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ABSTRACT

Research sought to test the utility of the Optacon (an optical-to-tactile converter, which enables the blind to read ink-print materials), to identify predictors of success with the Optacon, and to observe the Optacon's effect on student attitudes. Matched groups of blind students in grades 4 through 8 and 9 through 12 received instruction individually or in groups of three. Results showed that after 24 hours of instruction, students read with high accuracy but only limited speed (6.3 words per minute). Elementary and secondary students and individuals and groups performed equally except for superior accuracy for the older students and groups. Intelligence and tactile ability predicted reading speed and accuracy; grade level, spelling ability and attitude toward education appeared predictive of accuracy. About 40% of the students could use the Optacon to read in a variety of situations, and this flexibility correlated with intelligence, tactile ability and the number of years for which the person had sight before becoming blind. No significant attitude changes were noted. It was concluded that accurate reading was possible with only limited training on the Optacon and it was hypothesized that reading speed and flexibility would increase during phase II of the project as students acquired more experience with the Optacon. (Author/PB)

AIR-34500-9/73-ITR

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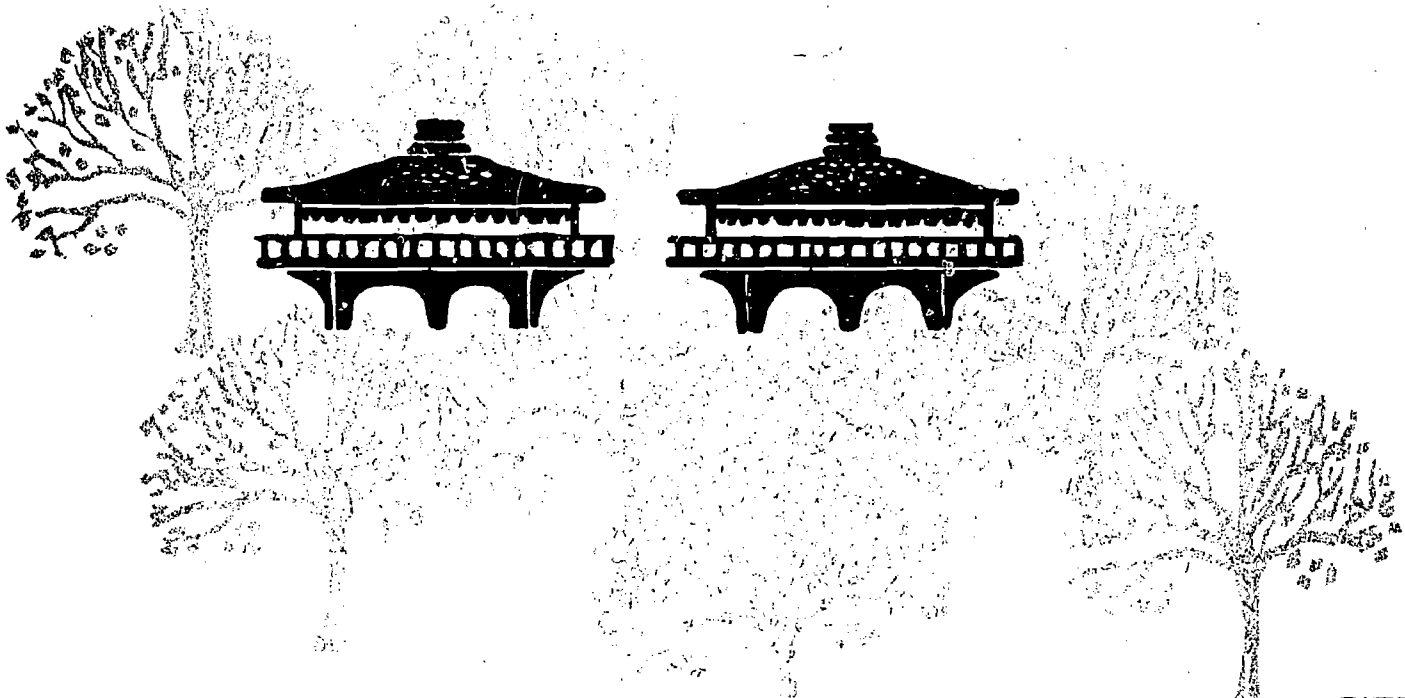
EDUCATIONAL EVALUATION OF THE OPTACON (OPTICAL-TO-TACTILE CONVERTER) AS A READING AID TO BLIND ELEMENTARY AND SECONDARY STUDENTS

INTERIM TECHNICAL REPORT

PHASE I

Contract No. OEC-0-72-5180

September 1973



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Educational Evaluation of the Optacon (Optical-to-Tactile Converter) as a Reading Aid to Blind Elementary and Secondary Students

Contract No. OEC-0-72-5180

Interim Technical Report

Phase I

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Submitted to

Bureau of Education for the Handicapped
U.S. Office of Education
Washington, D.C.

September 1973

The research reported herein was performed pursuant to a contract with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

ABSTRACT

This report covers work during the first 15 months of an ongoing study entitled Educational Evaluation of the Optacon (Optical-to-Tactile Converter) as a Reading Aid for Blind Elementary and Secondary Students. The study was intended to test alternative teaching arrangements, identify predictors of Optacon success, and observe the effect of Optacon training on student attitudes. In addition to measurement and evaluation, the project objectives also included the development of appropriate instructional materials for training blind elementary and secondary students to read standard inkprint. Instructional materials and tests were developed in the fall of 1972 and instruction began in the spring of 1973 with the cooperation of some 15 geographically distributed public school districts and residential schools.

Seventy-one regular cases and ten special cases are included in the data reported in this study. With the exception of the special cases (differences in age, teaching mode, handicapping condition or other unique circumstances outside the defined population constraints), the sample was stratified and balanced by cohort group (grades 4-8 and 9-12), student/teacher ratio, and whether student teachers were involved. A substantial range of intelligence, tactile ability, braille reading ability, and English spelling ability was represented in the sample.

Criterion assessment included multiple measures of reading speed, accuracy and variety of usage with the Optacon, and measures of attitude toward the Optacon, toward education and toward the self. Predictor indices included measures of intelligence, braille ability, tactile ability, English spelling ability, attitude toward self and education.

Logs were maintained on learner progress. They yielded data on study time, utilization and mastery of instructional units, and equipment functioning. The latter data were made available to a concurrent evaluation conducted by Franklin Institute Research Laboratories.

The study design called for approximately a half hour of daily study time during school days, but a number of "real world" constraints (teacher strikes, illness, etc.) limited the aggregate study time over the spring semester, typically to about 24 hours per student.

Findings following this limited amount of study time indicate that high levels of accuracy in reading print were attained (mean 86%), but that reading speeds appeared to be relatively slow (mean 6.3 WPM). It is essential that these reading speeds be viewed as conservative for a number of reasons indicated in the main body of the report. Certainly, they only represent no more than interim ability levels attained part way through the recommended training period.

With respect to treatment variables, (a) the elementary grade level cohort did not perform significantly lower than the secondary level cohort except with regard to reading accuracy; (b) differences in Optacon performance of students taught singly and those taught in 3:1 student/teacher ratios were not significant, with the sole exception of accuracy of reading which showed 3:1 ratios performing better; and (c) the involvement of student teachers, under supervision of credentialed teachers, did not result in a lower level of student performance as compared to teaching accomplished solely by credentialed teachers.

Positive predictive relationships with Optacon reading success (speed and accuracy) appear highest with respect to intelligence and tactile ability. Grade, age, sex, English spelling, and attitude toward education appear predictive of Optacon accuracy. Braille reading speed does not appear to be a useful predictor of Optacon reading speed or accuracy, but braille accuracy appears to be correlated with Optacon success. Self-concept was not a predictor of Optacon speed or accuracy.

The variety of Optacon use for various kinds of reading was also assessed (bottle labels, excerpts from telephone books, etc.). In spite

of the fact that a number of students had not completed all instructional units, about 82% attempted this part of the test and about half of these scored at acceptable criterion levels.

In a predictive sense, flexibility of Optacon use for different kinds of reading was positively associated only with intelligence, tactile ability, and with the number of years that the individual was sighted.

Findings related to attitudes indicated no significant changes over the study period. In terms of predictive value, attitude toward education was correlated with Optacon accuracy. Self-concept was not correlated with any of the performance criteria, i.e., speed, accuracy or variety of use.

The newly developed instructional materials were evaluated favorably by over 95% of the teachers in terms of meeting individual student needs. About 66% of the students also indicated that the materials were appropriate. About 84% of the students found Optacon tracking to be an easy task, but only about 61% thought it was easy to adjust the Optacon for different kinds of print. About 75% of the students thought that instruction in the operation of the Optacon should begin in the primary or upper elementary grades.

In sum, high levels of accuracy in reading were demonstrated with the Optacon even before completion of the study materials. Estimates of mean reading speeds and the flexibility of use of the Optacon in various reading contexts cannot be fully judged until students have had considerably more opportunity to develop their skills. This opportunity is expected to be afforded in the second phase of training. It would appear, however, that having had, on the average, less than the equivalent of one full school-week of study time, a mean speed of 6-7 words per minute in a new code (with high accuracy) is no small accomplishment.

ACKNOWLEDGMENTS

Advice and counsel was received from a number of key people in the fields of special education and sensory research. We particularly appreciated the perspectives on special education provided by Philip Hatlen, on educational design by Robert Gagné, on reading approaches by Mary Herman, and tactile phenomena by Emerson Foulke. We thank the various persons around the country who responded so helpfully when we were soliciting information about available, appropriate measures.

A special debt of gratitude is owed to Mrs. Marian Canfield, whose extraordinary talents as a teacher and willingness to experiment were major factors in our including certain case studies of an unusual and most interesting nature. She also deserves the primary credit for developing special draft instructional materials for one of those students, based on a whole word approach to the teaching of reading.

Early in the study, suggestions from Mr. Gale Lutz, of the San Diego schools, were quite helpful in alerting us to topical areas that needed to be included in the instructional materials, as well as some past problems and experiences in Optacon teaching that should be avoided or overcome in our own efforts.

We would like to sincerely thank the parents of those pilot students and special students whose participation required their being regularly transported by private car to teaching locations outside their school districts.

Any research project which is conducted in the field is dependent in large measure on the willingness of school personnel to devote extra time and energy in the implementation of the innovation and in the collection of essential data. AIR project staff feel very fortunate to have had the cooperation and commitment of the personnel in the fifteen schools and school districts listed below, many of whom have become friends as well as colleagues.

Azusa Unified School District, Azusa, California

Harold L. Heywood
Lucille O. Potter

Cheri Blackwell
Esther Laschober
Erna Maron
Pat Presley
Pearl Steel

Berkeley Unified School District, Berkeley, California

Robert W. Whitenack
Nancy Rubin
Howard Schirmer
Ginny Soffa

Campbell Union Elementary School District, Campbell, California

Anthony Perreira
Marion Canfield

Campbell Union High School District, Campbell, California

Nick Montesano
Arta Jo Chambers
Virginia Braun
Ben Sanematsu

Chula Vista City School District, Chula Vista, California

John F. Vugrin
Bonnie McConnell

Cincinnati Public Schools, Cincinnati, Ohio

Muriel C. Lass
Mary Pinkelton
Marilyn Meckes
Nancy Dunn

Florida School for the Deaf and the Blind, St. Augustine, Florida

Walter S. Davis
MacDonald Johnstone
Mrs. Anderson
Susan Beck
John Cardinale
Charles Cowart
R. D. Moore
LaRhea Sanford
Tuck Tinsley
Mrs. Washington

Houston Independent School District, Houston, Texas

Charles Meisgeier
Genevieve Yates-Gamble
Ruth Reed
Virginia Guillet

Logan School, Philadelphia, Pennsylvania

Muriel G. Korn

Roseann Halpern
Sue-Ann Lieberman
Vickie Mann
Lilian Pisch
Michelle Toohey
Dutch Witkowski

Overbrook School for the Blind, Philadelphia, Pennsylvania

David W. Olson
Mary Anne Sullivan

Mrs. Bender
Linda Christensen
Elizabeth Costello

Perkins School for the Blind, Watertown, Massachusetts

Benjamin F. Smith
Carl J. Davis

L. Beauchamp
Anne Buxton
Ray Condon
Charlene Howe
Karen Putzer

Salem Public Schools, Salem, Oregon

A. Weston Niemela
Eva Southwell

San Diego City Schools, San Diego, California

C. Robert Calhoun
Gale W. Lutz

E. Specter

Visalia Unified School District, Visalia, California

Hugo Steigman

Keith Lindersmith

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INTRODUCTION

Research and development in reading devices for the blind has been and will continue to be a vital link in improved inward and outward communication with those who handicapped through sensory deprivations. In terms of societal goals, high priority must be given to finding alternative means of reading which can alleviate the effects of the deprivation both in a functional and emotional sense. Many of these deprived individuals have much greater potential to operate in a sighted world than is generally achieved and there is ample evidence to show that this failing is not due to lack of intellect or capacity for work. Nor is the hesitancy to undertake new experiences a sign of lack of motivation. Rather, these are consequences of a forced dependence on others--for spatial orientation, for conceptualizing the wholeness of places and things, and, of great importance, for distinguishing meaningful ink-print materials, be they labels, phone books, or professional journals.

Various engineering groups have been active in the area of ink-print readers, which convert optical images to either tactile or aural analogs. One of the former types of readers, the Optacon, was developed by Stanford University and the Stanford Research Institute, with federal support. (Linvall, 1973) The Optacon device which was evaluated in terms of educational potential in the present study is a two-handed, battery powered, portable version. Figure 1 shows the main features of the device. Ancillary devices, intended primarily for training purposes, are a tracking aid, master/slave cable, visual display, and cassette trainer (which uses computer generated tape input).* Some 46 Optacons and lesser amounts of ancillary training equipment were made available for purposes of this educational evaluation.

Prior to this study the main focus of instruction and use of the Optacon in this country was with adults who acquired their own Optacon and received concentrated individual training in its use. A number of critical

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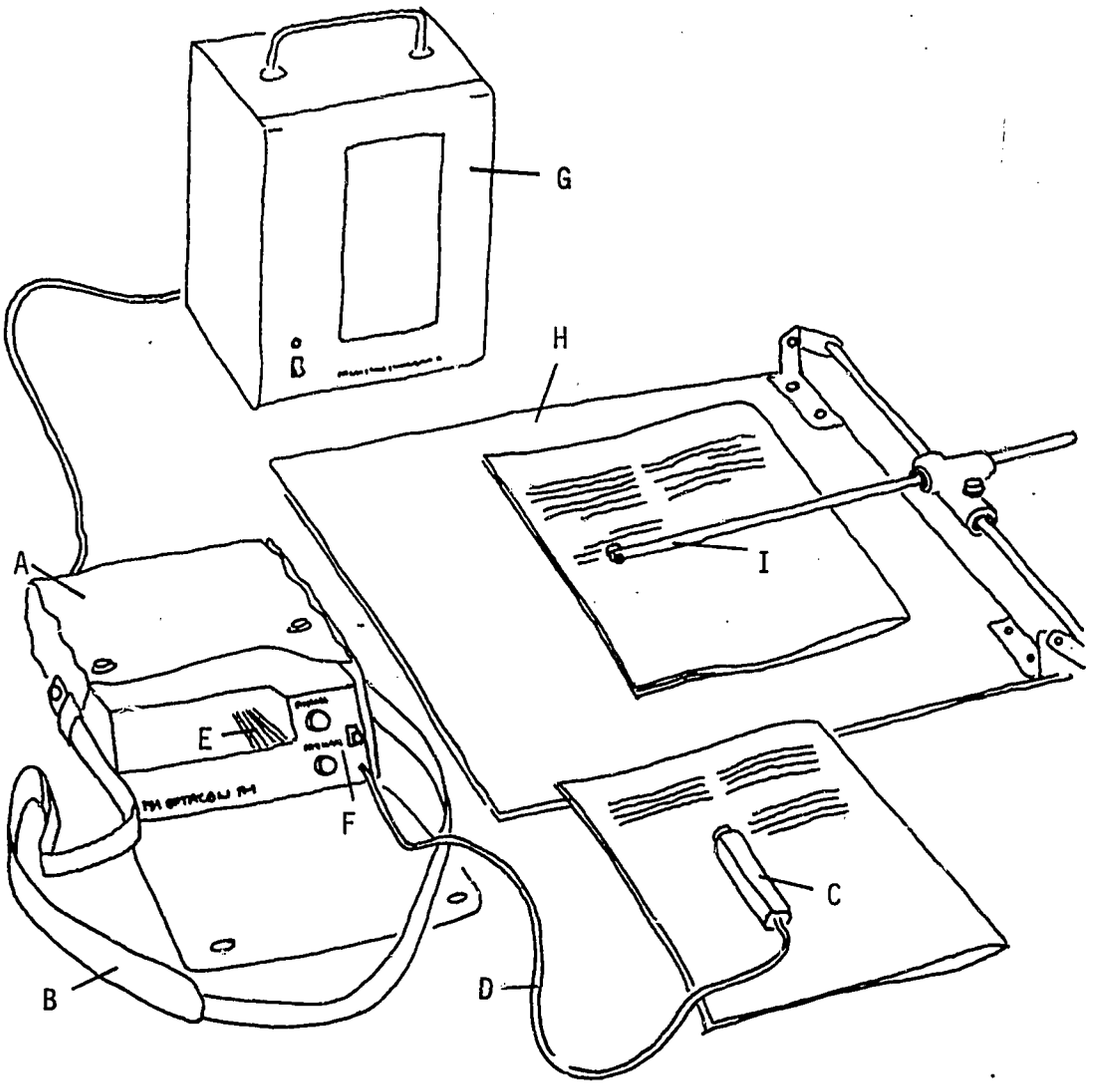
*The Optacon and associated devices are presently manufactured and marketed by Telesensory Systems, Inc., 2626 Hanover, Palo Alto, California 94304.



