM PLAYS BALL. . . . . . . 1. TWO BOYS CAME. 2. SHE IS HAPPY. 3. SAM PLAYS BALL.
Objective 800 Given a short stimulus sentence, the student will choose from a group of pictures the pucture which illustrates the stimulus. (Source: New)	THE BOY IS SITTING . . . . . . 1.  2.  3. 

Objective	Sample Item
Objective 900 Given a sentence and a question about the content of the sentence, the student will choose an answer from a list. (Source: WAK-1)	THE MAN CAN RUN. WHAT CAN THE MAN DO? . . . . . . 1. SIT 2. SEE 3. RUN
Objective 1000 Given a phrase with a blank space, the student will choose from a list a word that would be appropriate in the blank space. (Source: WAK-1)	THAT _____ DOG. . . . . . . 1. BOX 2. HAT 3. BAD
Objective 1100 Given a stimulus word and its opposite, the student will choose from a list a word that is opposite to the stimulus. (Source: WAK-1)	THE OPPOSITE OF GIRL IS BOY. WHAT IS THE OPPOSITE OF GIRL? . . . . . . 1. HELLO 2. AFTERNOON 3. BOY
Objective 1200 Given a stimulus word, the student will choose from a list a word that is opposite to the stimulus. (Source: WAK-1)	WHAT IS THE OPPOSITE OF HELLO? . . . . . . 1. GOOD-BYE 2. AFTERNOON 3. SMILE

Objective	Sample Item
Objective 1300 Given a simple two or three sentence story and a question about the content, the student will choose an answer from a list. (Source: WAK-1)	SAM WAS PLAYING FOOTBALL IN THE GARDEN. THAT MADE HIS MOTHER MAD. WHO WAS MOTHER ANGRY WITH? . . . . . . 1. SAM 2. MOTHER 3. THE PLAYERS

Subobjectives: The student will

a. Recognize key words.

b. Recognize synonyms of key words.

3. Recognize a key idea even if a sentence has undergone a syntactical transformation.

Objective	Sample Item
Objective 1400 Given a simple story between three to ten sentences in length and a question about the content, the student will choose an answer from a list (several questions may be asked about the content of one story). (Source: WAK-1)	Polar bears live in the Arctic, near the North Pole. You might think it's too cold to live there, but the bears don't mind the cold weather. They swim, play, eat, and hunt in the ice-cold water. The polar bears have thick fur coats and layers of fat to keep them warm. Also, there is some oil in the fur. The oil makes the water roll off. What kind of weather does a polar bear like. . . . . . . 1. HOT 2. COLD 3. WARM

Objective	Sample Item
Objective 1500 Given a short sentence or paragraph, the student will choose from a list an inferred answer to a question about the paragraph. (Source: New)	JOE'S FATHER IS ALWAYS BUYING BOOKS. WHERE ARE THE BOOKS KEPT? . . . . . . 1. ON THE BED 2. ON BOOKSHELVES 3. ON THE BREAKFAST TABLE

The source of materials for each objective and a sample item is shown for each objective. Some materials for objectives 900, 1000, 1100, 1200, 1300, 1400 could be drawn from the original materials of Year I, called WAK-1. Some materials for objectives 100, 200, and 500 could be drawn from the matching materials of WAK-2. The objectives indicated additional types of skills which appeared to be needed.

REVISION AND ADDITION OF MATERIALS

Careful examination of Year I materials during the process of reorganizing the content, served to highlight the problems noted earlier, and it was found that extensive work was needed. The majority of materials were extensively revised or completely new. Only for objectives 900 and 1000 was there very little revision necessary.

In making revisions or in developing new material vocabulary and content ideas were drawn from the following sources:

a. A list of words recommended by teachers during Year I,

b. The vocabulary lists from The Design for Daily Living, a source for EMR instruction,

c. The 100 most important words listed by Clarence R. Stone in Progress in Primary Reading,

d. The 300 most important words listed by Edward Fry in "Developing A word List for Remedial Reading" in Elementary English,

e. The materials from the WAK-3 word-picture matching study.

Description of CMI Materials. The materials themselves are composed of lessons containing ten questions each, progressing in one or more parameters of difficulty for each objective. Number of lessons per objective varies, although the structure by objective does not. The first lesson in each objective is considered a pre-test for the next four lessons, and is presented at the computer terminal. The student sees a question, responds with his answer, receives favorable feedback or is simply given the correct answer when he misses. This procedure is untimed, giving the student time to ask questions of the aide or teacher, or to study the correct answer until he has satisfied himself. At the end of the lesson, the student was given his score, with a smiling face if he scored over 80%. He was free to tear off this paper printout and keep it in a notebook, or further study it.

Branching Technique. Before the student was signed-off, the computer terminal printed out his next assignment, based on the mastery level he had shown in the assessment. If a student scored 60% or below, he was assigned to study the next four paper-and-pencil units before reporting back to the terminal for further assessment. If he scored 70%, he studied three lessons; 80%, two

lessons; 90%, one lesson; 100%, he was assigned directly to the next pretest, covering four more-advanced lessons. In this way, the learner was not practicing skills he had already mastered, but was given an opportunity to master in small steps if he needed the practice. After he had taken the second test under any objective, excessive error would cause the terminal to prescribe a return to prior lessons. Since the aide and teacher also received this message, they were able to work more closely with the student to determine the cause for error, and possibly correct it.

When a learner had taken the last test for an objective, he would be recycled through some prior materials or assigned the first test on the next objective from which he received his off-line prescription on the basis of his performance.

This linear model moved the learner in small steps, provided for more likely success, allowed repetition as needed, and was individualized by performance. The learner worked on his own paper-and-pencil instructional packets, which were numbered by objective and lesson sequence.

Format of Lessons. The programmed lessons were first devised in a somewhat traditional programmed format, with multiple choice questions presented on the right hand side of the page, and answers covered, on the left hand side, by a half-sheet of contrasting color. (See Appendix A for a sample.) The student circled the chosen alternative, lifted the half-sheet covering the feedback, and checked his accuracy. Individuals who answered by copying from

the feedback were assumed to perform poorly on the computerized assessments, and would be recycled under the teacher's attention. This format was chosen for several reasons. It was felt that the usual programmed format of turning a page to obtain feedback would be too taxing for the memory of EMR students. Placing the covered correct response on the left made it possible to compile the booklet with staples on the left side which is the standard book format, whereas, top binding would not have been.

Several problems were seen with this format, but it was adopted as the best solution until time allowed a further search of possibilities. Although the format provided immediate feedback, it was undesireable for several reasons. (1) Storage is a problem when one side is twice as thick as the other, (2) All answers on a page could be seen when the half-sheet was lifted, rather than just one. (3) The student recorded his answer on the right half of the page and then went to the left half to check his response, which is contrary to the left-right sequence used in the reading process.

By Spring a new format was developed which eliminated the problems of the first format and in addition (1) provided special feedback to redirect the thinking which may have caused a student to mark an incorrect response, (2) eliminated any possibility of "cheating", and (3) maintained student interest. For each alternative there was a response box containing a latent image which would only appear after being marked through with a latent image pen. (See Appendix B for a sample.) In addition to being a much

more desireable format from the learner's point-of-view, it was also found that this format greatly simplified production of booklets by eliminating the time-consuming collation of alternating full-size and half-size sheets of paper.

Pretest. A pretest for the total set of objectives was developed to determine which objectives in the sequence each student had already mastered. This test was also used as a Post-test. The test is in paper and pencil form and is composed of two items from each objective. (See Appendix C for the Test.) Each student was required to start instruction at a level in the sequence no higher than where he first missed an item. Discussion of pretest and posttest data appears in Section IV.

Reliability of On-line Lessons. Table 2 shows the characteristics for each on-line lesson, all of which were considered tests. In examining the coefficients of reliability it is imparative that consideration be given to the influence of sample size test length, difficulty level and variability of scores on the reliability statistic. Maximum coefficients of reliability are most likely for tests with many items where the average item is passed by 50% of the subjects and total scores vary a lot. It is not unusual to have thousands of subjects involved in such analyses. These factors suggest that coefficients of reliability obtained for unit tests in this project are very rough estimates.

According to Table 2 only one test had an average difficulty in the 4.0 to 6.0 range. This test, lesson No. 321 had reliability of .705 which is very respectable considering that only 15 subjects were involved. Of the seven tests with means in the range of

6.00 - 7.00 only one is highly questionable, test 806. In general the rest of the data is of questionable value in examining reliabilty, but could be valuable for visual examination of the items themselves.

Table 2. Characteristics of On-line Lessons

LESSON	N	MEAN	SDEV.	ALPHA
101	13	9.69	.82	.663
106	13	9.54	.75	.281
111	13	9.69	.72	.530
116	12	9.75	.83	.741
121	12	9.83	.37	-.111
126	12	9.92	.27	.000
201	13	9.23	1.37	.703
206	13	7.77	2.01	.657
211	13	9.31	.91	.286
216	13	8.92	1.44	.635
221	13	9.54	.84	.444
226	13	7.38	1.21	-.054
231	13	8.62	1.33	.541
236	12	8.69	1.14	.265
301	15	8.07	1.73	.577
306	15	7.60	1.89	.575
311	15	8.07	1.61	.495
316	15	8.20	1.56	.545
321	15	5.80	2.40	.705
326	15	6.80	2.17	.692
331	15	6.67	1.81	.490
401	14	8.79	2.54	.940
406	14	8.50	1.45	.479
411	14	8.93	1.49	.667
416	14	8.64	2.06	.826
421	14	6.93	2.91	.881
501	14	9.00	1.25	.534
506	14	9.00	1.00	.159
511	14	9.29	.96	.370

Table 2. (cont'd)

601	15	6.60	1.82	.559
606	15	8.60	2.09	.833
801	13	9.15	1.29	.654
806	13	6.85	1.02	-.175
901	14	7.36	2.38	.761
906	14	8.36	2.19	.815
911	11	6.91	2.81	.823
916	11	7.64	1.49	.313
921	11	7.73	1.71	.565
926	13	8.00	1.96	.691
1001	29	8.48	2.19	.827
1006	27	9.04	1.45	.672
1011	26	8.85	1.29	.520
1016	25	9.20	1.13	.489
1021	23	8.13	1.73	.613
1026	23	7.78	1.89	.605
1031	21	7.71	2.18	.761
1036	20	8.75	2.56	.879
1041	19	8.63	1.72	.697
1046	19	8.53	1.43	.492
1051	18	8.89	1.41	.597
1056	18	8.89	1.15	.393
1061	18	8.22	1.62	.522
1066	17	8.65	1.19	.318
1071	16	9.06	.97	.195
1076	16	7.63	1.45	.449
1081	16	9.13	1.05	.391
1086	15	8.80	1.42	.556
1091	15	9.53	.62	-.052
1096	14	9.14	.83	-.016
1101	15	9.80	.40	-.185
1106	15	8.73	.57	.300
1111	15	9.80	.40	-.124
1201	16	9.13	.99	.247
1206	16	8.25	1.30	.376
1211	16	9.06	.97	.167
1216	16	8.69	1.16	.298
1301	17	7.29	1.99	.654
1306	13	6.08	2.50	.727

SECTION IV. EVALUATION OF PROJECT OBJECTIVE 2

As stated in the proposal the second project objective for this year was "to evaluate the efficacy of CMI reading materials developed during the year." The efficacy of the materials have been evaluated from several aspects.

Pretest Analysis. The pretest data was examined in terms of validating the sequence of objectives and in terms of usability as a diagnostic placement instrument. Table 3 shows the percent of students passing each item, the average percent passing the two items for each objective, and the percent of students passing both items of each objective.

From these data it was noted that objectives 500 and 700 yielded very similar results. Since both objectives dealt with visual matching and only differred in terms of the content being a phrase or a sentence, it was decided to eliminate objective 700 entirely. Based on these data the sequence of objectives by difficulty would need to be revised so that all visual matching objectives came first, then 400 and 300 in the order, followed by the comprehension type objectives.

This test was used to make an initial assignment of students. each student assigned the objective in the sequence where he first failed an item or an objective lower in the sequence. Since revision and production of materials was incomplete when students

Table 3. Pretest Data

Item Number	Percent Passing Item	Average	Objective Number	Percent Passing Objective
1	98	99.0	100	98.0
2	100			
3	100	94.5	200	90.2
4	89			
5	93	85.0	300	74.5
6	77			
7	95	90.5	400	84.3
8	86			
9	95	95.5	500	92.1
10	96			
11	82	84.0	600	78.4
12	86			
13	95	95.5	700	94.1
14	96			
15	84	80.5	800	72.5
16	77			
17	75	75.0	900	68.6
18	75			
19	72	59.0	1000	39.2
20	46			
21	67	66.0	1100	58.8
22	65			
23	51	46.5	1200	31.4
24	42			
25	42	38.5	1300	27.4
26	35			
27	33	34.0	1400	11.8
28	35			
29	44	38.5	1500	21.5
30	33			

first started using the materials many students were placed lower in the sequence than indicated by their pretest performance.

Table 4. Assignment of Materials Based on Pretest

Student	Theoretical Assignment	Actual Assignment	Re-assignment
102	1300	1000	none
104	1400	1000	none
106	1000	1000	none
108	1000	1000	none
110	400	300	none
113	600	600	none
114	1200	1000	none
115	200	100	1000*
201	900	900	none
203	1300	1000	none
207	1200	1000	none
208	1000	1000	none
209	200	200	none
210	1000	1000	none
211	800	800	none
212	1000	1000	none
213	800	800	100*
301	100	100	100**
302	200	100	none
303	200	100	100**
304	300	100	100**
306	800	200	none
308	200	100	none
310	200	100	none
311	200	100	none
312	600	200	none
313	1000	1000	none
314	300	100	none
315	1500	1000	none
316	200	100	none
317	1400	1000	none
318	1000	1000	none
401	1300	1000	none

402	1200	1000	none
406	300	100	none
407	1300	1000	none
411	1400	1000	none
417	1000	1000	300*
418	1300	1000	600*
419	1000	1000	500*

*Data used in this report is based on work after re-assignment.
Data used in this report is based on work prior to re-assignment.

Of the 40 students included in the final analysis, five (5) were considered to be inappropriately placed on the basis of the pre-test. Based on teacher recommendations and performance in the classroom, it was decided to reassign these students. Four of the five students were re-assigned to lower-level objectives. The other student was re-assigned to a high-level objective. On the pretest, this student missed one item for objective 200, one for objective 600, one for objective 1300, one for objective 1400 and both items for objective 1500.

Three students were unable to progress beyond objective 200, Although their original assignment had been adequate, these students were re-assigned to the same objectives in order to allow the teacher to use the off-line materials in a new way. Only the original work was considered in analysis of on-line test performance.

Description of Students. As soon as possible after development, all students in each EMR classroom were administered the

the pretest. The six students with perfect scores were eliminated from further analysis at that time. After psychological services were received and recent I.Q. information had been obtained on each student, eight additional students were eliminated. Attrition of the other four students occurred due to lack of post-test data or moving. Table 5 shows the attrition of students by EMR teacher.

Table 5. Attrition of Students

	Total No. of Students	Eliminated Due to Perfect Pretest	not EMR	other Reasons	Number in final Analysis
Teacher A	14	2	3	1	8
Teacher B	12	1	1	1	9
Teacher C	18	0	2	1	15
Teacher D	14	3	2	1	8
Totals	58	6	8	4	40

Characteristics of the 40 students included in the final analysis are shown in Table 6.