A Leather-cased Optacon Electronics
B Shoulder Strap
C Camera or Light Probe, with Zoom
D Cable
E Tactile Array (Index Finger)
F On-Off, Threshold and Intensity Controls
G Visual Display
H Tracking Aid
I Tracking Aid Guide Bar-Camera Attachment

Figure 1. Components of the Optacon device as evaluated in this study.

questions needed investigation to determine the potential of the device under "real world" educational conditions when:

- students are at different grade levels (4-12) and have a range of academic ability,
- student/teacher ratios vary and Optacon equipment is shared,
- credentialed teachers or student teachers under supervision serve as instructors,
- the setting for instruction varies, and
- the time available for instruction is constrained by school schedules.

The principal objectives of this study were:

- To develop appropriate instructional materials at the elementary and secondary levels for teaching the tactile recognition of Arabic numerals, English letters, words and sentences, as well as reading of such material in a variety of formats, contexts and typestyles.
- To conduct a field investigation in which the evaluation design would allow comparison of certain treatment variables, i.e., elementary vs. secondary school level, student/teacher ratio, involvement of student teachers.
- To investigate possible predictive relationships between success in reading with the Optacon and measured intelligence, tactile ability, braille reading ability, English spelling ability, attitude toward education, and self-concept.
- To establish the levels of reading speed and accuracy that are typically attainable and to relate these to study time.
- To explore the diversity of applications for which the students might find the device useful once their initial or basic instruction has been completed.

It should be noted that the fulfillment of these objectives is largely dependent upon a sufficient training period and opportunity for observation. Since the net study time made available by the schools during the spring semester of 1973 was necessarily attenuated (less than half the hours usually allocated by the manufacturer for the teaching of adults), the study is being extended for an additional school year. The findings from this study, then, are interim in nature and do not represent the full extent of skill levels attainable by elementary and secondary school Optacon students.

METHODS

Instructional Materials Development

Initially, project staff analyzed a number of widely used approaches to the teaching of character recognition, including those for sighted children, learning disabled children, and physically handicapped children, for their applicability to the instructional design to be used in this study. Some consideration was also given to general approaches to the teaching of second languages since the students in this study were already established readers but were largely using the braille code.

The instructional strategy subsequently developed for the Optacon training materials was tried out with pilot elementary and secondary students and reviewed by Dr. Robert Gagné, a leading authority in instructional design, learning hierarchies, and educational research; Professor Philip Hatlen, coauthor of a text on reading by the blind and nationally known special education teacher-educator; and Professor Mary Herman, experienced teacher in the lower grades and specialist in the teaching of remedial reading for the handicapped.

Inherent within these instructional materials were design characteristics which reflected certain principles of learning thought to be essential for efficient mastery of the task at hand. Thus immediate positive reinforcement was stressed throughout; instructional provision was made for both drill and practice and prompt application of the newly learned material in meaningful form; allowance was made within the materials for diagnostic and remedial looping geared to individual needs; and the materials were structured so that bright learners could move rapidly and selectively ahead without penalty. After pretesting various alternatives, the IBM Selectric typeface Letter Gothic was selected as most suitable.

The resulting AIR/Optacon Instruction Manual included both student and instructor sections, which were contained in three-ring binders in order that single pages could be taken out and affixed to the tracking aid for study purposes. These instructional materials were submitted to the U.S.

Office of Education as a separate product of this project, and they will be revised in Phase II. Inasmuch as they contain a complete rationale and instructions for their use, they will not be extensively described here. However, an overview of the contents of these materials will place in perspective the kinds of learning experiences that were engaged in by the subjects of the study. Letters are introduced in the approximate order of their frequency in words. The basic instructional units were:

Unit 1: Field Practice (orientation to the tactile field)
Unit 2: Numerals
Unit 3: Letters A,T,R,E; a,t,r,e
Unit 4: Letters I,H,O,S; i,h,o,s
Unit 5: Letters D,L,U,N; d,l,u,n
Unit 6: Letters C,G,M,F; c,g,m,f
Unit 7: Letters W,P,K,Q; w,p,k,q
Unit 8: Letters Y,B,V; y,b,v
Unit 9: Letters J,X,Z; j,x,z

The supplementary instructional units were:

Unit A: Tracking
Unit B: Remediation and Special Help
Unit C: Building Reading Speed
Unit D: Additional Typefaces
Unit E: Machine Adjustment
Unit F: Personalized Language Experience
Unit G: Free Reading

Sample pages from the various instructional units in the student's manual are shown in Appendix A and equivalent instructor's pages in Appendix B.

Lessons within the various instructional units were addressed to specific skills development. For example, in Unit 3 lessons were included for capital letters, for lower case letters and for a mixture of the two; in Unit G lessons were included for gaining experience in reading diverse

materials, including a tape recorder guarantee, a library catalog card, a pamphlet, a 15-page booklet, a page of a telephone book, and a section of a newspaper.

While Units 1-9 were to be studied sequentially, Units A-G were undertaken in no special order but rather according to learner interests and readiness as evidenced to the teacher through criterion exercises. Unit B could be bypassed completely if the learner had no difficulty in recognizing or discriminating among different numerals and letters.

Instructional materials for the elementary and secondary grades differed in terms of the age-appropriate content in the enrichment materials within basic units.

Instructional Plan

At the outset of the spring semester, AIR project staff conducted one and one half day training sessions at each of the cooperating schools. These sessions were intended to (a) familiarize teachers with the instructional materials package, both in terms of content and the way that instruction should proceed; (b) explain the nature of the testing program, the instruments, procedures for administration, and reporting requirements; and (c) demonstrate the use of Optacon equipment in a teaching situation. (In addition to AIR's one and one half day training, Telesensory Systems, Inc., the manufacturer, was responsible for instruction of the teachers in the operation and care of the equipment itself.) Each site was revisited by AIR staff during the semester to observe and advise on instructional procedures as they were being employed.

At each site "learning stations" were established to which the students reported for instruction (a suggested half hour daily during regular school hours). However, at several sites an itinerant teacher transported equipment between schools daily to meet with several students. Elementary and secondary level students were necessarily taught separately since the lesson materials were designed to be age-relevant, thus somewhat different in content.

A key instructional treatment variable was the student/teacher ratio. Ratios of 1:1 were conducted in tutorial fashion, with the teacher observing the visual display and assisting the individual student to work with an Optacon. Where 3:1 ratios were implemented, however, the instruction proceeded somewhat differently, with three Optacons being connected in a master/slave mode. Thus, only one of the three students would be tracking the camera, and it was this Optacon which would be attached to the visual display. The other two students using the slave machines would only be feeling the image as transmitted from the master Optacon and be unable (directly) to control the rate or clarity of presentation. This instructional procedure meant that even though the operation of the master Optacon could be rotated among the three students, there was, necessarily, a certain "lock-step" quality to the three students' movement through the basic units. Also, while it would appear economical (in terms of requirements for teacher time) to teach several students at once, it was evident that in a 3:1 ratio students would have proportionately less opportunity to receive personalized help. Once the students in the 3:1 groups had achieved mastery of the first nine instructional units dealing with numeral and the alphabet, they were allowed to study separately even though they still had to share the teacher's time.

Evaluation Plan

Population. For reasons of practicality, necessitated by the limited numbers of tracking aids and visual displays available to the researchers, schools were not considered for participation unless there were enough qualified blind students in attendance to warrant establishment of a learning station. Among the schools who expressed willingness to participate, preference was given to those who were located at points providing geographic balance to the overall study and providing future demonstration capability. Efforts were also made to include at least some schools that employed each of the different instructional philosophies of residential, public itinerant and public resource schools.

To be qualified for inclusion in the main study, schools were asked to nominate students who were braille readers at 50 WPM or more, who had no additional handicaps that would interfere with learning, who were within the range of grades 4-12 and had parental or institutional consent. In actuality, about one-fourth of the students nominated by the schools fell below the 50 WPM braille standard.

A limited number of students who, on one or more of the criteria, were inappropriate to be included in the main study were observed as special cases to further test the potential of the Optacon.

Interim measurement data were obtained for 81 cases, of which 36 were at the elementary level (grades 4-8), 35 were at the secondary level (grades 9-12), and 10 were special cases (grades 1-adult). As indicated previously, the latter were chosen to explore unique dimensions of the educational evaluation not within the scope of the main study.

An additional 17 students began training but complete data were not collected on them due to excessive absence or other local causes; it is expected that some of these students will be available for inclusion in Phase II of the study. Appendix C shows the breakdown of the student population, including cause of attrition. Appendix D shows the ranges of major characteristics of the students in this population.

Some 33 subjects were attending residential schools and 38 were attending public schools.

Fifty-one students were instructed by their special education teachers and twenty students were taught by a student teacher under the supervision of the special education staff.

Efforts were made to balance the student/teacher ratio within each elementary and secondary cohort group as shown in Table 1.

TABLE 1

STRATIFICATION OF THE POPULATION

	1:1 Ratio	3:1 Ratio	
Elementary	17	19	36
Secondary	19	16	35
	36	35	

Instruments

Data collection was accomplished through administration of the following measures (administration guidelines and specimens of these measures, other than the standard intelligence tests, are included in Appendix E).

- A measure of intellectual functioning. Intellectual functioning is a student characteristic which may be related to learning to read with the Optacon. Accordingly, the verbal scales from the Wechsler Intelligence Scale for Children (WISC) and the Wechsler Adult Intelligence Scale (WAIS) were administered orally by qualified persons, or scores were obtained from records if administration had been within 18 months. The WISC was used with students up through the age of 15; the WAIS for ages 16 and up. These instruments have an extensive history of use with blinded subjects, both for research studies and in applied educational settings.
- A measure of tactile discrimination. Inasmuch as the Optacon is an optical-to-tactile converter, the student's ability to discriminate tactually may be an important variable in learning to read with the Optacon. The Tactile-Kinesthetic Form Discrimination Test (Hammill and Crandall, 1969), was used and is referred to in this study as the tactile ability test. The test consists of geometric forms embossed with three-dimensional

figures on thin plastic sheets. Common geometric forms are represented. Subjects are asked to either identify the form which is different from the others in a set or to identify a form which matches an example. The test has been previously used with blind subjects for experimental purposes.

- A measure of braille reading. Braille reading speed and comprehension were used in the study to determine whether the student's previous braille reading competency is related to his developed ability with the Optacon. Adapted portions of the reading subtest of the Comprehensive Tests of Basic Skills were prepared and then transcribed into braille with the publisher's permission. The passages chosen were checked for difficulty level using the Fog Index (Klare, 1963) and found to be at the 4.5, 8.6 and 11.7 grade equivalents, providing a range of difficulty suitable for the fourth through twelfth graders in the study.

- A measure of accuracy in English language spelling. In order to qualify, the students in this study were to be braille readers. Braille contains many contractions which are spelled differently from a word, or part of a word, in typical written English. The Diagnostic Spelling Test was developed to determine whether the student used braille contractions as the basis for his spelling or in fact had general spelling problems. It was orally administered. Test items consist of words having typical braille contractions which are spelled differently from their form in written English. The data from this measure yielded a student "readiness" characteristic and the relationship between this measure and reading competency with the Optacon was explored.

- A measure of student attitude toward education and self-concept. Two major purposes of this attitudinal measure were: (1) to indicate whether there was a relationship between the initial state of these attitudes and Optacon reading competency, and

(2) to indicate whether learning to use the Optacon brought about changes in blinded students' attitudes toward their own potential as learners. The instrument selected is an adaptation of a measure, the Would You test, developed by AIR and previously used in an Office of Education supported project (Weisgerber, Coles and Everett, 1972). This test was presented in braille form to the blind students.

- A measure of student attitude toward the Optacon. An Optacon attitude inventory was developed especially for the project and produced in braille form. The student's attitude toward the Optacon was used to examine whether such attitudinal variables were related to performance and also to determine whether there was a change in student attitude toward the Optacon over the period of the project. The instrument focuses upon present feelings toward the Optacon, the use the subject believes might be made of it in the future, the perceived importance of the Optacon relative to other devices, the perceived ease of use of the equipment, and the appropriateness of learning materials the student has used during the project.

- Activity log. A weekly record of teaching/learning progress was kept throughout the study by the teachers. This log provided a record of criterion performance, time spent per unit, and the teacher's evaluation of the adequacy of the materials, learner performance, and any special problems occurring. The log also was used to collect information about the amount of equipment use and any associated problems for transmittal to the engineering evaluation contractor, Franklin Institute Research Laboratories.

- Criterion measures of Optacon reading. A five-part criterion measure of performance on the Optacon was administered to determine speed and accuracy in reading with the Optacon as well as the range of uses to which students were able to apply their skills with the Optacon. The five parts consisted of:

1. Two samples of reading speed using brief paragraph selections to be read aloud. The selections were formed from the 300 most commonly used words taken from the American Heritage Word Frequency Book (Carroll, J. B., Davis, P., and Richman, B., 1971).

2. Two samples of reading speed involving short paragraphs utilizing vocabulary drawn from the instructional materials.

3. A sample of reading speed adapted from the Comprehensive Tests of Basic Skills, an abbreviated version of that used in the initial braille reading assessment. The sample consists of one paragraph at or below the learner's grade level.

4. A second sample of reading speed using an additional adapted passage from the CTBS consisting of a paragraph at or slightly above the learner's grade level.

5. Seven items concerning possible home and school applications of the Optacon, including reading other typefaces, locating a phone number from a page of the telephone book, reading a newspaper headline, reading a catalog price, finding a page in a table of contents, and distinguishing labels from harmful and unharmful pharmaceutical goods.

To place the above measures in meaningful perspective, essential background information was accumulated on each subject relative to sex, age, duration of blindness, experience with typing or print, and physical handicaps other than blindness.

The scaling of the measures for analysis purposes is described in Appendix E.

Procedures for Data Collection

AIR personnel visited each site and held orientation sessions with the teachers involved to explain the purpose of the study, the nature of the instructional materials and the importance of adhering to the plan for data collection for the entire duration of the study. Each teacher was given a packet containing instructional materials, data collection instruments and a guide to their use (see Appendix E). With the exception of the intelligence test all measures were administered by the teachers.

Data collection itself fell into three stages: (1) before training, (2) during training, and (3) after conclusion of training, as shown in Figure 2. A repeated measures design was used with two cohorts of blind students: elementary students in grades 4-8 and secondary students in grades 9-12. Within each grade band, two student/teacher ratios were employed: a 1:1 ratio and a 3:1 ratio. The overall scheme of the design is displayed in Figure 2.

Groups	N	Pretests	Measures During Treatment	Post-Treatment Measures
Elementary Cohort				
1:1 Ratio (School A,B...)	17	A, B, C, D, E	F, H	C, G, H
1:3 Ratio (School A,B...)	19			
Secondary Cohort				
1:1 Ratio (School A,B...)	19	A, B, C, D, E	F, H	C, G, H
1:3 Ratio (School A,B...)	16			
Special Cases	10	A, B, C, D, E	F, H	C, G, H

Measures consist of:

A Braille Reading Ability
B Tactile Ability (Tactile-Kinesthetic Form Discrimination)
C Attitude toward Education and Self-Concept (Would You)
D Diagnostic Spelling Test
E Intellectual Functioning, verbal scales
F Activity Log: time and performance
G Optacon Reading Criterion: speed, accuracy and variety
H Attitude toward Optacon

Figure 2. Design of the study.