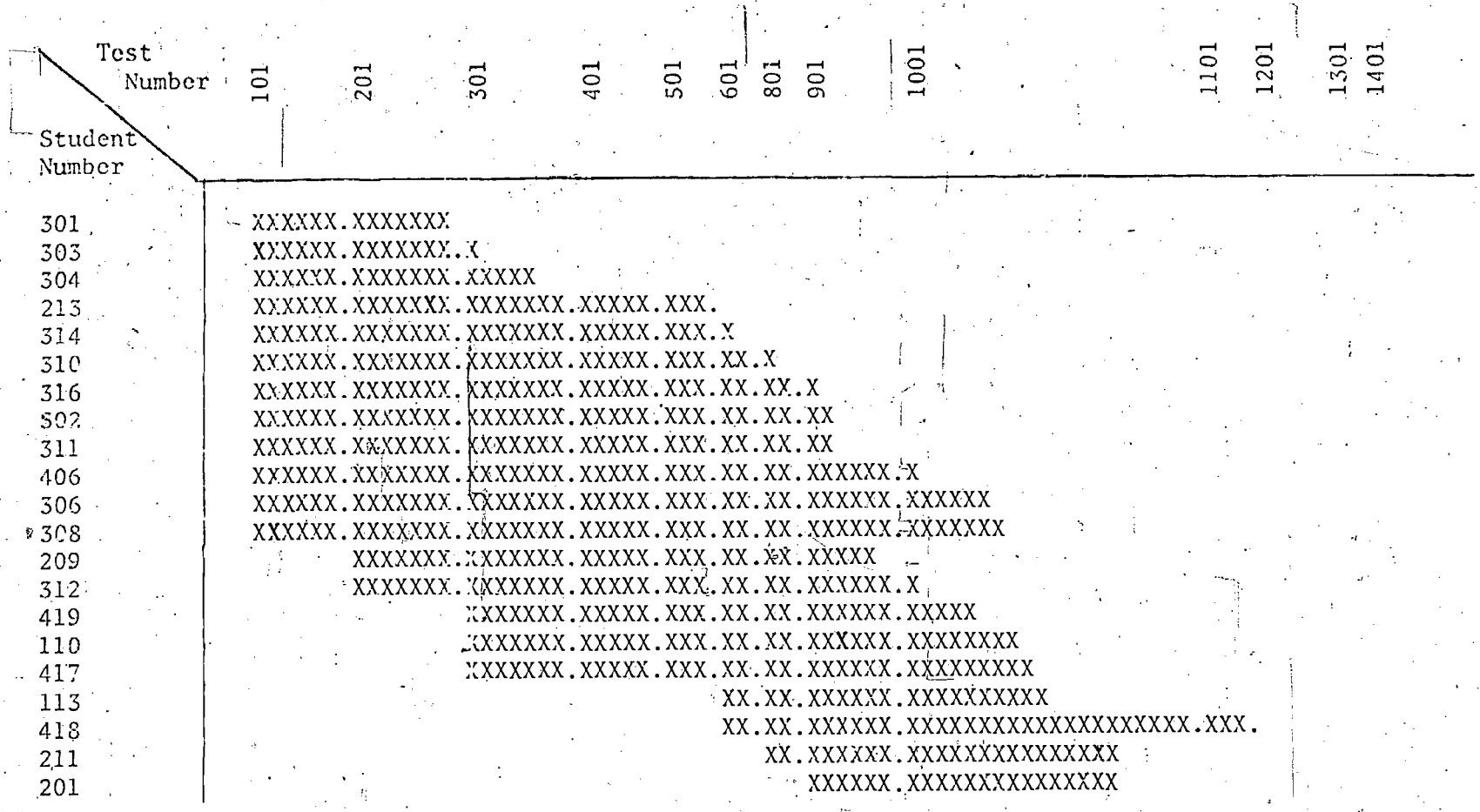
Table 6. Student Characteristics of those in Final Analysis

Teacher	Race B	Race W	Sex M	Sex F	WISC Range	Full Scale Mean
A	7	1	2	6	62-74	67
B	5	4	5	4	61-77	71
C	9	6	8	7	59-77	70
D	6	2	6	2	50-72	65
Total	27	13	21	19	50-77	69

In Figure 2, the number of on-line tests completed by each student is shown. The first test for each objective is labeled across the top of the figure. Each "X" represents an on-line test completed. As can be seen there was a lot of variation in the amount of the materials completed except for those students starting with Objective 1000. This was probably due to the fact that most of these students were waiting for Objective 1400 to be produced in the revised format. With the limited time remaining in the school year, variation in individual rate was not as noticeable. This figure does not show the total amount of work completed, since after each on-line test a student could be assigned anywhere from no off-line lessons to four off-line lessons depending upon test performance. In some cases a student would be assigned to previous off-line lessons and then would retake the on-line test.

Table 7 shows a summary of number of units completed. Although some variability in mean number of units completed is evidenced, the median number of units completed was very consistent between teachers of different students. However, the greatest range of variability occurred among the students of Teacher C. Whether this was due to the larger number of students or to teacher procedures in the classroom is unknown.

Figure 2. On-line Lessons Used as Tests



CONTINUED ON NEXT PAGE

Figure 2. On-line Lessons Used as Tests- continued

Student Number \ Test Number	101	201	301	401	501	601	801	901	1001	1101	1201	1301	1401
317	X	X	X	X	X	X							
318	X	X	X	X	X	X	X						
313	X	X	X	X	X	X	X	X	X				
102	X	X	X	X	X	X	X	X	X	X	X	X	X
315	X	X	X	X	X	X	X	X	X	X	X	X	X
210	X	X	X	X	X	X	X	X	X	X	X	X	X
208	X	X	X	X	X	X	X	X	X	X	X	X	X
401	X	X	X	X	X	X	X	X	X	X	X	X	X
407	X	X	X	X	X	X	X	X	X	X	X	X	X
411	X	X	X	X	X	X	X	X	X	X	X	X	X
106	X	X	X	X	X	X	X	X	X	X	X	X	X
108	X	X	X	X	X	X	X	X	X	X	X	X	X
207	X	X	X	X	X	X	X	X	X	X	X	X	X
212	X	X	X	X	X	X	X	X	X	X	X	X	X
402	X	X	X	X	X	X	X	X	X	X	X	X	X
203	X	X	X	X	X	X	X	X	X	X	X	X	X
115	X	X	X	X	X	X	X	X	X	X	X	X	X
104	X	X	X	X	X	X	X	X	X	X	X	X	X
114	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 7. Number of Units Completed

Number of Students	Teacher A (8)	Teacher B (9)	Teacher C (14)	Teacher D (8)
Mean	28.9	28.2	24.0	32.0
Median	30.5	30.25	29.5	30.4
Range	14	11	39	10

Classroom Procedures. All students were administered the pretest prior to working in the materials. Each student was then assigned to an objective as shown previously in Table 4, page 23. Each student started with the first test for the assigned objective. The test was taken at the teletype machine, except during the few weeks prior to complete installation of the computer hookup.

On the basis of test performance the student was assigned 4, 3, 2, or 1 off-line programmed lesson for test performance of 60% or less, 70%, 80%, and 90% respectively. If test performance was perfect, the student was assigned to the next test. Each student was to progress at his own rate, completing any number of lessons each day. Teachers (or aides) were to read instructions to the student and explain the example given at the beginning of each lesson. The student was to complete each page before looking under the blue half-sheet to check his answers. After completing the page, the student was instructed to lift the blue sheet and check his answers. If he found any errors, he was to circle the correct response. Teachers were asked to praise the student for working without copying, even if errors were made. For further details see Appendix D, Instructions For Use of Booklets.

The teletype terminals were available in the classroom from 8:30-2:00 p.m each school day except on Tuesdays they were not available between 11:30 a.m. and 1:00 p.m. Each teacher arranged her own classroom schedule within the general restrictions. Appendix E fives more details regaring initial procedures.

The large segment of time during which the computer program was available to students compensated somewhat for the great inconvenience due to telephone line failures. Appendix F shows the actual downtime for the computer, 15 days, and the time of telephone line failure--17 school days of initial delay, one month of telephone line failure for all four terminals plus an additional two weeks of failure for one of the terminals.

By the time the revised format for programmed booklets was available, it was evident that students needed more repetition than was being provided by the branching techniques which had been used. Thus, procedures used with Objective 1400 materials required that each student use all the materials. This format required the student to mark a space for the selected response with a special pen which would then expose a latent image. Each student was to read the material in a dotted box, read all possible answers, then mark the answer he thought was correct. If the selected answer was incorrect, the student was to read the latent-image message and then select between the other alternatives. Detailed instructions were prepared explaining these procedures and how to teach the students to use the materials appropriately. (See Appendix G, Procedures for Revised Programmed Format.)

Questionnaire information from the teachers indicated that the teacher aides managed the use of the booklets and the teletype terminal, finding the appropriate booklet and reading instructions to the student. If a student did not recognize a picture, the aide told the student what the picture represented. Students worked approximately five minutes a day with the materials, however, some students spent more time each day due to their interest in the materials. Approximately 5-10 lessons were completed each week. (See Appendix H, Questionnaire for Wakulla Reading Project.)

Posttest Performance. A t-test was performed on the gain scores from the pretest to the posttest to determine whether there was any significant improvement in performance. The mean gain of 2.025 points was significantly different from no gain at the .005 level of significance ($t=3.33$ with $n=40$).

Performance of students within each classroom was then examined. Table 8 shows the means and standard deviations for each group of students. There was significant gain in two of the four classrooms.

Table 8. Mean Gain Scores on Posttest

Classroom	n	Mean	Standard Deviation
A	8	1.00	2.26
B	9	1.78*	2.16
C	15	4.27**	4.20
D	8	-.38	3.52

* $p < .025$ ** $p < .005$

An attempt was made to verify any differences between classroom by

a one-way analysis of covariance, using pretest scores as the covariate. There was no significant difference among the classroom after adjustment was made with the covariates ($F=.964$, with 3,35 df).

Examination of the gain scores showed that 35% of the 40 students did not improve on the posttest. Six of these fourteen students were in classroom D.

Although the group of students as a whole showed significant improvement, there was a great deal of variability and some children did not benefit from the programmed materials. Since these materials were intended to be supplemental to regular classroom instruction and were intended for EMR students, the results indicate that changes are needed both in the materials and in the procedures.

Recommendations for Improvement of the Materials. Based on the students' performance and feedback from the teachers, two recommendations are made in regard to the procedures. (1) Materials for any particular objective should only be used at the time the teacher is working with the student on that objective. During this developmental year, students continued to work through the materials in sequence regardless of what was happening during regular instruction. (2) The students needed a great deal more repetition than was provided originally and thus the branching techniques should be eliminated. Any student not being able to perform the objective should work through all materials.

This latter change in procedures indicates a need to revise the pretesting procedures. Rather than testing each student on all objectives it is recommended that the student we given a longer test, preferably with at least five items, on each objective as deemed necessary by the

classroom teacher. This would eliminate the problems of reassignment of students and would utilize the general information about student capabilities which teachers obtain during day-today operations.

The materials themselves need to be greatly expanded. The original materials were almost entirely in the area of comprehension, and it was found that many of these students needed to acquire the basic word-attack skills. Table 9 shows the minimum recommendations for expansion of the materials. Objectives from this year should be placed in a new sequence and additional objectives should be added. With these further developmental changes, it is felt that the materials could be useful to teachers and could be effective in teaching EMR students to read.

Table 9. Recommendations for Expansion of Materials

1972-73 Organization of Materials	Proposed Organization of Materials	Revisions or Developmental Work Required
Objective 1: Given uppercase letter, identify same uppercase letter. (Source: WAK-2 Program)	Objective 1: Same Objective 2: Given lowercase letter, identify same lowercase letter. Objective 3: Given lowercase or uppercase letter, identify same letter printed in other form	None Minimum developmental effort Minimum developmental effort
Objective 2: Given printed word, identify same printed word. (Source: Wak-2 Program)	Objective 4: Same	None
Objective 5: Given a printed phrase, identify the same printed phrase. (Source: Wak-2) *Objective 7: Given a printed sentence, identify the same printed sentence. (Source: New during 1972-73)	Objective 5: Given a printed phrase or sentence, identify the same printed phrase or sentence.	This is a combination of Objective 5 and work already done in preparation for Objective 7.

Objective 4: Given printed consonant, identify the picture of word with that sound. (Source: New during 1972-73)	Objective 6: Given printed consonant, identify picture of word with that initial consonant sound. Objective 7: Given printed consonant, identify picture of word with that final consonant sound. Objective 8: Given printed consonant, identify picture of word with that medial consonant sound.	Increase number of lessons to provide more repetition for each consonant.
	Objective 9: Given one syllable or word with one syllable, identify the picture with the same vowel sound.	New material would need to be developed.
Objective 3: Given a printed word, identify picture illustrating that word's meaning. (Source: WAK-3 Program)	Objective 10: Same	Provide more repetition and gradual development of difficulty.
Objective 6: Given a printed phrase, identify the picture which illustrates that phrase. (Source: New during 1972-73 year)	Objective 11. Given a picture, identify the message which that picture illustrates	This is a combination of Objectives 6 and 8, reversing the stimulus and response.

Objective 8: Given a printed sentence, identify the picture which illustrates that sentence. (Source: New during 1972-73 year)		
Objective 9: Given a sentence select answer to recall question. (Source: WAK-1)	Objective 12: Same	None
Objective 11: Given a statement of opposites and one of the pair of words, identify the word meaning the opposite. (Source: WAK-1) Objective 12: Given a word, identify the word meaning the opposite. (Source: WAK-1)	Objective 13: Given a word, with or without a statement of it's opposite, identify the word meaning the opposite	This is a combination of Objectives 11 and 12.

Objective 10: Given an incomplete phrase or sentence, select a word which completes the phrase or sentence meaningfully. (Source: WAK-1)	Objective 14: Given an incomplete phrase or sentence, select the noun or adjective which completes the phrase or sentence meaningfully. Objective 15: Given an incomplete sentence, select the verb or infinite which completes the sentence meaningfully. Objective 16: Given an incomplete sentence, select the word which completes the sentence meaningfully.	This is a reorganization of materials in Objective 10.
Objective 13: Given a 2 or 3 sentence story, select the answer to a question about details or sequence of events. (Source: WAK-1)	Objective 17: Same	Expand the number of lessons.
	Objective 18: Given a word, phrase, or sentence identify the word, phrase or sentence which is similar in meaning.	There are only limited materials available at this time. EMR students appear to lack this skill.

Objective 14: Given a 2-4 paragraph story, identify inferences, such as main idea, extended meaning, causal relationships, extended application, etc. (Source: WAK-1)	Objective 19: Same	None

*These materials were not completely developed because the skill is so similar to Objective 5 and no differences in difficulty were notes in pretesting.

SECTION V. EVALUATION OF PROJECT OBJECTIVE 3

As stated in the proposal, the third objective of this year's activities was to "continue to explore an approach to intellectual evaluation of the mentally retarded learner, utilizing the continuous monitoring and performance assessment capabilities of CAI-CMI rather than conventional testing procedures."

It seemed that the time taken to respond to each test item on the teletype might yield some information regarding the intellectual evaluation of EMR students. Since recent scores on the WISC were available on all students, these scores, latency of responding, and gain scores were correlated. Table 10 shows the correlations of these variables. The "increase in objectives passed" was determined by assuming that an objective was passed on the test if the student correctly marked both items for that objectives. The increase was calculated by subtracting the number of objectives passed on the pretest from the number of objectives passed on the posttest. "Increase in raw score" was determined by the difference between raw score on pretest and posttest. Latency of responding refers to the average number of seconds between the time the teletype completed the typing of the question and the student's typing a response. Both WISC subtests as well as full scale I.Q.s were used in calculating correlations.