Limitations of the Study

The conduct of this study was constrained by several considerations that should be kept in mind as the following Results section is reviewed. These considerations, and their collateral limitations, are:

- Selection of subjects could not be accomplished on a random basis since several cooperating schools had to involve all of their students who met the qualifying criteria. This was imposed by the larger study requirement of a sufficient number of cases at each site to warrant the assignment of a complement of the limited Optacon training equipment.
- While representation from residential, public itinerant, and public resource programs was purposely sought, there is no assurance that the schools selected are representative of those respective programatic approaches. Residential schools, for example, vary considerably in the type of students served and the three residential schools cooperating in this study were not selected to represent these differences.
- The ideal amount of daily study should very probably be well above the half-hour during the regular school day which was requested of the schools as a condition of participation. However, a decision was made at the outset that after-school study sessions were unsuitable partly because of possible student fatigue and also because of the psychological burden it would place on teachers and students (even if they volunteered) and the special problems of transportation and general logistics. Plainly, the amount of study time per semester afforded to the students in this study is not a model for schools that might plan on instituting their own instructional programs centered on sophisticated reading devices. Indeed, it might be well to compare this type of instruction with mobility training, in which the allocation of specially trained professionals and appreciable blocks of time are advisable to accelerate the achievement of functional performance.

- If costs of the Optacon equipment and associated training devices were not a major constraint it is likely that some of the special problems encountered in the conduct of this study could have been averted. Thus complications of scheduling and equipment access could have been relieved if more visual displays and tracking aids were purchased and made available in relation to the number of Optacons. (The former devices are essential to use with new trainees.) Similarly, the few complex Tape Cassette Trainers incorporated in the study could only be placed at a few locations. In any case, the researchers were supplied with only one (computer generated) training tape for each Tape Cassette Trainer and this precluded any formal evaluation of the usefulness of this particular device.
- The distinction was drawn in this study between credentialed teachers and student teachers under the supervision of credentialed teachers. In the context of the subject matter of this investigation, teaching youngsters how to use the Optacon, both kinds of teachers suffer from inexperience in teaching with the Optacon. Within the constraints of time available for teacher training both kinds of instructors were given equivalent preparation and both had access to project staff through a local coordinator if teaching problems arose.

RESULTS

The results of the study will be reviewed according to six major components or aspects of the project. These six aspects are: Overall Performance of Students (as constrained by time), Predictors of Success, Treatment Effects, Affective Relationships, Ease of Optacon Operation and Appropriateness of Instructional Materials. In addition, ten case studies are presented. The reader will note that some limited discussion is included with these results. An integrative discussion is contained in the next chapter.

Overall Performance of Students

The reading achievement of the entire sample will be examined initially. In this section the three overall measures of reading attainment will be examined separately and the effects of time noted. In subsequent sections achievement associated with particular treatment groups will be reviewed.

Rate or speed. Within the main study, the average words per minute (WPM) achieved across the several parts of the Optacon Criterion Test was 6.3 for the sample as a whole. The range extended from 1 to 17 WPM. The distribution of average WPM scores is shown in histogram form in Figure 3. The mean rates do not differ significantly across the various parts of the Criterion Test, ranging from a low of 5.3 WPM on Part IV to a high of 7.3 WPM on Part II. A summary of the reading criterion results is shown in Table 2. By design, there were considerable differences in difficulty of the reading material among the first four parts of the Criterion Test. Part 1 consists of a paragraph drawn from the 300 most commonly used words in the English language. At the other extreme, Part IV represents a level of reading difficulty at or above grade level for the students. As described in the Methods section, Part IV consists of different paragraphs for the elementary and secondary students. For the elementary group, grades 4-8, the selection was at 8.6 grade level. For the secondary group, grades 9-12, the selection was at 11.7 grade level of difficulty. We might reasonably expect that the fourth and fifth graders, for example, would have

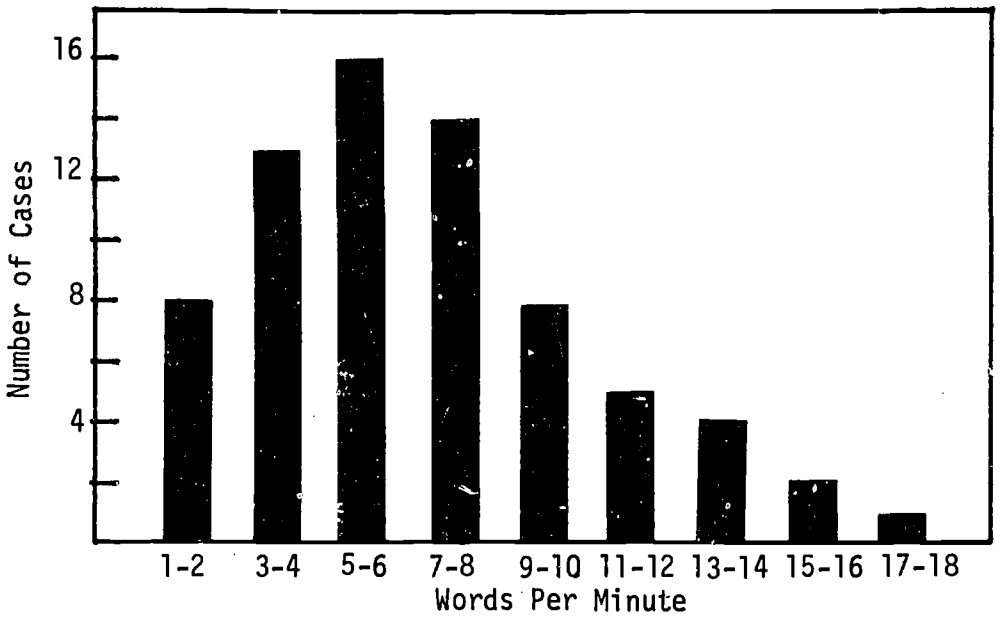


Figure 3. Frequency distribution of the overall reading rate on the Optacon reading criterion test.

some difficulty and read noticeably more slowly when they encountered eighth grade reading material. The consistency of the measured reading rate across this wide range of difficulty probably indicates students were not reading close to their functional level and therefore were not slowed down by more difficult material.

The reader may also note that within Table 2 a part of the test is identified as "Orion." Orion was one of the selections adapted from the CTBS, and had a difficulty level of 8.6 grade equivalent. This same selection was used as Part IV of the criterion test for the elementary cohort and Part III of the test for the secondary cohort. It is listed separately because it was a common measure for all students. While it is displayed in this table, the importance of the results will be discussed subsequently in connection with cohort treatment groups.

TABLE 2

SUMMARY OF OPTACON READING CRITERION TEST RESULTS

	Mean	Std. Dev.	N
Part I WPM	6.18	3.92	70
Part II WPM	7.30	4.02	69
Part III WPM	6.79	4.05	69
Part IV WPM	5.28	3.43	69
Orion WPM	6.29	3.87	68
Average WPM--Part I-IV	6.31	3.65	71
Part I Accuracy	.85	.19	70
Part II Accuracy	.89	.13	69
Part III Accuracy	.86	.16	69
Part IV Accuracy	.83	.17	69
Orion Accuracy	.84	.16	68
Average Accuracy--Part I-IV	.86	.14	71
Part V, Item 1A	1.96	.82	71
Part V, Item 1B	2.14	.76	71
Part V, Item 2	1.90	.78	71
Part V, Item 3	1.99	.87	71
Part V, Item 4	1.85	.86	71
Part V, Item 5	1.93	.85	71
Part V, Item 6	1.92	.86	71
Part V, Variety of Use	1.95	.67	71

Accuracy. Accuracy tended to be uniformly high across all parts of the Criterion Test with means of .83 to .89, as shown in Table 2. This represents the proportion of words read accurately to total words read. The variability was not extensive. An examination of Figure 4, which shows a distribution of average accuracy scores, reveals that most students were reading at an accuracy rate of .80 or better. It is interesting to note that the accuracy levels found on the Criterion Test are quite similar to the accuracy levels which were required throughout the study on criterion exercises embedded in the lesson units. An 80% accuracy level was established as the minimum requirement for a student to proceed to another basic alphabet unit. It could be that the students learned to work toward this level of accuracy and possibly to attain it at the expense of speed.

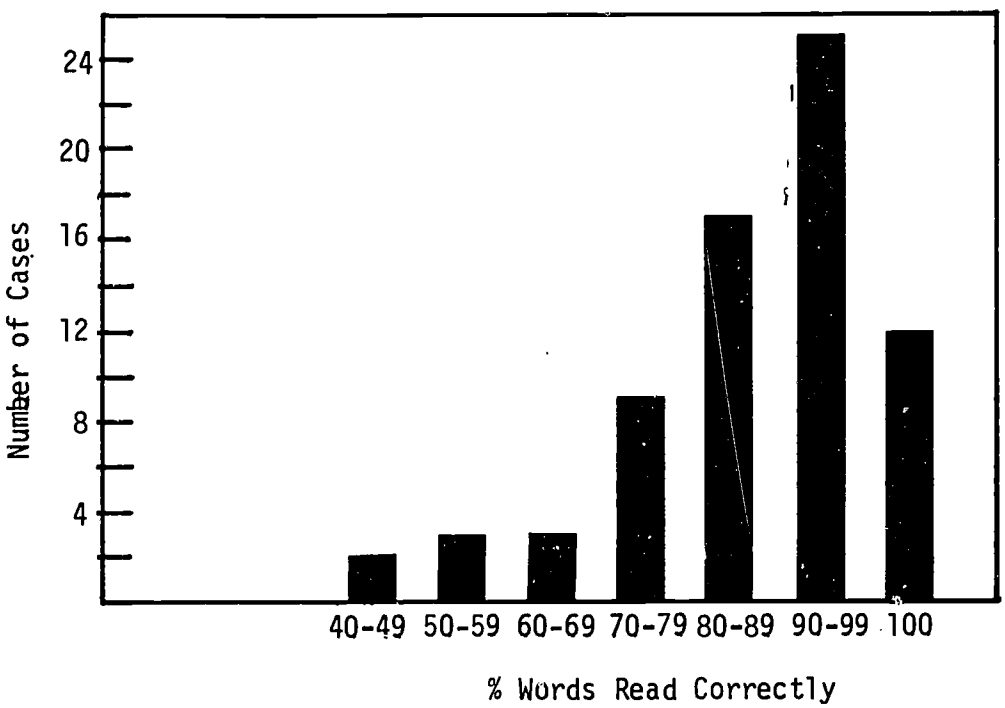


Figure 4. Frequency distribution of the overall accuracy on the Optacon Reading Criterion Test.

Variety of use. As the reader may note in an examination of Appendix E, Part V of the Criterion Test consists of seven different items representing possible applications of the Optacon, including reading different typefaces, locating phone numbers, reading headlines, catalog prices, etc. Each item of Part V was scaled separately on a 1-3 scale. A high score of 3 represented acceptable performance. It should be noted that acceptable performance depended on adequate functioning as appropriate for each task; thus relatively high standards were required. For example, to effectively locate and identify telephone numbers, a standard must be set which cannot admit many errors. The standard for Item 6, which requires correct identification of pharmaceutical labels, also permits few errors for acceptable performance.

A score of 2 on this scale indicated the student had attempted the item with more than an acceptable number of errors. A score of 1 indicated the student had not attempted the item. The scaled scores in Table 2 for Part V range from 1.9 to 2.1 across the seven items. It should be kept in mind that included in these averages are the scores of students who did not try the item at all and thus received a score of 1. A large proportion of students did not attempt each item; the percentage who did not try ranges approximately from 23% to 45% (see Table 3). However, of those who did attempt the items, approximately 50% made acceptable scores on most items.

The instructional materials which prepare the student for the variety of reading applications represented by the Part V items are contained in the lettered units of the student manual. Because of time constraints, many students never reached these specialized materials. Thus, from Table 13, which is fully discussed in a subsequent section concerning instructional materials, it is apparent that only 37 students received any exposure to Unit D which deals with different typefaces. For practical purposes, this unit is a prerequisite to Items 1a and 1b in Part V. Similarly, Unit A (Tracking) was utilized by only 41 students and Unit G (Free Reading) by only 46 students. Both of these units were intended to help students in coping with unusual formats such as encountered in Items 2-6 in Part V of the Criterion Test.

TABLE 3

PROPORTION OF STUDENTS ATTEMPTING & DEMONSTRATING SATISFACTORY ACCURACY ON PART V OF THE OPTACON READING CRITERION TEST

Item	% Not Attempting	% Attempting Unsatisfactorily	% Attempting Satisfactorily	N
1a.	35.2%	33.8%	31.0%	71
1b.	22.5%	40.8%	36.6%	71
2.	35.2%	39.4%	25.4%	71
3.	38.0%	25.4%	36.6%	71
4.	45.1%	25.4%	29.6%	71
5.	39.4%	28.2%	32.4%	71
6.	40.8%	26.8%	32.4%	71
7.	(Used only for anecdotal information)			
Average % Across Items 1a. to 6.	36.6%	31.4%	32.0%	71

Positive correlations between the three overall measures of criterion performance were obtained. Correlations of rate, accuracy and variety are shown in Table 4. In view of the limited number of students who progressed from the numbered basic units to the lettered supplementary units, it is of some interest to observe that the correlation between rate and variety of use is .68. This indicates that only the faster readers progressed far enough within the limited time available to receive the necessary training for Part V.

TABLE 4

INTERCORRELATION OF ATTAINED OPTACON SKILLS;
SPEED, ACCURACY & VARIETY OF MATERIALS READ

	Optacon WPM	Optacon Accuracy	Optacon Variety
Optacon WPM	1.00	.53**	.68**
Optacon Accuracy		1.00	.36**
Optacon Variety			1.00

**.01 level of significance

Impact of time. Unfortunately, the total time available for Optacon learning in this study was quite brief. It averaged slightly more than 24 hours of instruction during the entire semester. A substantial number of students devoted most of their learning time to those numbered units which consist of basic practice on letters of the alphabet. At the close of the semester many of these students were just entering the lettered units, which contain the speed practice, the different typefaces and other applications and enrichment units.

Total time spent on Optacon instruction is related to performance on the criterion tests. Positive correlations are shown between total time and rate, as well as variety of use. Correlations between performance and total time, time in basic units and in selected supplementary units is displayed in Table 5.

The time spent in the numbered basic units shows significant negative correlation with performance. This is true across all three measures of overall performance. We see in Table 5, on the other hand, that the time spent in lettered supplementary units correlates positively and significantly with rate, accuracy and variety of use.

TABLE 5

CORRELATION OF OPTACON PERFORMANCE WITH STUDY TIME IN BASIC UNITS, SUPPLEMENTARY UNITS, AND OVERALL

	Optacon WPM	Optacon Accuracy	Optacon Variety
Time in Units 1-9	-.44**	-.27*	-.27*
Time in Units C,D,F,G	.39**	.25*	.30**
Total Time	.19*	.14	.21*

*.05 level of significance
**.01 level of significance

The interaction between performance and time in basic versus supplementary units is further illustrated by examining different levels of student performance as they relate to time spent on the units. Figure 5 displays the student achievement by quartile together with the amount of time each quartile spent on each of the two categories of instructional units. The low quartile performers spent relatively less time on the lettered units and more time on the numbered units, while the reverse is true of the high performers.

Predictors of Success

A list of potential predictors of successful usage of the Optacon was drawn up from pretest results, field interviews and current knowledge about the blind. Particular attention was paid to variables which would tap either tactile ability or general educational skills. In addition, several demographic items (age, sex, number of years sighted) were included as possible predictors. Thus a number of potential predictors were examined in this study. Some were based on demographic characteristics of the subjects and others on pretests. The correlations of fifteen predictors with overall performance measures is displayed in Table 6.

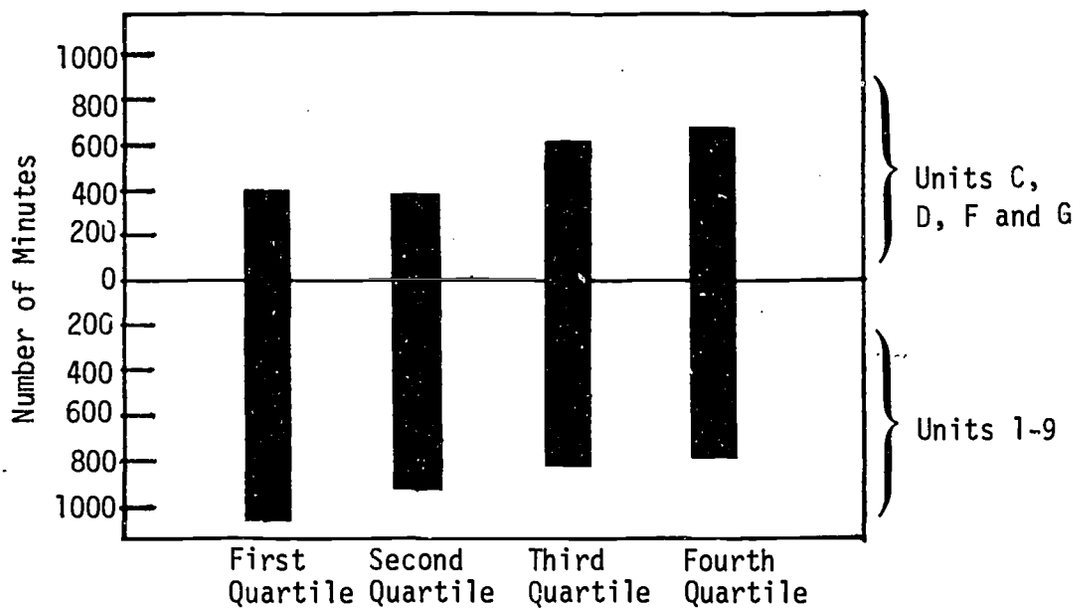


Figure 5. Time in basic and supplementary instructional units by quartiles of overall reading rate on the Optacon Reading Criterion Test.