The relationship between latency of responding and the increase in number of objectives passed was found to be significantly different from zero at the .025 level of significance; however, there was no significant relationship between latency and increase in raw score. Latency in responding was not correlated with any of the three measures

Table 10. Correlation of Performance, Intelligence, and Latency

	Increase in Objectives Passed	Increase in Raw Score	Latency of Responding	Verbal I.Q. on WISC	Performance I.Q. on WISC	Full-Scale I.Q. on WISC
Increase in Objectives Passed	1.00					
Increase in Raw Score	.83 (68%)*	1.00				
Latency of Responding	.35 (12%)	.25 (6%)	1.00			
Verbal I.Q. on WISC	.15 (2%)	.13 (2%)	.06 (0%)	1.00		
Performance I.Q. on WISC	.31 (10%)	.24 (6%)	.17 (3%)	.29 (9%)	1.00	
Full-Scale I.Q. on WISC	.30 (9%)	.25 (6%)	.08 (1%)	.69 (47%)	.88 (71%)	1.00

* Percent of variability accounted for by correlation

of intelligence. Both performance I.Q. and Full-Scale I.Q. did correlate significantly ($p < .05$) with the increase in number of objectives passed, but not with increase in raw score.

From this information it seems that those students who took a longer time to respond to the test items tended to increase the number of objectives they passed on the posttest. Perhaps these students need to be encouraged to respond carefully rather than quickly to academic tasks.

SECTION VI. SUMMARY OF CONCLUSIONS

The reorganization of Year 1 materials into sections according to behavior objectives tended to highlight the lack of word-attack skills in the original materials. The addition of two completely new sets of materials for objectives in this area made an improvement in the comprehensive nature of the materials; however, there are many more materials which should be developed along these lines. The original sequence of objectives contained some errors and the empirical sequence is shown in Table 8 along with the recommendations for expansion of the materials.

The branching technique originally designed proved to be too limiting. EMR students appear to need even more repetition and drill than originally thought.

The original format of off-line programmed lessons presented several problems--moving from right to left when checking responses, temptation to copy rather than to think, and uneven booklets for storage. The revised format, which was based on the latent-image process developed by A.B. Dick Company, proved to eliminate this problem and appeared to motivate the students. There was some concern expressed by teachers that without the novelty of the computer, the students would lose interest. This format would compensate for that loss.

The pretest was found to be somewhat inaccurate in placing students within the sequence. A better technique would be to increase the number of items for each objective. The pretest contained only two items for each objective. It would be better to increase the

the number of items per objective and to administer only that portion of the total test which seemed relevant to the student's capability. The student who cannot match letters of the alphabet does not need to be tested in the comprehension areas of reading.

The group of 40 students for whom complete data was available demonstrated significant gains on the posttest. Although there was some difference between classrooms this was not significant.

The materials as they presently exist need to be revised and expanded before an acceptable set of supplementary reading materials are available for the classroom teacher of EMR students. The needed expansion is detailed in Table 8. The area needing greatest expansion is word-attack skills.

Examination of the relationship between performance on these materials and the student's latency in responding to test items presented on the computer suggests that those students who took more time in responding tended to demonstrate more gain in the number of objectives passed on the posttest. No significant relationship between latency and I.Q. measures was found. Performance and full-scale I.Q. both correlated positively with increase in number of objectives passed.

Those who have worked on this project believe that the developmental efforts have been worthwhile and that the revisions suggested for the materials and the procedures would yield a significant contribution to reading instruction with EMR students.

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Hansen, D. N. and Rodgers, T. S. An Exploration of Psycholinquistic Units in Initial Reading, Rechnical Report 74. Institute for Mathematical Studies in the Social Sciences, Stanford University, 1965

Noonan, J. R. and Barry, J. R. Differential effects of incentives among the retarded, Journal of Educational Research, November, 1967, 61, 108-110.

Appendix A. Sample of First Programmed Format.

NAME _____

DATE _____

BEGINNING TIME _____

ENDING TIME _____

TEACHER OR AIDE COMMENT _____

_____

_____

Read the question above the dotted line. Find the answer below the dotted line and circle it.

Example:

WHAT IS THE OPPOSITE OF CLOSED?

1. SOME
2. OPEN
3. POP

2. OPEN

WHAT IS THE OPPOSITE OF FIND?

1. LOSE
2. SHIRT
3. TO

1. LOSE

WHAT IS THE OPPOSITE OF NONE?

1. ALL
2. THREE
3. SIX

1. ALL

WHAT IS THE OPPOSITE OF DIRTY?

1. DOG
2. FAST
3. CLEAN

3. CLEAN

WHAT IS THE OPPOSITE OF AFTER?

1. THREE
2. BEFORE
3. PIG

2. BEFORE

WHAT IS THE OPPOSITE OF FAR?

1. NEAR
2. TALK
3. THE

1. NEAR

WHAT IS THE OPPOSITE OF FULL?

1. DRIVE
2. RAN
3. HUNGRY

3. HUNGRY

WHAT IS THE OPPOSITE OF BEFORE?

1. PUP
2. AFTER
3. TALK

2. AFTER

WHAT IS THE OPPOSITE OF GO?

1. STAY

2. NICE

3. STORY

1 STAY

WHAT IS THE OPPOSITE OF FAR?

1. COW

2. YESTERDAY

3. NEAR

3. NEAR

WHAT IS THE OPPOSITE OF PULL?

1. HOT

2. PUSH

3. FIRST

2. PUSH

Appendix B. Sample of Revised Programmed Format

Lesson 1406

The Good King sat on his throne and sighed, "The Bad King is coming to take our gold!"

"Father," asked Princess Hilda, "is there no way to save the gold?"

The King sighed. "We can save it if we give the Bad King something so new that nobody has ever seen it before."

Hilda was silent. Suddenly she shouted, "I know something new!" And away she ran.

Up rode the Bad King. "I have come for the gold," he roared, "Unless you can give me something new!"

"Wait!" cried Hilda, and she ran in with a small box.

"What is this?" frowned the Bad King. Inside of the box was an egg. "Why this is nothing new," he laughed. But slowly the egg began to crack and out popped a baby chick!

"This chick is brand new!" cried Hilda.

"Nobody could possibly have seen it before," said the Good King. "You will get no gold from us!"

Which could have happened in the story?

1. The Good King frowned when Hilda saved the gold.

2. The egg hatched two chicks.

3. Hilda fell asleep when she thought of her idea.

If the story went on, which might have happened?

1. Hilda and the Good King had a celebration.

2. The chick stole the gold.

3. Hilda got a spanking.

Which of these are enemies?

1. Hilda and the chick.

2. The Good King and the Bad King.

3. Hilda and the Good King.

This is a story about _____

1. A Surprise.

2. A dangerous adventure.

3. A mystery.

The Bad King wanted the Good King's gold because _____

1. The bad King was greedy.

2. The Good King was friendly.

3. The Bad King was brave.

Hilda thought of something new because she wanted to _____

1. Get a chick for a pet.

2. Help the Bad King.

3. Save the gold.

In this story, Hilda _____.

1. Learns a lesson.

2. Solves a problem.

3. Has a good time.

Now try to answer the following thought problems.

On the playground, Laura always likes to play on the _____

1. Chairs.
2. Houses.
3. Swings.

Penny has a little bird for a pet. She keeps it in a small _____

1. Box.
2. Cage.
3. Yard.

Don can't ride his bicycle because it has a flat _____

1. Handlebar.
2. Basket.
3. Tire.

Appendix C. Test used for Pretest and Posttest

In the first two problems, read the letter above the dotted line. Find the same letter below the dotted line and circle it (include the number in the circle).

Example:

E

.....

1. O

2. E

3. I

C

.....

1. A

2. M

3. C

B

.....

1. B

2. R

3. D

In the next two problems, read the word above the dotted line. Find the same word below the dotted line and circle it.

Example:

TREE

.....

1. CLOUD
2. ON
3. TREE

SIT

.....

1. ARE
2. SIT
3. OF

WHILE

.....

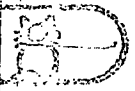
1. WHILE
2. WHITE
3. SMILE

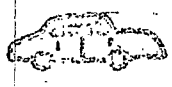
In the next two problems, read the word above the dotted line. The word describes one of the pictures below the dotted line. Circle that picture.

Example:

CAT

.....

1. 

2. 

3. 

STAR

.....

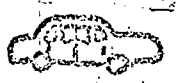
1. 

2. 

3. 

CAP

.....

1. 

2. 

3. 

In the next two problems, read the letter above the dotted line and think about the sound of the letter. Look at the pictures below the dotted line and think of the word that describes that picture. One of those words will include the same sound as the letter. Circle the picture described by that word.

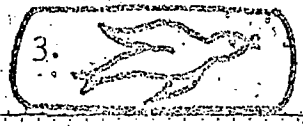
Example:

B

.....

1. 

2. 

3. 

T

.....

1. 

2. 

3. 

K

.....

1. 

2. 

3. 

In the next two problems, read the phrase above the dotted line. Find the same phrase below the dotted line and circle it.

Example:

THE FAT CAT

.....

1. THE BIG PIG

2. THE FAT CAT

3. THE LITTLE KITTEN

THE RUNNING BOY

.....

1. THE FAST CAR

2. A GOOD FRIEND

3. THE RUNNING BOY

A SMALL HAND

.....

1. A TALL MAN

2. A SMALL HAND

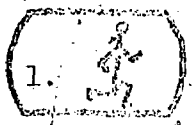
3. THE HARD BALL

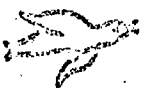
In the next two problems, read the phrase above the dotted line. The phrase describes a picture below the dotted line. Circle that picture.

Example:

THE RUNNING BOY

.....

1. 

2. 

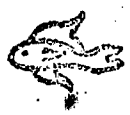
3. 

THE SWIMMING FISH

.....

1. 

2. 

3. 

THE OPEN BOOK

.....

1. 

2. 

3. 

In the next two problems, read the sentence above the dotted line. Find the same sentence below the dotted line and circle it.

Example:

SAM PLAYS BALL.

.....

1. TWO BOYS CAME.
2. SHE IS HAPPY.
3. SAM PLAYS BALL.

HE RUNS FAST.

.....

1. RED IS A COLOR.
2. HE RUNS FAST.
3. IT IS COLD.

SOME BOYS ARE TALL.

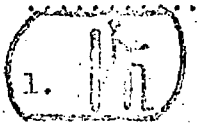
.....

1. THE BALL IS VERY SMALL.
2. ALL FISH SWIM IN WATER.
3. SOME BOYS ARE TALL.

In the next two problems, read the sentence above the dotted line. The sentence describes one of the pictures below the dotted line. Circle that picture.

Example:

THE BOY IS SITTING

1. 
2. 
3. 

THE BOY IS EATING.

1. 
2. 
3. 

HIS HEAD IS BIG.

1. 
2. 
3. 

In the next two problems, read the sentence and the question above the dotted line. Find the answer below the dotted line and circle it.

Example:

THE MAN CAN RUN.
WHAT CAN THE MAN DO?

.....

1. SIT
2. SEE
3. RUN

THE TREE IS GREEN.
WHAT COLOR IS THE TREE?

.....

1. RED
2. BLUE
3. GREEN

THE BOY IS NINE.
HOW OLD IS THE BOY?

.....

1. BIG
2. HE
3. NINE

In the next two problems. Read the phrase or sentence above the dotted line. Notice the blank space. One of the words below the dotted line will fit in the blank space. Circle that word.

Example:

THAT _____ DOG.

.....

1. BOX

2. HAT

3. BAD

THE _____ PIG.

.....

1. RAN

2. DO

3. BIG

HIS DOG RAN _____ WITH HIM.

.....

1. CARRY

2. ALONG

3. BUMP

In the next two questions, read the sentence and the question above the dotted line. Find the answer below the dotted line and circle it.

Example:

THE OPPOSITE OF GIRL IS BOY.
WHAT IS THE OPPOSITE OF GIRL?

.....

1. HELLO
2. AFTERNOON
3. BOY

THE OPPOSITE OF THAT IS THIS.
WHAT IS THE OPPOSITE OF THAT?

.....

1. CAT
2. THIS
3. WITH

THE OPPOSITE OF COUNTRY IS CITY.
WHAT IS THE OPPOSITE OF COUNTRY?

.....

1. FINGER
2. CITY
3. GIRL

1200

In the next two problems, read the question above the dotted line. Find the answer below the dotted line and circle it.

Example:

WHAT IS THE OPPOSITE OF HELLO?

.....

1. GOODBYE

2. AFTERNOON

3. SMILE

WHAT IS THE OPPOSITE OF SMALL?

.....

1. WALK

2. WHEN

3. TALL

WHAT IS THE OPPOSITE OF ALL?

.....

1. NONE

2. MOTHER

3. COULD

In the next two problems, read the sentences and the question above the dotted line. Find the answer below the dotted line and circle it.

Example:

SAM WAS PLAYING FOOTBALL IN THE GARDEN. THAT MADE HIS MOTHER MAD. WHO WAS MOTHER ANGRY WITH?

.....

1. SAM
2. MOTHER
3. THE GARDEN

THE CAT SCARED THE DOG. THE DOG BEGAN TO BARK. WHAT SCARED THE DOG?

.....

1. THE CAT
2. A CAR
3. THE DOG

THE CAR STOPPED AT THE RED LIGHT. WHEN THE LIGHT TURNED GREEN, THE CAR STARTED AGAIN. WHAT COLOR WAS THE LIGHT WHEN THE CAR STOPPED?

.....

1. YELLOW
2. GREEN
3. RED

In the next two problems, read the paragraph and the question above the dotted line. Find the answer below the dotted line and circle it.

Example:

JOE'S FATHER IS ALWAYS BUYING BOOKS.
WHERE ARE THE BOOKS KEPT?

.....

1. ON THE BED
2. ON BOOKSHELVES
3. ON THE BREAKFAST TABLE

THE MAN WITH THE BROKEN ARM GROANED LOUDLY. HIS WIFE HEARD HIM GROAN. WHAT IS A GROAN?

.....

1. A PERSON
2. A SOUND
3. AN ARM

THE CAT STARTED TO EAT THE DOG'S FOOD. THE DOG BEGAN TO BARK. WHAT WAS THE DOG BARKING AT?

.....

1. THE CAT
2. THE DOG
3. THE FOOD

For the next ~~two problems~~, read the story at the beginning. Then read the question above each of the dotted lines. Find the answer below each of the dotted lines and circle it.

Example:

WHEN FALL COMES THE WEATHER BEGINS TO CHANGE. THE DAYS ARE COOLER AND SHORTER THAN THEY WERE IN THE SUMMER. THE LEAVES START TO CHANGE COLORS. MOST OF THE LEAVES TURN BROWN, BUT SOME OF THEM BECOME RED, ORANGE, AND YELLOW. SOME OF THE BIRDS FLY SOUTH BEFORE WINTER COMES.

WHEN DO THE LEAVES BEGIN TO CHANGE COLORS?

.....

1. NEVER
2. IN THE FALL
3. IN THE SUMMER

WHY DO THE BIRDS FLY SOUTH?

.....

1. IT IS WARMER IN THE SOUTH.
2. THE LEAVES ARE CHANGING COLOR.
3. THE DAYS ARE TOO LONG IN THE NORTH.

JIM LIKES TO COLLECT COINS. HIS COINS COME FROM MANY DIFFERENT PLACES. JIM'S FATHER IS AN AIRPLANE PILOT AND TRAVELS ALL OVER THE WORLD. EACH TIME HE COMES BACK FROM A TRIP, HE BRINGS JIM A NEW COIN.