This broad approach to the examination of predictors was taken because the study was essentially exploratory in nature. Little was known about potential correlates of Optacon performance. Student use of the Optacon in the immediate future seems unlikely to be universal even for totally blind students, due in part to the cost of the machines. Therefore, it seemed advisable to search for useful measures to select those students who could most profitably make use of the Optacon.

Predictors of rate. As shown in Table 6, only two of the potential predictors chosen demonstrate a significant positive association with Optacon reading speed at the .01 level. These are overall IQ score and total correct on the tactile ability test. It is not surprising that IQ is highly correlated with Optacon reading speed, particularly when it is recalled that the IQ computed for blind students is based solely on the verbal scores of the intelligence scale. One might realistically expect the brighter students to learn to use the machine more readily than the less able students in the early stages of instruction. However, this correlation may diminish in time.

TABLE 6

CORRELATION OF OPTACON PERFORMANCE WITH PREDICTORS

Predictors	Optacon WPM	Optacon Accuracy	Optacon Variety
Grade Equivalence	.10	.40**	-.03
Age	.01	.31**	-.09
Sex (Female)	.12	.20*	.11
Number of Years Sighted	.04	-.03	.21*
Overall IQ	.46**	.42**	.25*
Braille WPM, Part 1	.09	.25*	-.15
Braille Accuracy, Part 1	.15	.39**	.12
Braille WPM, Part 2	-.01	.17	-.19
Braille Accuracy, Part 2	.23*	.37**	-.04
Braille Orion WPM	.06	.17	-.17
Braille Orion Accuracy	.19	.40**	.06
Diagnostic Spelling (English)	.17	.55**	.12
Tactile Ability	.53**	.27*	.42**
Attitude toward Education	-.04	.35**	-.06
Self-Concept	-.11	-.01	-.16

*.05 level of significance
**.01 level of significance

The tactile ability measure was previously used for experimental purposes only. It was chosen because it appeared to be relevant to one of the major skills needed for Optacon use, tactile pattern discrimination. Of the two parts of the test, there was greater variation in deciding on the sameness rather than on difference of shapes, but the total number of correct choices had the highest correlation. Its stability as a predictor will be carefully examined in future phases of the study. Although Braille Accuracy, Part 2 (the comprehension test for the second braille passage)

also shows a significant positive relation to rate, the other five braille measures fail to display significance.

Grade equivalence and age failed to show any significant relationship with rate. This lack of effect may well stem from the low words per minute achieved on the criterion measures, far below what would be meaningful for students in the fourth to twelfth grades. Until reading speed increases to a more functional level, these potential predictors should not be dismissed.

Predictors of accuracy. Many of the potential predictors were found to be significantly related to accuracy. Grade equivalence, age, IQ, three measures of braille accuracy, diagnostic English spelling, and attitude toward education were all found to be significantly correlated with accuracy at the .05 level. Upon this basis, if we were to characterize an accurate Optacon reader, the specifications might call for an older student in the upper grade levels, a girl, with a high IQ, who is very accurate in braille reading, a competent speller with a positive attitude toward education and good tactile ability.

Achieved accuracy was quite high. Three-fourths of the sample attained accuracy scores of 80% or higher. Thus, the relatively few students in the lower end of the distribution, as shown in Figure 4, contribute a large share of the variance. They had not learned to read accurately at this point in time. The majority of the students appear to be on the verge of crowding the upper limit--so that a ceiling effect may be operating.

Predictors of variety of use. Several potential predictors demonstrated a relationship to performance on the variety of use scale. These included IQ, tactile ability, and number of years the student was sighted. A reason for this latter finding can be adduced when we consider the requirements for the variety of use scale. To perform well on this measure the student must be able to read a variety of difficult print items, compounding variation in typeface with variation in layout or format. Students who had longer exposure to such printed displays before losing their sight may better be able to cope with this potentially frustrating task. This particular correlation must be viewed with some caution, however, as it is based on only 20% of the subjects. (For 80% of the sample sighted experience was nil.)

Overall predictors. The two predictors displaying consistent relationships across the three measures of performance are IQ and tactile ability. Braille skills did not show consistent predictive power.

The fact that the brighter students were able to learn the material more effectively, particularly when constrained by a limited amount of exposure to the material, was not unexpected. IQ has been a durable predictor of a wide variety of learning skills across varied subject populations. The range of WISC or WAIS verbal IQ scores in the sample extended from 85 to 158 and covered the standard intelligence classifications from "dull-normal" through to "very superior." The only classifications not in our sample were borderline or mental defective cases who typically constitute the lowest 9% of the population.

That the Tactile-Kinesthetic Form Discrimination Test was sustained as a significant predictor across performance measures is of considerable research interest. The previous experimental data on this measure were suggestive but limited (Hammill and Crandall, 1969). In passing, one may note that the maximum score was 25 on the tactile test, and the subjects' mean was 20.9 with standard deviation of only 3.6. Within this limited range, substantial predictive power was achieved, largely from that part of the test requiring matching of similar figures.

The relationship between the two predictors, IQ and tactile ability, and WPM is amplified in Figure 6. The consistency of the relationship across IQ range and tactile performance range is marked. The tactile test apparently presents a predictive potential comparable to the IQ. Cutoff points could tentatively be defined on the basis of either predictor. For example, a score of 23 on the tactile test would select the faster readers of the sample. If equipment availability were a major concern, strata of students with higher potential could readily be identified.

One might question the degree to which each test is measuring the same phenomena. Is the tactile test an alternate form of an IQ test? The correlation between IQ and the tactile test is .44, which represents a statistically significant correlation. The relationship between the two tests

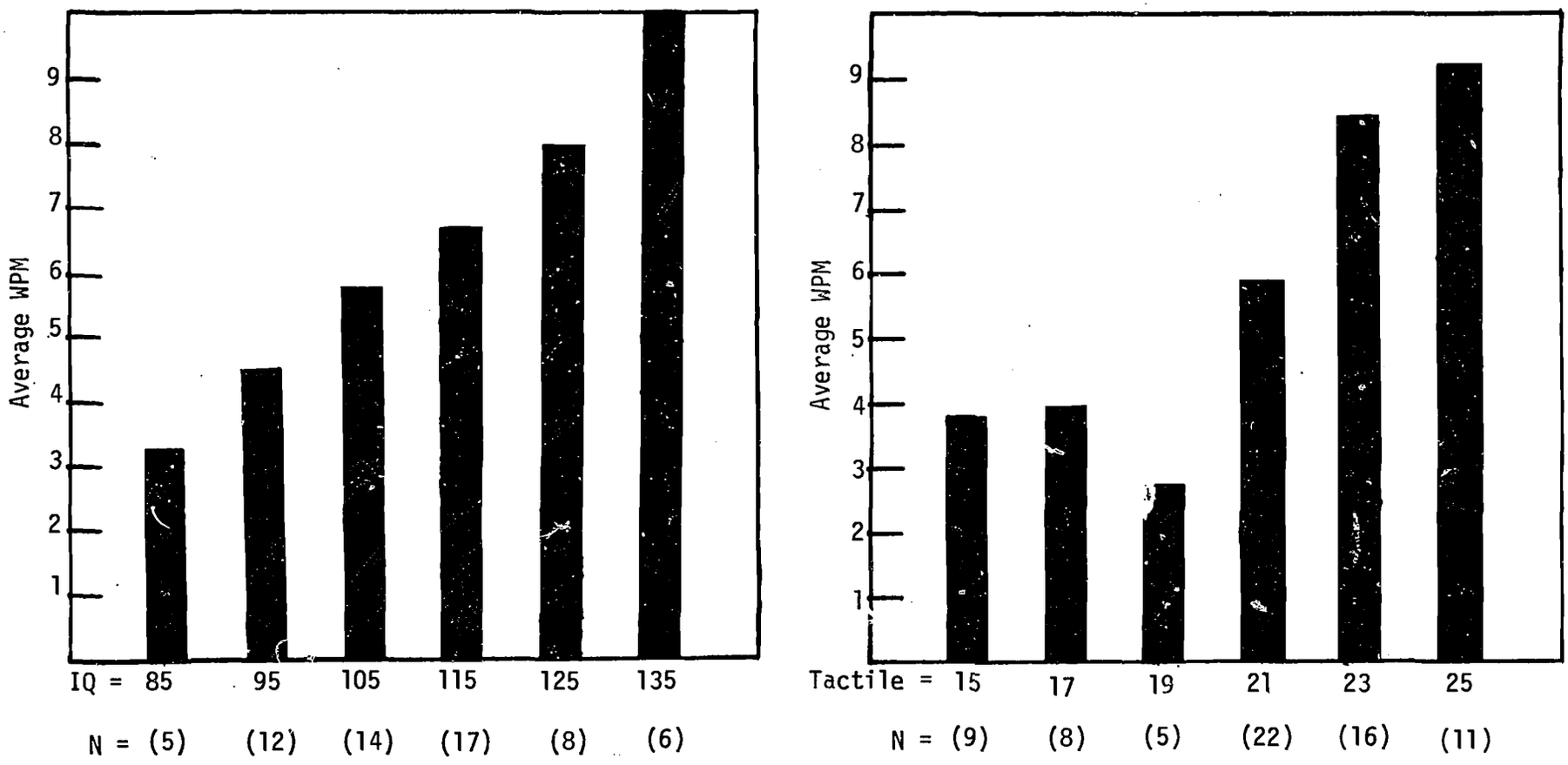


Figure 6. Frequency distribution of attained words per minute by IQ scores and by tactile scores.

was examined more closely in Figure 7, which displays the tactile scores across IQ intervals. It is readily apparent from this figure that only a moderate relationship exists between IQ and the tactile measure.

The combined predictive power of these two tests appears to be relatively strong. The multiple correlation of both IQ and tactile scores with words per minute is .63. The multiple correlation can be raised in small increments by adding the other predictors to the equation. However, their contribution is relatively minor compared to the IQ and tactile tests as they only raise the multiple R to .71.

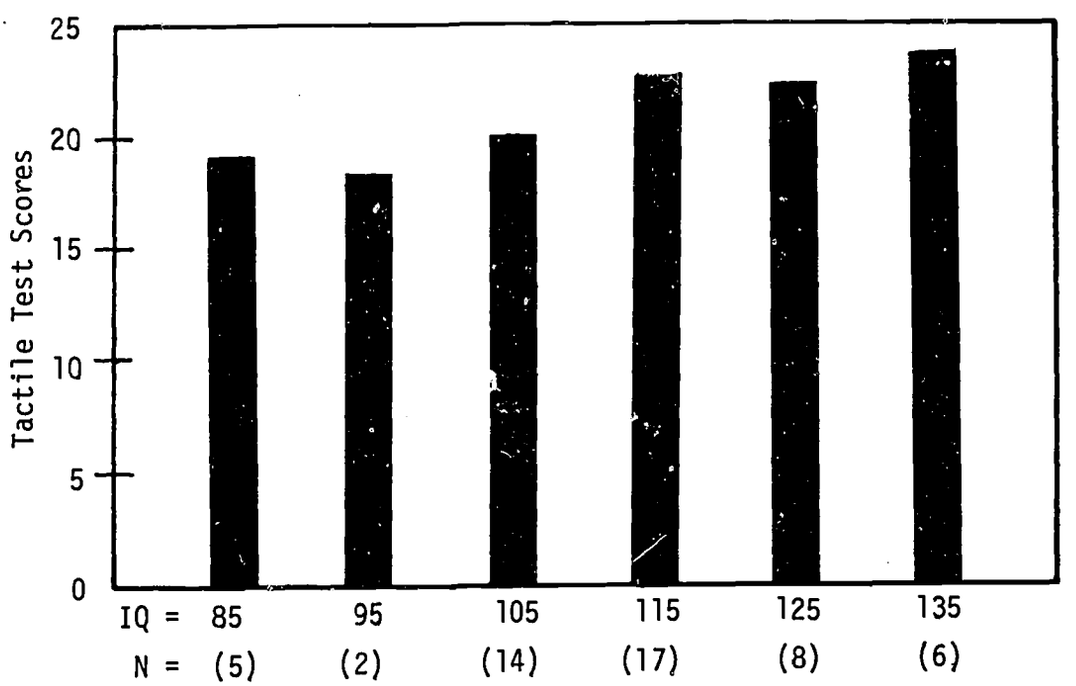


Figure 7. Average scores on the tactile test at each IQ level, and number of cases at each level.

Treatment Effects

Three treatment dimensions were utilized in the study. Each treatment was comprised of two different conditions. One dimension was the ratio between students and teachers. Two ratios were used--an individual tutorial in which the ratio was 1 to 1, and a small-group ratio in which one teacher worked with three students. A second dimension was the use of student teachers. In one condition student teachers were used, under the supervision of certificated teachers; and in the other condition no student teachers were involved. Thirdly, subjects in the study were either elementary students, i.e., 4th through 8th graders, or secondary students, 9th to 12th graders. Although this variable could be dealt with as a population characteristic, it may usefully be treated as an additional treatment variable and its relative effects will thus be analyzed in conjunction with the other treatment dimensions.

Elementary and secondary (cohorts) grade levels. Elementary and secondary cohorts received similar treatments, except for minor differences in materials. As was described previously in the Methods section, the materials for each cohort were slightly modified to provide enrichment exercises appropriate to grade level. The instructional strategies used throughout the materials, the content of units as well as their sequence, and the criterion exercises were essentially the same for both sets of materials.

Mean differences on all criterion measures for elementary and secondary cohorts, as well as for the other treatment factors, are presented in Table 7. The overall reading rate for both elementary and secondary cohorts was slightly over 6 words per minute. The small advantage displayed by the secondary group, 6.6 WPM versus the 6.1 WPM of the elementary group represents neither a statistical nor a practically useful difference.

On inspection, the absence of any significant differences across cohorts on reading rates held throughout all the parts of the Criterion Test. On Part III of the test, in which the materials were especially selected to be at or slightly below the grade level for each cohort, both groups had almost identical speeds, i.e. approximately 6.7 WPM. On Part IV of the

TABLE 7

MEAN DIFFERENCES FOR TREATMENT GROUPS;
ELEMENTARY/SECONDARY COHORTS, 1:1-3:1 STUDENT/TEACHER RATIO,
AND USE OF STUDENT TEACHERS

Criterion Measures	Treatment Differences								
	Elem. Mean	Sec. Mean	Sig.	1:1 Mean	3:1 Mean	Sig.	St.Tchr. Yes Mean	St.Tchr. No Mean	Sig.
Optacon WPM	6.06	6.58	N.S.	5.83	6.81	N.S.	6.71	6.16	N.S.
Optacon Accuracy	.82	.90	.05	.81	.91	.01	.91	.84	.05
Optacon Variety	1.96	1.94	N.S.	1.84	2.06	N.S.	1.98	1.94	N.S.
Self-Concept(1)	23.47	24.77	N.S.	25.22	22.97	N.S.	24.50	23.96	N.S.
Attitude toward Education(1)	24.56	26.49	N.S.	25.83	25.17	N.S.	25.15	25.64	N.S.
Attitude toward Optacon(1)	18.14	17.49	N.S.	19.31	16.29	N.S.	21.85	16.23	.01
Optacon Present Use(1)	4.94	5.09	N.S.	4.94	5.09	N.S.	5.20	4.94	N.S.
Optacon Preference(1)	3.17	2.86	N.S.	2.94	3.09	N.S.	3.75	2.72	N.S.

(1)Second administration of this measure.

Criterion Test, in which the selection was to be at the upper grade level in difficulty for each particular cohort, the reading rate of each group dropped, as might be expected. However, there was no significant difference between rates of the two cohorts on Part IV.

As explained previously, the Orion selection presented a grade level difficulty of 8.6 and was a common measure to both cohorts. It was thus somewhat difficult for the elementary students and relatively easier for the secondary group. As displayed in Figure 8, student performance on the Orion selection rose according to grade equivalent, but showed little overall difference between cohorts. The secondary group read slightly but not significantly faster.