WHAT IS JIM'S HOBBY?

1. HE COLLECTS STAMPS.

2. HE COLLECTS COINS.

3. HE FLIES IN AIRPLANES.

WHAT KIND OF JOB DOES JIM'S FATHER HAVE?

1. HE IS AN AIRPLANE PILOT.

2. HE IS A COIN COLLECTOR.

3. HE IS A BANK ROBBER.

Appendix D. Instructions for Use of Booklets

VANILLA COUNTY SCHOOL BOARD

TITLE VI PROJECT

INSTRUCTIONS FOR USE OF BOOKLETS

General Instructions: These booklets are to be used by the children on an individual basis. Each student should progress at his own rate completing any number of booklets and tests each day. Each student starts with a test. (Remember that all lesson numbers ending in a 1 or 6 are tests.) On the basis of his performance, he is then assigned a designated set of lessons. The lessons to be assigned are prescribed by the computer. In the case of printed tests, the assignment is shown on the test cover for each possible score on the test.

Using the Tests: During the period when we must use printed tests, be sure that the printed test is legible. If not, you may need to go over some of the printing. The student should work individually on the test. You should score the test and record the number of correct responses on the front sheet. Based on the student's score, assign the next lesson or lessons or the next test.

Using the Lesson Booklets: These booklets are small programmed texts. Be sure the information on the front blue sheet is completed. We are requesting the beginning and ending time so that we have a measure of how long it takes students to do the booklets. The instructions should be read to the student and the example explained. The student should then complete the first page without looking under the blue sheet. After completing the page, the student should raise the blue sheet and check his answers. If he has made any errors, he should put a circle around the correct response. Please do not let him erase any errors. We need to know where the difficulties are. The student then does the next two pages in the same way. We had some production difficulties and you may find the blue strips cover the question half of the page. If this happens, have the student fold back a portion of the blue strip so as to expose all the work area.

Encourage students to follow these instructions. If the student should raise the blue sheet and copy responses, he will only hurt himself. When he takes a test, he will not do well and will have to do the booklets again. You should encourage students to take pride in doing the work properly. Praise the student for working without copying even if he makes errors. Make learning visible. Tell a student what he has learned to do. Be delighted in each small accomplishment.

IMPORTANT: SAVE ALL MATERIALS for us to examine when revising materials.

Appendix E. Memo Regarding Initial Procedures

Wakulla County School Board

P. O. Box 93
CRAWFORDVILLE, FLORIDA 32327
TELEPHONE 926-3661

WILLIAM M. PAYNE
SUPERINTENDENT

WARREN CRUM
DISTRICT IV
CHAIRMAN

KENNETH ROBERTS
DISTRICT I

J. C. KYLE
DISTRICT V
VICE-CHAIRMAN

LOWELL NAKER
DISTRICT II

BOBBY C. POSEY
DISTRICT III

October 6, 1972

M E M O R A N D U M

TO: Title VI Personnel

FROM: Elinor Elfner, Director, Title VI

SUBJECT: Meeting, October 4, 1972

I felt our meeting was quite helpful. Although we aren't so formal as to have minutes recorded, I would like to relay to you some decisions I felt were agreed upon. If my recall is inaccurate or incomplete please let me know.

Decisions regarding procedures

Naomi will coordinate all visits to classrooms. She should be called between 9:00 a.m. and 1 p.m. prior to visiting the EMR classrooms.

If there are any problems with operation of the terminals and a phone call needs to be made, Edna Reynolds should be contacted.

The terminals will be in operation on October 16th. They will be available for use during the following hours:

8:30 a.m.-2:00 p.m.	Mondays, Wednesdays, Thursdays, Fridays
8:30 a.m.-11:30 a.m. and 1:00-2:00	Tuesdays

Decisions regarding "Getting Started"

All teachers will send a list of students presently in their classes to Naomi for delivery to Edna Reynolds.

The CAI staff will prepare a Pretest containing two items for each objective. These will be sent to Naomi for distribution to teachers in time for them to administer the tests on October 11th and 12th.

CAI personnel will estimate the appropriate objective at which instruction will begin for each student.

A CAI staff member will visit each school to review sign-on procedures during the week of October 9-13.

Decisions regarding development of materials

The CAI staff will send to Naomi for distribution to teachers copies of the objectives. Each teacher will receive two copies, one of which is to be returned to CAI with comments and suggestions.

For each objective there will be as many lessons as seem necessary. The children will do four lessons in booklet form and then will take a test on the computer. The child will then either repeat some booklet lessons, go to the next booklet lesson, or go to the next test on the computer, depending upon his test performance.

The elementary teachers of EMR units will meet with Elinor at Shadeville the morning of October 13th to outline some content areas they will be covering. This information will be sent to CAI so the materials can be more relevant.

When instruction begins, there will be booklets available at the lowest level and at an intermediate level. The remaining materials will be developed as rapidly as possible.

Elinor will meet with Jeanne Ryan (October 11th) and convey information regarding textbooks to CAI personnel.

All booklets and on-line tests are in the developmental stage. The teachers are to make suggestions for revisions to CAI personnel.

EE/nh

cc Mr. Payne

Appendix F. Memo Regarding Computer Down-time and Telephone Line Failure

THE FLORIDA STATE UNIVERSITY TALLAHASSEE 32306

Center for Computer Assisted Instruction
Tully Building

May 4, 1973

Mrs. Elinor Elfner
Box 98
Crawfordville, Florida 32327

Dear Mrs. Elfner:

Following is the information you requested concerning the periods of time computer service was not available to Wakulla County. Included is telephone line failure time and computer down time.

Telephone Line Failures

October 9, 1972 Request made for Multidrop line.
November 1, 1972 Expected completion date.
November 28, 1972 Multidrop line installation complete.
February 15, 1973 Telephone circuit out.
March 16, 1973 Telephone circuit repaired.
March 31, 1973 (approx. date) Telephone circuit repaired for 4th line.

Computer Down Time

January 8 - 12, 1973
January 15 - 17, 1973
February 16, 1973
April 9, 1973
April 19 - 20, 1973
April 23 - 25, 1973

Yours truly,

Duncan N. Hansen

DNH/jp

Appendix G. Procedures for Revised Programmed Format

PROCEDURES FOR PROGRAMMED BOOKLETS

GENERAL INFORMATION

These programmed materials are designed to give the student immediate feedback. There is a latent image in the box below each possible answer. The student selects the answer he thinks is correct and then marks through the box just below that answer with the latent image pen. If the answer is correct, five stars and a positive comment of praise will appear. If the answer is not correct, the message will act as a private tutor to guide the student's thinking.

If your students are going to learn as they use these materials, it is necessary that certain conditions be met.

1. Each student must read the material in the dotted box carefully.

2. Each student must read all the answers before selecting the one he thinks is correct.

3. If the first answer marked is not correct, the student must read the latent image message and the remaining two alternatives before marking a second choice.

As the student's teacher, it is your responsibility to see that these conditions are met. Here are some suggestions to assist you in assuming this responsibility.

1. Before the student uses the lesson booklets, make sure he is able to mark the sheet properly. Use the exact wording in the "Directions for Marking Booklets."

2. While the student is using the first booklet, watch to see that he is meeting the three conditions listed above. Provide any necessary instructions to be sure that the three conditions are being met. Check the student periodically to be sure he continues to meet the conditions.

3. After the student has completed a lesson, look at his responses. If three or more questions have two alternatives marked, go over the lesson with the student. Use an unmarked booklet. Have the student read the material in the dotted box to you. Then have the student read all the alternatives and tell you which is correct.