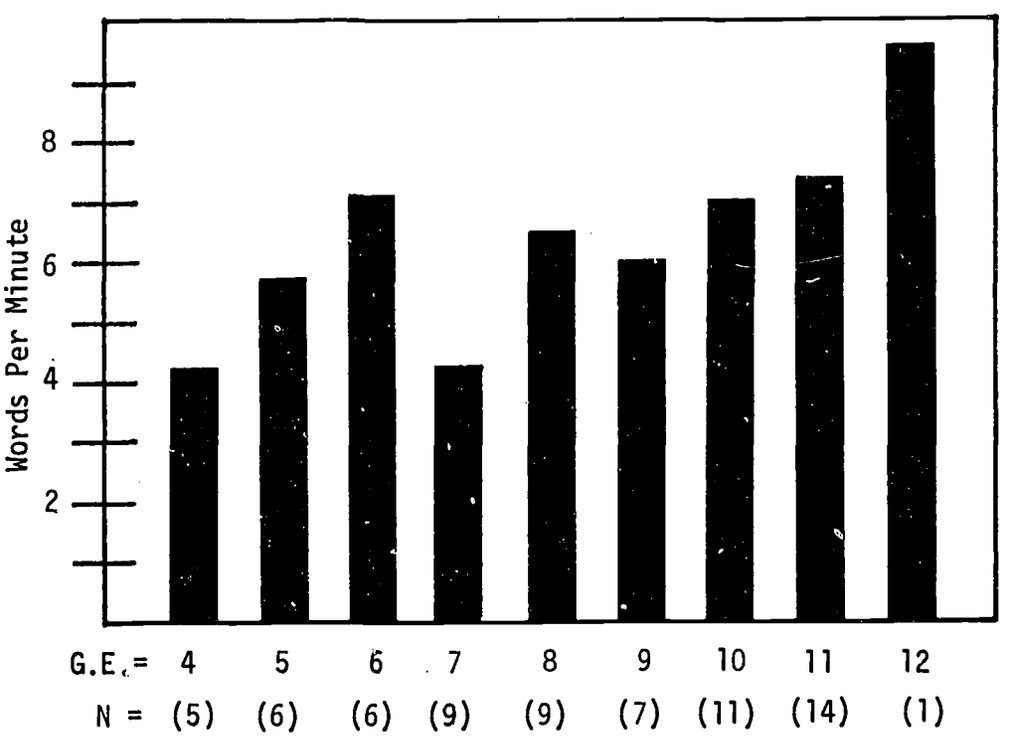


Figure 8. Average reading rates on the 8.6 grade level passage (Orion) of the Optacon Reading Criterion Test at each grade equivalent, and number of cases at each level.

With respect to accuracy, there was a statistically significant differency between the cohorts at the .05 level. The mean accuracy of the elementary cohort was .82 and the mean of the secondary cohort was .90. However, mean accuracy did not markedly differ between cohorts on any part of the Criterion Test except Part 1. Comparing the two groups on the Orion exercise, we find that both groups are reading at an accuracy level of better than 80%, and there is no significant difference between the two groups.

A consistent lack of significant differences between groups was found across the variety of use measures (mean scores 1.96 and 1.94).

Specific analyses with respect to these affective variables will be dealt with in the following section. However, it is clear from Table 7 that there were no significant differences between treatments on any of the five affective measures.

1:1 versus 3:1 student/teacher ratios. With respect to reading rate there was no significant difference between student/teacher ratio treatments with respect to overall rate or rate on specific parts of the Criterion Test.

With respect to accuracy, a statistically significant advantage is found for the 3:1 ratio group. The 1:1 group had a mean accuracy of .81; while the 3:1 group displayed a mean accuracy of .91, a significant difference at the .01 level. Treatment differences and means and any significances of differences are displayed in Table 7.

Both ratio groups performed similarly on the variety of use measure, with no significant differences between groups. Again, no significant differences on any of the affective measures were found.

A major reason for including the 3:1 ratio group in the study was to determine whether any detriment to learning would occur if students did not receive individual tutorial instruction on the Optacon. It appears that, within the constraints of the present study, the 3:1 ratio is fully as effective as the tutorial. It may be of passing interest to note that on all specific comparisons across parts of the test,with respect to accuracy, rate and variety, each difference was slightly, but not statistically,

significant in favor of the 3:1 group. If each portion of the Criterion Test is considered an independent trial, a questionable assumption, one might examine the direction or sign of the difference in each comparison in terms of the probabilities derived by a binomial. A simple sign test such as this would indicate, across a number of such comparisons, a significant superiority for the 3:1 ratio. Nevertheless, any observed differences are not practical differences; they are mostly small.

However, a major issue should not be made of this. We had originally suspected that a 3:1 group might show some noticeable deficiencies in learning. They did not. In at least one overall measure, accuracy, they appear significantly superior; nevertheless, this should be interpreted cautiously.

Student teachers under supervision versus credentialed teachers. This treatment was introduced to determine the effect of utilizing student teachers to carry a major load of the face-to-face instruction. However, in all cases, the student teachers used were supervised by a qualified professional. The results indicate that the only significant difference in reading performance found in comparing the students taught by student teachers with other students taught by qualified professionals is with regard to accuracy, and it is actually in favor of the former group. Of the affective measures, only Optacon attitude yielded significant differences between student teacher and credentialed teacher groups, and again, the student teacher group is higher.

Overview of treatment effects. The lack of clear superiority of the secondary students over the elementary cohort was not an expected finding. To further examine possible relationships of Optacon performance with grade equivalent, the WPM in the Orion selection was analyzed across the grade range of the entire sample. Figure 8 displayed these relationships. It is evident from the histogram that only a modest grade/performance relationship exists.

As this phase of the study, we seem to have established that none of the treatment factors made an important difference. Overall, the cohort group, the student/teacher ratio used, and use of student teachers do not appear to influence learning achievement. We might then infer that Optacon instruction is generalizable across grades, across individual and small-group

modes of instruction, and across personnel, including the use of student teachers. However, we should be cautious of overgeneralization insofar as rate is concerned. As has been discussed before, student achievement at this point is at a relatively low level with respect to rate. It may be reasonable to expect that as secondary students increase their levels of achievement to their functional rate their academic and age-related skills will enable them to read advanced material more rapidly than the elementary students. Thus elementary and secondary cohort generalizations concerning rate might best be viewed as tentative.

One significant treatment difference noted was the superiority of accuracy for the 3:1 ratio. This may stem from the instructional strategies used in the small group and the kind of interaction that followed. Typically, one student controlled the tracking and reading while the other two students followed on slave machines. The followers read silently along with the leader, although lacking any control over his tracking, and one of their major behaviors was to search for errors on the part of the leader. When errors occurred they would interrupt the reading and suggest corrections. It is possible that this may have led to a strong emphasis upon accuracy. However, this particular difference should not be overplayed. In view of the general absence of differences reviewed in Table 7, the fact that one difference displays significance may represent no more than a chance occurrence.

Finally, the 3:1 ratio typically becomes unnecessary once the students have demonstrated that they can read and prefer to become <u>independent</u> users. Such students do not need to be interconnected to each other's machines, to the tracking aid or to the visual display. It is clear from observation that even where the 3:1 ratio was used at the beginning of training, the tendency is to break away from lock-step use. Certainly <u>all</u> students need practice on their own and this should be encouraged.

Affective Relationships

Affective measures were included in the study for two major reasons. First, it was hypothesized that the use of the Optacon with the accompanying

expansion of learning opportunities that its use would bring, might result in more positive student attitudes toward self, toward learning and toward the Optacon. Secondly, it was hypothesized that attitude toward self, education and the Optacon might serve as useful predictors of performance.

The instruments used to measure attitude, i.e., the Would You inventory and the Optacon questionnaire, are described in the Methods section. A self-concept scale and an attitude toward education scale were derived from the Would You inventory. The several scaled attitudes concerning the Optacon were derived from the Optacon questionnaire. The scale derivation method is described in Appendix E.

The Would You instrument was administered at the beginning and the end of the semester. The Optacon questionnaire was administered about midway through the semester and again at the end of the semester.

Attitudinal change over time. The results of the first versus the second administration reveal no significant differences on any of the scales. Self-concept, attitude toward education, attitude toward both potential use and present use of the Optacon, and preference for the Optacon when compared to braille, tape, readers, and talking books did not change significantly throughout the study. In most respects, mean student attitudes may be described as moderately positive. For example, on the self-concept scale, which had a range of 8 to 40, the mean was approximately 24.

It had been originally hypothesized that an initial positive halo effect about the Optacon might be detected, but that this would diminish as students began the arduous daily work involved in learning to read. Such an effect was not detectable. Estimates of probable future use and actual present use remained constant. Compared to other techniques of learning open to the blind student such as braille, tape, readers, and talking books, the Optacon averaged as third choice on both administrations. Differences on attitude scales between first and second administrations are displayed in Table 8.

TABLE 8

MEAN DIFFERENCES IN
ATTITUDE SCALES BETWEEN FIRST AND SECOND ADMINISTRATION

Scale	First Administration	Second Administration	Significance
Self-Concept Scale (Range = 8 to 40)	23.6	24.1	N.S.
Attitude Toward Education Scale (Range = 7 to 35)	25.6	25.5	N.S.
Attitude Toward Optacon Scale (Range = 6 to 30)	19.6	17.8	N.S.
Optacon Present Use Scale (Range = 3 to 15)	5.4	5.0	N.S.
Optacon Preference Scale (Range = 1 to 5)	3.3	3.1	N.S.

Relationship between predictors and affective measures. We were also interested in the possibility that one or more of the predictors were related to the affective measures. Table 9 displays a correlation of predictors with affective scales. It is apparent that most of the relationships with the ten predictors are not significant, especially at the time of the second test administration.

A noticeable exception is attitude toward education. Several predictors do appear to be significantly and positively related to attitude toward education. Age, IQ, braille speed and accuracy, and diagnostic English spelling all display significant correlations. This is primarily true of the first administration of the attitude toward education scale. On the second administration five of the predictors drop from significance.

TABLE 9

CORRELATION OF PREDICTORS WITH AFFECTIVE CRITERION MEASURES

Predictors	Self-Concept		Attitude Toward Education		Attitude Toward Optacon		Optacon Present Use		Optacon Preference	
	1	2	1	2	1	2	1	2	1	2
Age	.17	.05	.31**	.16	-.08	-.06	-.11	.04	-.29**	-.15
IQ	.14	.19	.37**	.35**	-.19	-.18	.04	-.23*	-.25*	-.26*
Braille WPM, Part 1	.14	-.16	.23*	.12	-.21*	-.07	.04	-.04	-.26*	-.07
Braille Accuracy, 1	-.03	.08	.33**	.39**	-.12	-.24*	-.16	-.15	-.30**	-.39**
Braille WPM, Part 2	.22*	-.16	.21*	.07	-.27*	-.12	-.05	-.05	-.32**	-.08
Braille Accuracy, 2	-.02	-.02	.07	.17	-.10	.07	.04	-.10	-.12	-.09
Diagnostic Spelling (English)	-.04	-.04	.31**	.19	-.20*	-.27**	-.07	-.07	-.28**	-.15
Braille Orion WPM	.20*	-.13	.22*	.09	-.17	-.06	-.04	-.07	-.25*	-.10
Braille Orion Accuracy	.03	.17	.32**	.43**	-.14	-.15	-.04	-.20*	-.23*	-.26*
Tactile Total	-.15	.17	-.11	.10	-.07	-.23*	-.10	-.07	-.03	-.16

*.05 level of significance
**.01 level of significance

Another exception to the generally nonsignificant relationship is Optacon preference. We find that all the predictors are negatively related to Optacon preference, and eight of them are significantly negatively related on the first administration of the Optacon questionnaire. This negative relationship weakened somewhat across the second administration, and only three of the predictors are then related at a statistically significant level.

From these results we may reasonably infer that the older and brighter students, the ones who are better braille readers and spellers, tend to have a more positive attitude toward education. In contrast, these same students show the least preference for using the Optacon in relation to other modes of learning.

Interaction with Optacon performance. Were the affective measures related to reading criterion performance? The correlations between several attitudinal measures and the three overall measures of performance are displayed in Table 10.

Attitude toward the Optacon, and preference for using the Optacon, on the second administration, are significantly and negatively correlated with words per minute. It appears that the faster readers have a more unfavorable attitude toward the Optacon.

When we examine accuracy we find that a positive predictor is attitude toward education. However, on the second administration, accuracy is negatively correlated with attitude toward the Optacon and Optacon preference. Again, we note that the more accurate readers are more critical of the Optacon. No significant correlation with attitudinal measures were found on the overall Optacon variety of use scale.

Overview of affective relationships. Student attitude did not change during this first semester of the project. This may be related to the relatively low level of Optacon reading speed and variety attained. The average student did not learn sufficiently so that the Optacon became a useful tool to open new opportunities. It remains a plausible hypothesis that as students continue to develop skills in Optacon reading, attitudes toward the Optacon and even toward themselves and education may change.

TABLE 10

CORRELATION OF OPTACON PERFORMANCE
WITH AFFECTIVE MEASURES

	Optacon WPM	Optacon Accuracy	Optacon Variety
Self-Concept (1)	-.11	-.01	-.16
Self-Concept (2)	-.07	-.15	.11
Attitude toward Education (1)	-.04	.35**	-.06
Attitude toward Education (2)	.02	.16	-.01
Attitude toward Optacon (1)	.02	-.12	.08
Attitude toward Optacon (2)	-.20*	-.28**	-.15
Optacon Present Use (1)	-.02	.01	-.03
Optacon Present Use (2)	-.07	-.04	-.08
Optacon Preference (1)	.00	-.18	.06
Optacon Preference (2)	-.26*	-.20*	-.16

*.05 significance level
**.01 significance level
(1) first administration
(2) second administration

The negative correlations of braille skill with preference is an interesting finding. The better braille readers had developed a useful skill. They did not attain any comparable skill with the Optacon during the study. Those less skillful with braille, including the younger students, did not possess this strong alternative with which to compare Optacon reading. Thus, the latter students seemed to prefer it more than the skilled braille readers.

The negative attitudes toward the Optacon shown by the faster and more accurate readers bears some consideration. It will be recalled that the Optacon reading performance is significantly correlated with intelligence. The more accurate readers in this study were the brighter students who presumably had higher expectation of their own performance. Reading with the Optacon, in the first stages, tends to be a humbling experience to someone whose learning expectations are high. Older students and ones who are typically skillful in the classroom may find that younger colleagues are doing as well as they on the first lesson. The time available for Optacon practice was not sufficient for a high achieving student to develop valuable applications. As the study is continued, students may well begin to read at a rate closer to their expectations, or at least close to a functional rate; and these negative correlations with predictors of performance may well vanish.

Ease of Optacon Operation and Instructional Materials

An Activity Log was completed by teachers for each instructional unit on each student. The log included items for teacher evaluation of student performance and for the evaluation of the adequacy of materials. The Optacon questionnaire included items for student evaluation of Optacon operation and the appropriateness of the instructional materials.

Teacher evaluation of student performance. The Activity Logs presented the teachers with three alternatives on which to rate student performance: excellent, average, or poor. For scaling purposes, excellent and average were combined as one category of favorable responses. The percentage of favorable responses given to six aspects of student performance is displayed in Table 11. Ratings of student performance included tracking technique, tactile technique, letter recognition, word attack, interest level and attention span. The percent of favorable responses recorded were uniformly high across all aspects of performance, i.e., well above 90%. According to teacher judgment, the students were working at an average or excellent level most of the time.

TABLE 11

TEACHER EVALUATIONS OF STUDENT PERFORMANCE
AND INSTRUCTIONAL MATERIALS APPROPRIATENESS
AS INDICATED ON ACTIVITY LOGS

Evaluation of Student Performance	Percent of Favorable Responses
Tracking Technique	93.2 (778)*
Tactile Technique	91.0 (788)
Letter Recognition	95.2 (745)
Word Attack	96.2 (663)
Interest Level	96.8 (791)
Attention Span	96.2 (789)
Evaluation of Materials Appropriateness	**Percent of Favorable Responses**
Drill and Practice Materials	98.8 (725)*
Enrichment Materials	97.1 (524)
Criterion Exercises	98.2 (495)
Difficulty Level	96.2 (744)
Inherent Interest	98.2 (741)

*Total number of evaluations

Teacher evaluation of materials appropriateness. The Activity Log presented the teachers with three alternatives for rating the materials: very appropriate, useable, or inappropriate. Very appropriate and useable categories were combined as favorable responses. The following aspects of the materials were rated: drill and practice, enrichment, criterion exercises, overall difficulty level, and overall interest. An extremely high percent of favorable responses is shown in Table 11. All aspects of the materials rated received 96% or more favorable responses. Teachers obviously found materials to be appropriate across instructional units and across students.

Student evaluation of Optacon operation. The Optacon questionnaire contains items on which students rated the ease or difficulty of several Optacon tasks. These tasks were: learning to track, learning to read different kinds of print, and adjusting for different kinds of print. They were rated as either hard, easy, or very easy. Easy and very easy were combined as a favorable response category.