4. When you look at the student's booklet, watch for stray marks at the beginning of the boxes. The student may be making these little dots to see if the stars are there. This behavior must be discouraged because the student will not learn to comprehend what he reads by this method. Learning to interpret the meaning is more important than marking the correct answer.

DIRECTIONS FOR MARKING BOOKLETS

The teacher should distribute a Sample Page and a latent image pen to each student who will be using the booklets. Then she should say,

"PUT YOUR FINGER ON THE DOTTED BOX."

The teacher then checks to see that each student has his finger on the correct box.

"NOW, READ WHAT IT SAYS INSIDE THE DOTTED BOX."

The teacher pauses until all students have finished reading the context within the dotted box.

"WHAT DOES IT TELL YOU TO DO FIRST, (name of a student)?"

The teacher calls on a student, who should respond that you read what is in the dotted box first. If the student does not respond correctly, the teacher should tell the class the correct answer and then ask another student. When the correct response is given, the teacher should say,

"THAT'S RIGHT. YOU READ WHAT IS IN THE DOTTED BOX FIRST."

Then the teacher asks,

"WHAT WILL YOU FIND BELOW THE DOTTED BOX, (name of a student)?"

The teacher calls on a student, who should respond that you find questions below the dotted box. If the student does not respond correctly, the teacher should tell the class the correct answer and then ask another student. When the correct response is given, the teacher should say,

"THAT'S CORRECT. YOU WILL FIND QUESTIONS BELOW THE DOTTED BOX."

"FIND THE FIRST QUESTION. PUT YOUR FINGER ON IT."

The teacher checks each student to be sure he has his finger on the first question.

"GOOD. FOR EACH QUESTION THERE WILL BE SEVERAL POSSIBLE ANSWERS. YOU ARE TO CHOOSE THE BEST ANSWER TO THE QUESTION. FIND THE POSSIBLE ANSWERS TO THE FIRST QUESTION. HOW MANY POSSIBLE ANSWERS ARE THERE?"

The students should respond "three." If they give any other response, the teacher should go to each student individually and point to each possible answer as the student counts.

"NOW LOOK BELOW EACH POSSIBLE ANSWER. THERE IS A BOX BELOW EACH POSSIBLE ANSWER. AFTER YOU DECIDE WHICH ANSWER IS CORRECT, YOU ARE TO MARK THE BOX BELOW THAT ANSWER. NOW PUT YOUR FINGER BY THE SECOND ANSWER. PICK UP YOUR SPECIAL PEN AND MARK LIGHTLY THROUGH THE BOX TO SHOW THAT THE SECOND ANSWER IS CORRECT."

The teacher should check to see that each student has marked the correct space. Also the teacher should be sure each student has made a wide mark so that the latent image shows. Any student who has not made an acceptable mark should be required to make an acceptable mark in the space for the first or third possible answer.

"WHAT DO YOU SEE IN THE SPACE YOU MARKED?"

The students should say "stars" and "very good."

YES. THE STARS MEAN THAT YOU ARE THINKING. YOU HAVE MARKED THE CORRECT ANSWER. THAT'S WHY IT SAYS "VERY GOOD."

"NOW PUT YOUR FINGER WHERE THE NEXT QUESTION WOULD BE."

The teacher should check to see that each student has his finger on the correct line.

"GOOD. NOW LET'S PRETEND THAT YOU THINK THE THIRD ANSWER IS RIGHT. PUT YOUR FINGER BY THE THIRD ANSWER."

The teacher should check to see taht each student has his finger beside the third answer.

"NOW PICK UP THE SPECIAL PEN AND MARK LIGHTLY THROUGH THE BOX FOR THE THIRD ANSWER."

The teacher should pause while the students all mark the box.

"WHAT DOES IT SAY IN THE BOX, (name of a student)? READ IT FOR US."

After the student reads the message ("Since there are no stars, try another answer."), the teacher should say,

"IF YOUR ANSWER IS NOT RIGHT YOU WILL GET SOME HELP FROM THE MESSAGE IN THE BOX. NOW, DO WHAT THE MESSAGE TOLD

YOU TO DO."

The teacher pauses until all students mark either answer one or two.

"WHAT DOES IT SAY NOW, (name of a student)?"

The student should respond "excellent" or "there are stars and it says excellent."

"GOOD. NOW YOU SEE THE STARS AND YOUR ANSWER IS CORRECT. YOU SHOULD ALWAYS READ CAREFULLY. TRY TO CHOOSE THE RIGHT ANSWER SO THAT YOU CAN GET STARS THE FIRST TIME. NOW YOU ARE READY TO USE THE LESSON BOOKLET.

Appendix II. Questionnaire for Wakulla Reading Project

QUESTIONNAIRE FOR WAKULLA READING PROJECT

A. Objectives

1. Were the objectives appropriate for your students? (check one)

   YES____ USUALLY____ SELDOM____ NO____

2. Which objectives should be omitted?

3. What type of objectives should be added?

4. Which objectives coincide with those of your instructional program?

5. Which objectives are irrelevant to your program?

B. Self-Instructional Booklets

1. Does the student find his own booklets, or does the teacher hand them to the student? (Check one)

   STUDENT FINDS _____ TEACHER FINDS _____

2. In what way, if any, did a teacher or aide assist the students with the self-instructional booklets? (circle a letter)

   a. They stayed with the student while he used the booklet.

   b. They read the directions and made sure the student knew what to do.

   c. They provided fee back and encouragement when students complete a booklet.

   d. They merely handed out and cottected booklets.

3. If the student does not recognize what a picture is, do you tell him what it is?
YES_____ NO_____ (check one)

4. Was the format of the booklet appropriate? (Check one)

YES_____ NO_____

If not, why not and what format can you suggest?

5. When do the students look at the feedback? (circle a letter)

a. after each item
b. at the end of each page
c. at the end of each booklet
d. never

6. Do you suspect the students looked at the feedback before responding? (check one) YES_____ NO_____

If yes, is the fact detrimental to his learning or does it teach him some values you consider inappropriate? (circle a letter)

a. detrimental to learning
b. not detrimental to learning
c. has effect on relevant values
d. has no effect on relevant values

7. Do you discuss with the students the consequences (in learning) of cheating? (check one)
YES_____ NO_____

8. Do you feel the booklets provided the students with needed practice? (circle a letter)
a. too much
b. too little
c. not appropriate

C. Tests

1. Do you feel the pretest was successful in locating the appropriate point in the program for students to begin? (check one)

YES_____ NO_____

2. Did you or the students have any difficulty with the on-line tests? (check one)

YES_____ NO_____

If yes, explain:

3. Did you feel the students were spending too much time taking tests? (check one)

NO_____ TOO MANY_____ TOO FREQUENT_____

4. Do you feel the decisions made after each test were appropriate as far as assigning students to instructional booklets is concerned? (check one)

YES_____ NO_____

5. How well did the ~~off-line tests~~ (used before the computer was available) work? (check one)

GOOD_____ FAIR_____ POOR_____

6. Was it difficult to keep track of what test or booklet a student should do next? (check one)

YES_____ NO_____

How did you do it?

What could be done to make the task easier?

D. Time and Frequency

1. How much time did the students on the average spend on the materials?

TIME PER DAY _____ DAYS PER WEEK _____

2. How did you decide when a student could do the next test or booklet?

3. Approximately how many tests or booklets would a student complete in one day_____ in one week_____ ?

E. General

1. How do you feel the project this year compares with the project last year? (check one)

BETTER_____ ABOUT THE SAME_____ WROSE_____

2. What do you think would be the effect of removing the computer terminals?

3. What is your overall opinion of the project?

4. How would you describe your students' attitudes toward the materials?

5. What do you do if the student cannot answer the booklet questions in a new objective?

6. How do you help a child with material he has missed?

7. Does your classwork revolve around the project, or are the booklets supplementary to the classwork, or neither?

8. Should objective 4 be before objective 3? (check one)

YES_____ NO_____

9. What suggestions can you make to improve the project?

END