Table 12 displays the percent of favorable responses for both first and second administrations of the Optacon questionnaire. The percent of favorable responses tends to be relatively high--from 61.8% to 74.5% on the first administration. The percent of favorable responses tended to decline between the first and second administrations in regard to reading different kinds of print and adjusting the Optacon for different kinds of print. However, it should be noted that at the time of the first administration the students had not yet read different kinds of print. Many of them were just grappling with this complex task at the time of the second administration of the questionnaire.

The ease of learning to track tends to be evaluated more favorably on the second administration. Students did start tracking in the first unit. By the time of the second administration, close to the end of the semester, most students had achieved considerable skill in tracking. In contrast to reading different kinds of print, they then rated tracking as relatively easier.

An additional item on the Optacon questionnaire requested the students to indicate the grade level at which children should first learn to read with the Optacon. Percentages of responses naming each of several grade levels are displayed in Table 12. Student responses did not differ appreciably between the first and second administration on this item. The students in the sample judged that the elementary grades would be a more appropriate start than the secondary grades. The highest number of responses from both administrations preferred grades 4-6. Second highest percentage was given for grades 1-3. It is interesting to note that no student felt that Optacon reading should start in college.

TABLE 12

STUDENT EVALUATIONS OF EASE OF OPTACON OPERATION
AND INSTRUCTIONAL MATERIALS APPROPRIATENESS
AS INDICATED ON OPTACON ATTITUDE MEASURES

	Percent of Favorable Responses	
Evaluation of Optacon Ease of Operation	First Administration	Second Administration
Learning to track	74.3% (66)*	84.5% (71)*
Reading different kinds of print	61.8% (55)	42.7% (68)
Adjusting for different kinds of print	74.5% (51)	60.6% (71)
Grade level children should learn to read with the Optacon:		
1 to 3	21.5% (14)	32.4% (22)
4 to 6	50.8% (33)	42.6% (29)
7 to 8	16.9% (11)	16.2% (11)
9 to 12	9.2% (6)	7.4% (5)
College	0	0
Never	1.5% (1)	1.5% (1)
Evaluation of Instructional Materials Appropriateness	**First Administration**	**Second Administration**
Interesting lessons	64.2% (67)*	65.7% (70)*
Right length of lessons	71.2% (66)	73.2% (71)
Raised Thermoform letters useful	78.2% (64)	61.2% (67)
Stories and games enjoyable	71.0% (62)	61.7% (68)

*Total number responding

Student evaluation of materials appropriateness. The Optacon questionnaire contains four items on which students rated aspects of the instructional materials. These included: the degree to which the lessons were interesting, the appropriate length of the lessons, usefulness of the raised letters, and enjoyability of the stories and games. The alternatives for each item were assigned favorable and unfavorable categories. The percent of favorable responses given to each item is displayed in Table 12. The students on both first and second administrations of the questionnaire showed a relatively high percentage of favorable responses. The percent of favorable responses did not differ significantly between first and second administrations. In rank order, the percent of favorable responses were: (1) stories and games enjoyable, (2) raised letters useful, (3) lessons about the right length, and (4) interesting lessons.

Overview. Ratings of the materials by both teachers and students were favorable. Ratings were also quite consistent across different aspects of the materials, and in the case of the student ratings, consistent across time. No particular feature or unit of the materials was indicated to be in need of major revision, though anecdotal feedback did point out some aspects of the materials that might benefit from revision.

Student evaluations of materials tend to show a somewhat lower percent of favorable responses than teachers'. For example, on "interesting lessons," 65% of the students gave a positive response on the second administration. In contrast, teachers gave 98% favorable responses to the inherent interest of the materials in each unit. This difference may derive in part from the different alternatives given to the respondents. Students selected one of five alternatives based primarily on frequency; e.g., the materials were interesting most of the time. The alternatives extended from almost always to almost never. Unfortunately for comparability purposes, in no case were exactly the same items given to both students and teachers.

A perspective on the above findings is provided by examining the number of minutes spent in each instructional unit. Table 13 displays the median and mean number of minutes spent per unit. It is apparent that

the average time spent on each of the basic numbered units, i.e., those which provided instruction in the alphabet, was relatively constant across units. Average time spent ranged from 89 to 120 minutes. In contrast, time spent on the supplementary units varied markedly. A mean of only 39 minutes was spent on the remediation unit; while a mean of 261 minutes was spent on the speed reading section.

TABLE 13

MEDIAN AND MEAN NUMBER OF MINUTES
SPENT IN EACH INSTRUCTIONAL MATERIALS UNIT

Unit	Median	Mean	N
Basic Instructional Units			
1 (Field Practice)	61	65	71
2 (Numerals)	88	94	70
3 (Letters A,T,R,E)	117	113	71
4 (Letters I,H,O,S)	118	120	70
5 (Letters D,L,U,N)	96	104	71
6 (Letters C,G,M,F)	109	116	71
7 (Letters W,P,K,Q)	114	116	69
8 (Letters Y,B,V)	103	102	68
9 (Letters J,X,Z)	87	89	66
Supplementary Instructional Units			
A (Tracking)	101	99	41
B (Remediation and Special Help)	28	39	13
C (Building Reading Speed)	200	261	52
D (Additional Typefaces)	163	179	37
E (Machine Adjustment)	28	29	20
F (Personalized Language Experience)	88	89	30
G (Free Reading)	134	213	46

The number of students on which the average is based also provides some interesting contrasts. Almost all students in the sample enter into the averages for the basic instructional units. This number drops substantially for the supplementary units and then varies considerably among supplementary units. For example, only 20 students were exposed to the machine adjustment unit, and 30 encountered the personalized language experience unit. As discussed previously, one import of this is that a large proportion of the sample did not have time to receive instruction across the supplementary units. In fact, 19 students did not enter the reading speed unit. The overall slow reading speed does not appear surprising in view of this. Thirty-seven students failed to receive experience on additional typefaces although this was an important aspect of the variety of use scale on the Criterion Test. The information in Table 13 also serves to qualify the basis of teacher and student evaluations of materials. The aspects of the materials on which the most adequate basis for evaluation lies are the basic instruction units, i.e. Units 1-9. Each student in the sample was uniformly exposed to these units. Beyond the basic units, evaluations are based on varying and selected portions of the student sample.

Case Studies

Ten persons were treated as special cases in the study. Their data have not been included in the main sample analyses. These special cases include very young students, an adult, students with additional handicaps, students instructed on an experimental basis by AIR staff, and several students with prior experience with the Optacon. As is evident from the individual case studies on the following pages, a variety of instructional approaches were also explored.

Performance of the ten special cases are examined individually on the following pages. Beginning on page 88, an overview of the case studies is presented and some comparisons between the special cases and the main study group are made.

A synthesis of the main study findings follows, beginning on page 91.

Individual cases.

Case # 1 First Name Percy

TEST RESULTS

Intelligence (WISC): IQ: 144

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: NA

WPM: - Comprehension: - % correct out of -

CTBS passage:
Grade equivalent of difficulty: NA

WPM: - Comprehension: - % correct out of -

Tactile Test: 96 % accuracy

Diagnostic Spelling Test

33 % accuracy 0 % errors related to braille 67 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	1st quartile	1st quartile	4th of 5
Post:	- quartile	- quartile	- of 5

Attitude toward Education

Pre: 4th quartile Post: - quartile

Self-concept.

Pre: 3rd quartile Post: - quartile

Three estimates of reading speed were attained. Each was a timing of his reading during a regular lesson using (draft) first grade materials. Vocabulary was limited to those words which were in the regular first grade reader. Percy's measured speeds were:

Trial 1: 14 WPM
Trial 2: 13 WPM
Trial 3: 12 WPM

Case # 1 First Name: Percy

This male student was 6 years old, and was in the 1st grade in a public school. The student's blindness was caused by retinoblastoma. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had no prior experience with print and he had no experience typing. The student was working on a one-to-one basis with a resource teacher on a regular schedule. The student had no additional handicaps. The student completed a special set of Optacon Instructional Materials unlike other subjects in the study, based on a whole word approach.

Beginning in November, and for the next five months, the student worked approximately 10-20 minutes per day--half of that time in the morning and the rest in the afternoon. The latter part of the spring semester he was unable to work as often because of teacher illness. During this latter part of the semester he typically worked approximately 10-20 minutes for 3 days during the week. Percy was working with an experienced Optacon teacher and was using specially prepared instructional material at the 1st grade level. These materials, still in draft form, are based on a whole word approach, not character recognition.

Percy usually had lots of energy and was very eager to do his school work, especially his lessons with the Optacon. During the winter and spring, however, he had quite a bit of trouble with upper respiratory infections. He had a minor operation during Christmas vacation which seemed to help somewhat. But, because of his health problems sometimes he seemed to tire very quickly and would become very restless if he had to work on anything for extended periods. When he seemed especially restless, the teacher would sometimes let the student decide, before he started, how many lines he was going to read. Percy usually chose to read about 6 or 7 lines (about half the page). This seemed very effective with this student and he usually settled down and worked very willingly.

Case #1 First Name: Percy

The teacher's reinforcement of the student's effort was very positive. The student's instructional materials were written to coincide with the vocabulary in his 1st grade reading texts. When Percy first started reading with the Optacon, his teacher used a set of plastic letters that Percy could feel whenever he came to a new letter. From the beginning his teacher stressed recognizing and saying the whole word rather than letter by letter recognition. When Percy was having trouble with a word she would often give hints to the identity of the word until Percy guessed it. Percy did very well with this method and made very good use of contextual cues. When Percy identified a word incorrectly, it often made sense in the context of the sentence. He seemed to identify frequently occurring words such as "and" and "the" very quickly. Percy had excellent recall for words that he had read before on the Optacon. However, when he came to a new word he was usually able to spell it out. Also, a few times when the AIR staff member was observing, Percy came to a word that he could spell correctly, but could not remember.

Percy started out tracking with the tracking aid and soon mastered this skill. He then learned to track without the tracking aid. He soon reached the point where he handled this skill very well, but he seemed to tire more quickly when he had to read as well as do the tracking. Because of this, his teacher would often do the tracking for Percy.

When the teacher tracked for the student, she would track across the whole word, slowly. Usually the student recognized the word the first time it was presented. If Percy was unable to read a particular word, the teacher would go back and move the camera across the whole word again. If Percy still had trouble he was asked to say each letter aloud. When Percy tracked for himself he seemed to follow the same technique of looking at each word as a whole.

Case #1 First Name: Percy

Percy's instructional materials consisted entirely of short sentences which usually were part of a short story. These were prepared by his teacher. He was introduced to different letters very quickly, but the vocabulary was very limited. Percy's instructional materials were typed with the same print style as the AIR instructional materials, using a sans serif print and an IBM Selectric typewriter. The AIR page format with tracking cues and signals for the student to stop at the end of a line were used, also.

Optacon training with a student this young did not seem to prove to be impractical. Rather, he seemed to accept it as fitting right in with his other school work. Percy enjoyed working with the Optacon to the extent that he said he was "saving to buy his own." The whole word approach seemed to work with this student. It would seem worthwhile to try this method with other students, especially young ones, since limited vocabulary and repetition are probably appropriate for this type of instruction.

Case # 2 First Name Keith

TEST RESULTS

Intelligence (WISC): IQ: 126

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 4.5

WPM: 26 Comprehension: 38 % correct out of 8

CTBS passage:
Grade equivalent of difficulty: 8.6

WPM: 28 Comprehension: 63 % correct out of 8

Tactile Test: 81 % accuracy

Diagnostic Spelling Test

40 % accuracy 0 % errors related to braille 60 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	1st quartile	4th quartile	2nd of 5
Post:	3rd quartile	3rd quartile	2nd of 5

Attitude toward Education

Pre: 2nd quartile Post: 2nd quartile

Self-concept

Pre: 1st quartile Post: 4th quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
3.4 WPM 88 % of accuracy

Paragraph using vocabulary from instructional materials:
4.8 WPM 88 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 4.5
6.4 WPM 97 % accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
6.0 WPM 90 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type		x	
Italic type		x	
Newspaper headlines		x	
Telephone book	x		
Labels from Medicine bottles	x		
Index	x		
Tape recorder guarantee		x	

Case # 2 First Name: Keith

This male student was 8 years old and was in the 2nd grade in a public school. The student's blindness was caused by congenital cataracts. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had no prior experience with print and he had no experience typing. The student was working on a one-to-one basis with a resource and a student teacher on an irregular schedule. The student had no additional handicaps. The student completed Optacon Instructional Materials Units 1-9 and A, C, D, F. His scores on the criterion exercises within the instructional units were typically about 95% correct. According to the teacher's judgment the units were at an appropriate level of difficulty and indicated that this student typically exhibited the following levels of skill during study periods:

average tracking
excellent tactile technique
average letter recognition
excellent word attack
excellent interest level
excellent attention span.

Keith had good rapport with his student teacher, who taught him during the first part of the semester, and with his regular resource teacher, who completed his instruction. He approached his Optacon instruction with very high enthusiasm.

Fairly early in the semester he decided to try doing without the tracking aid. His willingness to attempt things was also evident in his frequent anticipatory remarks such as "I'd say . . ." or "Well, I'd guess . . . ."

It is interesting to note that at the outset of training Keith had spelling problems, with errors in more than half of his Diagnostic Spelling Test items. Then, by mid-semester, he stated that "words seem more meaningful when I get them in print." Eventually, on the final criterion exercise, his accuracy at word recognition was very high, ranging from 88% to 97% correct.

Case # 3 First Name Mike

TEST RESULTS

Intelligence (WISC): IQ: 128

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 4.5

WPM: 118 Comprehension: 38 % correct out of 8

CTBS passage:
Grade equivalent of difficulty: 8.6

WPM: 95 Comprehension: 25 % correct out of 8

Tactile Test: 100 % accuracy

Diagnostic Spelling Test

97 % accuracy 0 % errors related to braille 3 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	3rd quartile	2nd quartile	2nd of 5
Post:	4th quartile	3rd quartile	3rd of 5

Attitude toward Education

Pre: 1st quartile Post: 1st quartile

Self-concept

Pre: 2nd quartile Post: 1st quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
16.8 WPM 98 % of accuracy

Paragraph using vocabulary from instructional materials:
18.8 WPM 100 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 4.5
18.2 WPM 98 % accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
16.0 WPM 98 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type	X		
Italic type		X	
Newspaper headlines	X		
Telephone book	X		
Labels from Medicine bottles	X		
Index	X		
Tape recorder guarantee		X	

Case # 3 First Name: Mike

This male student was 9 years old, and was in the 4th grade in a public school. The student's blindness was caused by congenital genetic defect. Vision impairment was at a level that permitted the use of optical aids and the seeing of enlarged print. This student had some prior experience with print and he had some experience typing. The student was working on a one-to-one basis with a blind peer "teacher" on an irregular schedule. The student had no additional handicaps. He completed Optacon Instructional Materials Units 2-9 and C-G. His scores on the criterion exercises within the instructional units were 100% correct. According to the teacher's judgment the units were at an appropriate level of difficulty and indicated that this student typically exhibited the following levels of skill during study periods:

excellent tracking
excellent tactile technique
excellent letter recognition
excellent word attack
excellent interest level
excellent attention span.

Mike was working with the 4.5 grade materials and was being cross-age tutored by a blind 8th grade girl who had previous Optacon experience. Mike was transported from his regular school to the Optacon training school by his mother. During the first part of the semester his mother brought him over every day for approximately half-hour sessions. During the latter part of the semester, after he had finished the basic units, he came only 3 times a week for half-hour sessions.

Mike and Della worked by themselves in an isolated area of the resource room. Mike began tracking during the second unit and soon was tracking without the tracking aid. The regular teacher supervised only the first couple of sessions. While Mike and Della were working, the light box was consistently turned on so that they could be observed by sighted persons

without being interrupted. Mike's mother kept track of equipment time and usually observed.

Mike seemed to enjoy working with the Optacon. He is a soft spoken youngster who is usually fairly quiet, especially around adults. He would not usually volunteer information, but whenever he was asked if he would like to quit early or read one more page he always wanted to keep on working.

The 8th grade tutor had a copy of brailled teacher directions to go with each set of instructional material in the basic units. Mike seemed to have no problems learning to recognize letter shapes on the Optacon. Mike finished the basic units very quickly, after approximately one month (10 hours). He remembered letter shapes from when he had had vision and he was able to make discriminations between the tactile images that he felt. Mike and Della skipped the first introductory unit which consisted of shapes only. During the rest of the basic units, Mike and Della would only do parts of each unit since Mike learned to recognize the letters on the Optacon very quickly. The tutor had a very patient personality, but needed some encouragement at first to tell Mike when he was correct. She seemed to catch his errors in all but a few instances.

When Mike had finished the basic units he and Della worked on parts of the supplementary units. These included building reading speed, additional typefaces, personalized language experience and free reading. Mike worked with a student teacher for the machine adjustment unit. During the last few weeks of the semester Mike spent some time reading, without the aid of the tutor, some stories in book form which were "high interest, low vocabulary."

Initially there was a problem that Mike tracked consistently on a slant, as did his tutor. However, this seemed to correct itself during the semester with a few words from the supervising teacher. Mike kept his "reading" finger still after Della first explained proper tactile technique. Mike had very good word attack skills; he would read words rather than reading letter-by-letter.

Case # 3 First Name: Mike

Mike's parents were very happy with Mike's opportunity to learn to use the Optacon. Usually Mike's mother brought him to the school, but his father came once (on his day off) to see how Mike was doing. He seemed very pleased. Mike's parents have been trying to transfer him to the school where Optacon training was held so that Mike will be able to continue using the Optacon.

In this situation the cross-age tutoring worked very well. The tutor was a skilled Optacon reader and very patient. The tutee was a quick learner and responded well to verbal instructions. This type of set-up seems to be feasible, although possibly limited to a select type of student.

Case # 4 First Name Kent

TEST RESULTS

Intelligence (WISC): IQ: 114

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 4.5
WPM: 87 Comprehension: 38% correct out of 8

CTBS passage:
Grade equivalent of difficulty: 8.6
WPM: 74 Comprehension: 75% correct out of 8

Tactile Test: 52 % accuracy

Diagnostic Spelling Test

90 % accuracy 0 % errors related to braille 10 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	1st quartile	1st quartile	5th of 5
Post:	1st quartile	1st quartile	5th of 5

Attitude toward Education

Pre: 2nd quartile Post: 3rd quartile

Self-concept

Pre: 2nd quartile Post: 3rd quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
2.9 WPM 76 % of accuracy

Paragraph using vocabulary from instructional materials:
2.8 WPM 96 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 4.5
2.8 WPM 71 % accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
3.0 WPM 87 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type		x	
Italic type		x	
Newspaper headlines			x
Telephone book		x	
Labels from Medicine bottles			x
Index		x	
Tape recorder guarantee			x

Case # 4 First Name: Kent

This male student was 11 years old, and was in the 6th grade in a public school. The student's blindness was caused by cranial pressure, optic atrophy and he had been blind since 4 years of age. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had some prior experience with print and he had some experience typing. The student was working on a one-to-one basis with an AIR staff member on an irregular schedule. The student was hydrocephalic and had an orthopedic handicap with possible impact on study. The student completed Optacon Instructional Materials Units 1-9 and A-C. His scores on the criterion exercises within the instructional units were typically about 95% correct. According to the teacher's judgment the Units were at an appropriate level of difficulty and indicated that this student typically exhibited the following levels of skill during study periods: average tracking, average tactile technique, average letter recognition, excellent word attack, excellent interest level, and excellent attention span.

Kent worked from the regular elementary set of instructional materials. His teacher was a member of the AIR staff who traveled to his school (a school for orthopedically handicapped). This AIR staff member met with Kent in a very small room where Kent also met with an itinerant teacher for the visually handicapped. Kent had a special table that was adjusted for the height of his wheel chair and cut out so that his wheel chair would fit under the table. The table was large enough to hold the light box, Optacon and the tracking aid, but because of the cut-out for the wheel chair, the tracking aid had to be stabilized (with a notebook underneath) so that it would not tip.

Kent liked working with the Optacon, although he found it initially difficult. The AIR staff member was told by his regular teacher that when Kent is frustrated, he tends to give up easily and will refuse to try. This was not the case with the Optacon. Kent kept trying, although when he couldn't figure out what a letter was he would say that

"the image was no good." When he recognized a character he reported immediately that the image was "better."

Previous to working with the Optacon Kent had had some tactile experience with the shape of capital letters. Kent's parents had given him a set of cardboard capital letters which he enjoyed playing with. Kent had not had the same kind of experience with lower case letters. During the basic units Kent had problems with a number of the lower case letters.

Kent seemed to have a problem, initially, in understanding the spatial layout of the pages. This was reflected in his tracking technique. This may have been related to his confinement to the wheel chair and his lack of experience with movement. He had trouble, at first, following directions such as "right," "left," "up," and "down." He also had trouble learning to move the camera smoothly. Kent had a tendency to jerk the camera. Kent, at first, also wanted to move his left index finger around on the vibrators in order to feel the images. However, the result was that he would miss part of the image because his finger was not down flat on the array.

These problems were worked on during the first couple of units until Kent seemed to have an understanding of the spatial layout of each page, was able to move the camera smoothly, and only had to be reminded occasionally to keep his finger down. Kent seemed to respond best to positive reinforcement when he was doing something correctly.

Kent would get very excited when he was ready for a new set of letters. He usually mastered the capital letters with very few problems, but often hit snags with the lower case symbols. Work in the remediation units seemed to help, as well as practice with the thermoform letters. Sometimes Kent would forget how a letter was shaped (i.e. confusions between p, b, q, d), so even asking him to verbally describe significant features seemed to help. Kent enjoyed the sentences and stories more than the word drills, although he seemed to be proud of himself when he could read the long words. Kent seemed to enjoy the continuing enrichment stories, even

though he said that the main character was "dumb." When he learned that this character had a girlfriend instead of a horse in the secondary materials, he said he wished he could have read the other story instead.

Kent usually wanted to read each word letter by letter. Because he was having difficulty with some of the letters, he seemed to feel more secure with immediate feedback. The AIR staff member encouraged Kent to read the whole word first, and, only if necessary, resort to letter by letter analysis. When reading sentences Kent was much more successful, because he made good use of contextual cues.

Kent was encouraged to increase his reading speed by trying to read whole sentences, keeping the camera moving in a continuous motion across the sentence. Then, he would repeat whatever parts of the sentence he had recognized. Kent had a hard time with this kind of task since he usually was uncertain about many of the words read in this manner. Sometimes the AIR staff member would track for him, with the same type of task. When all he had to concentrate on was recognition of words, he seemed to be more successful. This indicated that part of his problem with character and word recognition was related to the difficulty Kent experienced with the motor task of tracking.

Kent's mother seemed very interested in his work with the Optacon. She seemed to feel that it was a good opportunity for Kent, and she hoped that Kent would be able to continue working with the Optacon in the fall.

Although Kent had initial difficulty in mastering some of the skills necessary to read with the Optacon, by the end of the semester he had finished all of the basic units and had started with the supplementary unit introducing different type styles. Kent worked on the Optacon during two 50-minute periods per week. At the end of the semester Kent was tracking without the tracking aid. He was having a hard time learning to move his whole arm. Instead, he wanted to keep his elbow stationary and to move his arm in an arc. With practice, though, he should be able to

master this skill also. This student is now at a point where he needs work on increasing reading speed and on recognizing different type styles.

Kent needs more individual instruction at this point, but during the next year he should reach a point where he could read independently.

Case # 5 First Name Cindy

TEST RESULTS

Intelligence (WISC): IQ: 134

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 4.5
WPM: 98 Comprehension: 100% correct out of 8

CTBS passage:
Grade equivalent of difficulty: 8.6
WPM: 90 Comprehension: 100% correct out of 8

Tactile Test: 96% accuracy

Diagnostic Spelling Test

100 % accuracy 0 % errors related to braille 0 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	2nd quartile	3rd quartile	3rd of 5
Post:	4th quartile	3rd quartile	4th of 5

Attitude toward Education

Pre: 3rd quartile Post: 3rd quartile

Self-concept

Pre: 2nd quartile Post: 2nd quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
9.0 WPM 98 % of accuracy

Paragraph using vocabulary from instructional materials:
10.0 WPM 98 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 4.5
10.4 WPM 98 % accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
8.2 WPM 93 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type		x	
Italic type		x	
Newspaper headlines	x		
Telephone book	x		
Labels from Medicine bottles	x		
Index	x		
Tape recorder guarantee	x		

Case # 5 First Name: Cindy

This female student was 11 years old, and was in the 6th grade in a public school. The student's blindness was caused by a congenital genetic defect. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had no prior experience with print and she had some experience typing. The student was working on a one-to-one basis with an AIR staff member on an irregular schedule. The student had no additional handicaps. The student completed Optacon Instructional Materials Units 1-9 and A, C-G. Her scores on the criterion exercises within the instructional units were typically about 95% correct. According to the teacher's judgment the Units were at an appropriate level of difficulty and indicated that this student typically exhibited the following levels of skill during study periods: excellent tracking, excellent tactile technique, excellent letter recognition, excellent word attack, excellent interest level, and excellent attention span.

Cindy started out in September working with an AIR staff member on the drafts of the instructional materials as they were produced. The feedback from Cindy and from three other pilot students helped in the revision of the instructional materials. Cindy's mother brought her to AIR for one hour of training twice weekly after school. After the instructional materials were printed and disseminated, Cindy continued coming to AIR on the same schedule.

Cindy was a very eager pupil. She enjoyed the challenge of learning to read with the Optacon and progressed through the units with only a few problems with character recognition. Since she was a pilot student, the AIR staff member had her read every word to discover problems within the instructional materials.

Cindy exhibited a deliberate, careful approach in learning to read with the Optacon. Usually she was able to distinguish the numbers and letters after they had been presented a few times. Each time a new symbol was presented, she was asked to describe its shape. When Cindy did have a

problem recognizing a letter it usually was a problem of confusing two specific letters. These letter combinations were later included as part of the remediation unit. To help Cindy differentiate between similar letters, distinguishing features were discussed and a sheet of thermoform raised letters was used.

Cindy's tactile technique was excellent from the beginning. She was encouraged to identify words as wholes, which she usually did, rather than to spell them out letter by letter. Cindy had fairly good word attack skills, although once she had trouble with a word she would often be stalled on that word for quite a while. Cindy needed encouragement to make guesses, since she liked to be sure of herself and to answer correctly.

Cindy started tracking without the tracking aid before she finished the basic units. Her tracking technique was generally good, although for a while she had some problems with drifting slightly off of the line of print. The usual result was a tendency to cut off the tops of the letters. Experimentation with the angle of the printed page seemed to help, as well as more practice tracking. Cindy started out concentrating on recognizing each letter individually. Because of this she tended to "look" at each letter carefully, rather than to track slowly across the whole word. When examining each letter she would keep the camera moving, rather than move her "reading" finger. When it was realized that this method of reading was slowing her down she was encouraged to track across the word as a whole. This seemed easier to do when the letters did not have a space between them. Once Cindy had learned all of the letters and was working in the supplementary units, she seemed to improve in this respect.

Cindy seemed to benefit from the speed building unit. She improved in her ability to skim many of the "most common words" and to use contextual clues to recognize words. She seemed to enjoy these drills when they were turned into games, such as "how many of these words can you read in one

minute?" Sometimes the AIR staff member would do the tracking, forcing Cindy to read at a faster rate than she would have normally. Cindy seemed to enjoy the challenge. She was encouraged to try to keep up with the increased speed, but reminded not to feel discouraged because she could not get every word.

Cindy also worked with the Cassette Tape Trainer, which operated along the principle of forcing speed. A surprising event occurred when Cindy was reading with the tape trainer. Her typical reading rate had been established by an AIR staff member to be approximately 6 words per minute at this time. However, when the Cassette Tape Trainer was set so that it delivered words at this rate, Cindy displayed great difficulty reading the short phrases. When the rate of delivery was subsequently slowed down, Cindy's difficulties increased. It was decided to increase the rate of delivery to the top speed on this tape, with the intent of decreasing the speed until an optimum rate was found for Cindy. The surprising result was that Cindy was able to read with the least difficulty at 12 words per minute. This reading speed was roughly double that of the rate that she normally read herself. The explanation for this occurrence is purely speculative. It may have been that the perceived clarity of the image improved with the increase in speed; it may have been that Cindy was able to make better use of contextual cues; or it may have been a consequence of the tape precluding Cindy's tendency to weigh alternatives when reading slowly.

Cindy also worked with other supplementary units which included additional typefaces, machine adjustments, personalized language experience and free reading. Cindy brought in a short story and a poem that she had written. These were typed with the sans serif print and read for practice. She seemed to have only slight difficulty adjusting to more complex type styles. After practicing reading different things at AIR, Cindy took the Optacon home for the weekend and experimented with materials she had at home. She enjoyed the experiment, but had difficulties with adjusting

the Optacon for some of the things that she tried. She tried to read such things as a typed personal letter, poems on a calendar (which were printed on different colored backgrounds), a xerox of a newspaper article (which proved almost impossible to read because of background "dots"), and something which she had typed on her own typewriter. She brought these materials, and others, into AIR the following week, and materials that had caused problems were reviewed.

By June Cindy had reached a point where she needed only a minimum of help.

Her parents were glad to have Cindy participate as a pilot student during the first year and friendships were established with the project staff. Nevertheless, it was decided by Cindy's parents to discontinue her involvement during the second year for personal reasons.

Case # 6 First Name Alicia

TEST RESULTS

Intelligence (WISC): IQ: 116

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 4.5
WPM: 118 Comprehension: 88 % correct out of 8

CTBS passage:
Grade equivalent of difficulty: 8.6
WPM: 92 Comprehension: 88 % correct out of 8

Tactile Test: 96 % accuracy

Diagnostic Spelling Test

100 % accuracy 0 % errors related to braille 0 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	4th quartile	4th quartile	1st of 5
Post:	4th quartile	4th quartile	1st of 5

Attitude toward Education

Pre: 3rd quartile Post: 4th quartile

Self-concept

Pre: 4th quartile Post: 4th quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
17.4 WPM 100 % of accuracy

Paragraph using vocabulary from instructional materials:
17.7 WPM 100 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 4.5
20.4 WPM 98 % accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
16.6 WPM 99 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type	x		
Italic type		x	
Newspaper headlines	x		
Telephone book		x	
Labels from Medicine bottles	x		
Index	x		
Tape recorder guarantee		x	

Case # 6 First Name: Alicia

This female student was 13 years old, and was in the 7th grade in a public school. The student's blindness was caused by a congenital defect. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had some prior experience with print and she had some experience typing. The student was working largely independently, with occasional help from the resource teacher. The student had no additional handicaps. The student did not regularly utilize Optacon Instructional Materials Units since she had previous experience. She studied independently under the general supervision of the resource teacher.

Alicia's schedule was set up on a "trimester" basis. Because of this she had a specific Optacon period, approximately a half-hour per day, from January to March, but not from April to June. During the period January to March, Alicia was allowed to use her Optacon time in free reading, since she had had some previous experience the year before with the Optacon. From April to the end of the school year, Alicia only read with the Optacon whenever she could find some free time. Time spent with the Optacon fluctuated greatly during this period.

Except for part of May and June Alicia spent most of her time with the Optacon reading stories, in book form, which were "high interest, low vocabulary." When Alicia was reading, she was doing so independently; a teacher's aide was usually nearby in case she had difficulties with a word. Alicia's tactile technique was good, as well as her letter recognition and word attack skills. She also had no problems with tracking (without use of the tracking aid) and seldom needed any help.

During the last two months, Alicia worked with a student teacher approximately twice weekly, 15-20 minutes per day. During this time Alicia was practicing reading her French and Spanish textbooks with the Optacon.

Case # 6 First Name: Alicia

At this time she was preparing to take the Optacon into her language classes, which she did on the 23rd of May and the 6th of June.

Alicia is a bright girl, but does not always seem to work at full capacity. When she began working with the Optacon she seemed to have problems getting interested in what she was reading, and changed books several times. However, when she was asked if she would like to practice reading her language books in order to use them in the classroom, she became very enthusiastic.

Alicia is a very determined young lady who likes to be "best" at the things that she does. However, she does not like to work hard in order to improve her skills. She seemed slightly jealous of the older student's position as a tutor. Using the Optacon for her language classes at least put Alicia back on the same level as Della, who was also preparing to take the Optacon into the classroom. Besides working with the textbooks, Alicia spent a little of her time trying to read dittos, which were used for these classes. Alicia was less successful with this latter task. She was able to read the dittos fairly well, but she quickly became frustrated because some of the words were hard to read.

Alicia seemed to prefer to do things that she could already do well rather than be challenged by new tasks which were difficult. She enjoyed reading portions of the French and Spanish textbooks. In these cases she was reasonably successful, having some minor problems making adjustments for print differences and understanding page layouts. Alicia was very excited about taking the Optacon into her classroom and greatly enjoyed demonstrating the Optacon for her classmates.

After Alicia had been using the Optacon in each of these classes for several days, the students in these classes were asked to fill out a questionnaire written by the resource teacher. These results are reported in the appendix.

Case # 6 First Name: Alicia

When Alicia gave the demonstration for her French I class, she explained the basics of how the machine worked, how long she had been using it, and how the different adjustments on the machine were used. Then, she gave a demonstration of reading with the machine. After she had shown the students in her class how the Optacon operated she answered a few questions and then let the other students feel the vibrations by means of hooking up a second Optacon with a master/slave cable. The students seemed very interested and most of them were eager to feel the vibrators.

The following day Alicia took the Optacon into the French class to try to use it in a regular class situation. In this class Alicia sat in the front row. She asked the girl who sat behind her to help her whenever she needed it. One minor problem was knowing which side of her book was up. This problem was solved by marking the front cover with a piece of tape. A second problem was finding the right page. This was the type of thing that her classmate helped her with. Once Alicia had the right page she was alright if the teacher stayed within a couple of pages. But, if the teacher moved more than a few pages Alicia had to have help finding the page. Another minor problem was knowing where the teacher was on the page. Here, Alicia needed verbal directions to know if they were starting near the top, middle, or bottom of the page in order to keep up with the class.

Without being able to see the whole thing at a glance, Alicia had a hard time knowing if the words, etc. were in several columns across the page. Also, the teacher did a lot of oral work using the basic vocabulary from the book. This confused Alicia at first, even though she was used to this teacher's style of teaching, but she soon seemed to be able to adjust to this procedure.

Another problem was that Alicia did not seem to know when the French words in her book were followed by English translations. Since Alicia had a hard time keeping up, she didn't seem to check to see if the French words were followed by anything. This particular exercise was a review,

though, and the teacher probably would have treated new material differently. Alicia often had to make "threshold" and zoom lens adjustments very quickly, which she handled very well. After this class Andrea seemed pleased with how she had done. She realized that there were many problems, but seemed to think that she could overcome them. Using the Optacon in this way would also provide Alicia with the motivation for increasing her skill.

Alicia gave a demonstration for her first year Spanish class two weeks later. It was very similar to the one she gave for her French class. These students also seemed very attentive and interested. The following day Alicia took the Optacon to this class, also. She seemed to be able to follow along with the Spanish book much more easily than with the French book. The students in this class also spoke louder when reciting than the students in the French class, which seemed to help.

Case # 7 First Name Della

TEST RESULTS

Intelligence (WISC): IQ: 94

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 4.5

WPM: 118 Comprehension: 65 % correct out of 8

CTBS passage:
Grade equivalent of difficulty: 8.6

WPM: 104 Comprehension: 65 % correct out of 8

Tactile Test: 76 % accuracy

Diagnostic Spelling Test

100 % accuracy 0 % errors related to braille 0 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	4th quartile	4th quartile	1st of 5
Post:	4th quartile	3rd quartile	3rd of 5

Attitude toward Education

Pre: - quartile Post: 3rd quartile

Self-concept

Pre: - quartile Post: 2nd quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
28.0 WPM 69 % of accuracy

Paragraph using vocabulary from instructional materials:
27.0 WPM 78 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 4.5
26.2 WPM 77 % accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
23.1 WPM 86 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type	x		
Italic type		x	
Newspaper headlines	x		
Telephone book	x		
Labels from Medicine bottles	x		
Index		x	
Tape recorder guarantee		x	

Case # 7 First Name: Della

This female student was 13 years old, and was in the 8th grade in a public school. The student's blindness was caused by congenital cataracts. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had some prior experience with print and she had some experience typing. The student was working largely independently with occasional help from the resource teacher. The student had no additional handicaps.

The student did not study Optacon Instructional Materials Units in any regular way, since she had previous experience. She practiced independently under the general direction of the resource teacher.

Della had had some experience reading with the Optacon during the previous year. She started reading again with the Optacon in early October and usually spent 1-1/2 - 2-1/2 hours weekly reading. Additional time was spent during the second semester when she acted as the instructor in a cross-age tutoring experiment with a 4th grade boy. Della was very diligent in practicing her reading skills. She enjoyed reading with the Optacon and brought a paperback book of short stories from home to read. She was very enthusiastic about reading this book and did not seem to have many problems with it even though the print was not the best. She also read several short mystery books for pleasure and for additional practice. When she was reading she did so independently, although teacher aides were usually available if she ran into difficulty with a word.

Della had developed good tactile techniques, letter recognition and word attack skills. At the beginning of the semester she tended to track so that the letters appeared on a slant. However, she only rarely cut off parts of the letters. During the semester, she worked on correcting this tendency and by the end of the school year tracked fairly straight.

Case # 7 First Name: Della

Della was somewhat hesitant about using the "threshold" and zoom lens adjustments. Even if someone had used the Optacon before her and had changed the adjustments, Della was likely to turn the machine on and try to read without making any corrections, even if the settings made it difficult to read the print. She needed much encouragement to make use of these adjustments and by the end of the semester she was doing this with greater frequency.

Della seemed to enjoy tutoring the 4th grade boy. She needed some guidance as far as giving the tutee positive reinforcement when he was correct. Della has a very patient personality and this cross-age tutoring seemed to work very well. The resource teacher helped only with the first lesson. After that she only observed occasionally. The boy's mother kept time records and was usually observing. If any problems arose she was available.

During the latter part of the semester Della practiced reading her Spanish textbook and dittos from this class with the student teacher. She soon seemed to be able to find her place fairly quickly and had only minor problems with the format. She also became adept at figuring out ditto sheets, although this seemed to be a difficult task.

Della demonstrated the Optacon for her Spanish II class during the first week in June. The students in this class were interested in the Optacon, as the students had been in Alicia's class. Della was a little shy about speaking in front of her classmates, but seemed to relax when they started asking questions about the Optacon. The students in this class also had the opportunity to feel the vibrators on a second Optacon as Della operated her machine.

There was a lag of a couple of days before Della was able to use the Optacon in this class. When she did have the opportunity she seemed to be able to

follow along very well. The time she had spent preparing for this occasion seemed to help her greatly. She was very familiar with the format and was able to find her place quickly with a minimum of help from a classmate. Della's classmate also seemed more aware of when she would need help than had Alicia's classmates. Della had no problem reciting when called on during the period. The students in this class responded loud enough so that Diane could hear them when she was reading.

Della graduated to high school at the end of the year. It is hoped that she will continue to develop her skill, as the high school was also a school included in this year's Optacon project.

Case # 8 First Name Dottie

TEST RESULTS

Intelligence (WAIS): IQ: 116

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 8.6
WPM: 92 Comprehension: 100% correct out of 8

CTBS passage:
Grade equivalent of difficulty: 11.7
WPM: 112 Comprehension: 88% correct out of 8

Tactile Test: 96 % accuracy

Diagnostic Spelling Test

97% accuracy 0 % errors related to braille 3 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	- quartile	- quartile	- of 5
Post:	1st quartile	3rd quartile	4th of 5

Attitude toward Education

Pre: 3rd quartile Post: 3rd quartile

Self-concept

Pre: 1st quartile Post: 1st quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
6.7 WPM 75 % of accuracy

Paragraph using vocabulary from instructional materials:
8.6 WPM 92 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
6.8 WPM 88 % accuracy

CTBS passage:
Grade equivalent of difficulty: 11.7
5.8 WPM 79 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type		x	
Italic type		x	
Newspaper headlines		x	
Telephone book		x	
Labels from Medicine bottles	x		
Index	x		
Tape recorder guarantee		x	

Case # 8 First Name: Dottie

This female student was 20 years old, and was in the 11th grade in a public school. The student's blindness was caused by congenital retrolental fibroplasia. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had no prior experience with print and she had some experience typing. The student was working on a one-to-one basis with a blind resource teacher on a regular schedule. The student had no additional handicaps. The student completed Optacon Instructional Materials Units 1-9 and C, D. Her scores on the criterion exercises within the instructional units were typically about 95% correct. According to the teacher's judgment the units were at an appropriate level of difficulty and indicated that this student typically exhibited the following levels of skill during study periods:

excellent tracking
excellent tactile technique
excellent letter recognition
excellent word attack
excellent interest level
excellent attention span.

Dottie was attending a regular high school and regularly came into the resource room for a 50-minute class period each morning. Once a week she had a mobility lesson at this time. Her instructor was also blind and had received a limited amount of training in Optacon use a short time before the start of the semester. Personal problems prevented this teacher from spending as much time training before the start of the semester as had been anticipated. During the spring semester one of the AIR staff members visited the school approximately twice monthly. Dottie usually worked on the Optacon for 30 minutes 3 times per week. She often did not complete her homework at night and her teacher felt that this took precedence over her Optacon instructional sessions.

Case # 8 First Name: Dottie

Dottie seemed to progress through the basic units at a fairly regular rate. The resource teacher questioned an AIR staff member regularly as to whether his student was finishing the units as quickly as students from other schools.

The teacher's and student's Optacons were hooked together by a master slave cable. The teacher also had a brailled version of the instructional materials, which he read with one hand while following along on the Optacon with the other hand. The student used the tracking aid most of the time during the whole semester. The student had problems with some of the letters, especially lower case. The teacher tried to help the student discover the dominant features of individual letters by verbal descriptions. He was not observed using the set of raised letters or other tactual means. When working on drill words, the teacher would anticipate the student and attempt to elicit more prompt response. In general, the thrust of teacher comments was directed toward minimizing errors rather than broad encouragement.

Dottie reads each word letter-by-letter. She moves her reading finger excessively, "scrubbing," and the blind teacher had a problem knowing whether she had stopped this or not. After an AIR staff member informed him of Dottie's habit, he explained to her why she should keep her finger still. But, even though he kept reminding her, she continued to move her finger. The teacher was never observed putting his own hand on top of Dottie's as a means of getting Dottie accustomed to reading with her finger still. Associated with the "scrubbing" technique, Dottie would hold the camera still on each individual letter. Dottie also seemed to have poor word attack skills. She often would guess a letter that would make no sense in the word. She especially had a difficult time with long words. The teacher was not observed helping her develop better word attack skills such as how to anticipate words by contextual cues.

This student continued using the tracking aid the whole semester. She evidently tried tracking without the tracking aid a few times, but went

Case # 8 First Name: Dottie

back to the tracking aid because of difficulty with this task. In this regard, the teacher had not used the supplementary tracking exercises. When Dottie tracked with the tracking aid she preferred to hold onto the tracking aid arm instead of the camera. The teacher would remind her to hold the camera, but Dottie usually continued holding onto the arm. It seems as if this probably added to the difficulty of transitioning to tracking without the tracking aid.

Dottie finished the basic units and worked on two of the supplementary units: speed building and additional typefaces. The speed building unit was used more or less as a reading exercise, and it seemed as if the student was not gaining much except practice reading words. It was suggested to the teacher that he use some of the other supplementary units as diversion between sessions using the speed building unit. However, he preferred to continue working with this unit. The student seemed rather bored.

It would seem possible for a blind teacher to work with a student on the Optacon. However, it would appear essential that the teacher should have a fairly high level of skill before attempting such a task. The difficult aspect of this type of training is that the teacher cannot see what the student is doing. Therefore the teacher must rely on verbal or tactile means to keep in contact with the student's behavior.

Case # 9 First Name Heinrich

TEST RESULTS

Intelligence (WAIS): IQ: 140

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 8.6

WPM: 41 Comprehension: 100 % correct out of 8

CTBS passage:
Grade equivalent of difficulty: 11.7

WPM: 51 Comprehension: 75 % correct out of 8

Tactile Test: 100 % accuracy

Diagnostic Spelling Test

100 % accuracy 0 % errors related to braille 0 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	1st quartile	3rd quartile	2nd of 5
Post:	2nd quartile	3rd quartile	2nd of 5

Attitude toward Education

Pre: 4th quartile Post: 4th quartile

Self-concept

Pre: 3rd quartile Post: 3rd quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
5.2 WPM 87 % of accuracy

Paragraph using vocabulary from instructional materials:
6.9 WPM 97 % of accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
4.8 WPM 88 % accuracy

CTBS passage:
Grade equivalent of difficulty: 11.7
4.2 WPM 86 % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type		x	
Italic type		x	
Newspaper headlines		x	
Telephone book		x	
Labels from Medicine bottles	x		
Index		x	
Tape recorder guarantee			x

Case # 9 First Name: Heinrich

This male student was 17 years old and was in the 12th grade in a public school. The student's blindness was caused by congenital optic atrophy. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This student had some prior experience with print and he had some experience typing. The student was working on a one-to-one basis with an itinerant teacher on an irregular schedule. The student had a severe hearing loss handicap with possible impact on the study. The student completed Optacon Instructional Materials Units 1-9 and A-E. His scores on the criterion exercises within the instructional units were typically about 90% correct. According to the teacher's judgment the units were at an appropriate level of difficulty and indicated that this student typically exhibited the following levels of skill during study periods:

average tracking
above average tactile technique
above average letter recognition
above average word attack
above average interest level
excellent attention span.

Heinrich's teacher was experiencing her first year of teaching. She was enthusiastic, energetic and resourceful. He tested this resourcefulness by finding fault with machine settings (but not learning to do them himself) and by exhibiting dissatisfaction with the tracking aid (though not tracking well on straight lines when given the chance). Teaching surroundings were not the best, consisting of a cubicle set off from a larger room used by others.

Heinrich's hearing impairment presented a very real problem in inward communication which greatly complicated the teaching-learning process and the testing process as well. The peculiar selective quality of his hearing meant that only certain people could be heard and then only at high volume. Because of his familiarity with German and the Optacon teacher's ability

to speak it, this was sometimes resorted to as a way of clarifying instructions.

In spite of this barrier Heinrich seemed to apply himself very diligently to the learning task and projected an impression of being highly motivated. His progress was slow but steady. Typically, he would read through a complete phrase or line followed by corrections and comments from the teacher. This was in contrast to other students where more informal prompting could easily occur at any point. Heinrich complained frequently throughout the semester that his left index finger "burned" and he would rest it every 5 or 10 minutes. He also tended to "scrub" with his left finger.

Because he was a graduating senior his Optacon study was abbreviated by 1-1/2 weeks from that of other students involved in the study.

Case # 10 First Name Pete

TEST RESULTS

Intelligence (-): IQ: -

Braille Reading Test

CTBS passage:
Grade equivalent of difficulty: 8.6
WPM: 70 Comprehension: 50 % correct out of 8

CTBS passage:
Grade equivalent of difficulty: 11.7
WPM: 109 Comprehension: 75% correct out of 8

Tactile Test: 92 % accuracy

Diagnostic Spelling Test

100 % accuracy 0 % errors related to braille 0 % errors related to spelling

Attitude toward Optacon

	Present use:	Projected use:	Ranking of Optacon and other reading methods:
Pre:	1st quartile	2nd quartile	5th of 5
Post:	1st quartile	1st quartile	5th of 5

Attitude toward Education

Pre: 3rd quartile Post: 3rd quartile

Self-concept

Pre: 2nd quartile Post: 3rd quartile

Final Criterion Test (Post):

Paragraph using words from 300 most common words:
1.5 WPM 100 % of accuracy

Paragraph using vocabulary from instructional materials:
- WPM - % of accuracy

CTBS passage:
Grade equivalent of difficulty: 8.6
- WPM - % accuracy

CTBS passage:
Grade equivalent of difficulty: 11.7
- WPM - % accuracy

Applications of skill:	no mistakes	some mistakes	did not attempt
Delegate type			x
Italic type			x
Newspaper headlines			x
Telephone book			x
Labels from Medicine bottles			x
Index			x
Tape recorder guarantee			x

Case # 10 First Name: Pete

This male subject was a 40-year-old adult and a blind teacher in a residential school. The subject's blindness was caused by optic nerve deterioration and he had been blind since 5 years of age. Vision impairment was at a level that precluded the use of optical aids and the seeing of enlarged print. This subject had some prior experience with print and he had some experience typing. The subject was working on a one-to-one basis with a regular teacher on an irregular schedule. The subject had no additional handicaps. The subject completed Optacon Instructional Materials Units 1-7 and 9. His scores on the criterion exercises within the instructional units were typically about 90% correct. According to the teacher's judgment the units were at an appropriate level of difficulty and indicated that this subject typically exhibited the following levels of skill during study periods:

above average tracking
above average tactile technique
excellent letter recognition
excellent word attack
excellent interest level
excellent attention span.

Pete is a blind instructor at a residential school. He still has slight residual vision but he is unable to read print. He does remember letter shapes, though. It was understood by an AIR staff member that Pete's vision loss was caused by some kind of nerve deterioration. It is not known whether or not this condition affected any besides ocular nerves. It is also unknown whether or not this could have had any effect on Pete's ability to feel images with the Optacon.

Pete seemed to have a quiet, easy-going personality. When interviewed by an AIR staff member at the end of March he had only been working with the Optacon for a short time. He was receiving instruction from one of the other teachers at the residential school and was using the regular secondary level instructional materials. Because of certain unforeseen problems,

Case # 10 First Name: Pete

these two individuals had been having difficulty matching schedules. This hampered Pete's opportunity to work with the Optacon.

Pete seemed to have more difficulty recognizing letter shapes than he had expected. Although he is an experienced braille reader, he felt that he was having a difficult time interpreting the tactile images that he received from the Optacon. He said that although he could remember what the letters looked like, he had a hard time making fine tactual discriminations.

Pete stated that before he had started to work with the Optacon he had been excited about learning to read with this device and had seen it as a challenge. However, at the end of March he seemed somewhat discouraged, and had low expectancies as to his own ultimate use of this device. He did not seem to be at all negative about the Optacon, but he did seem to feel that he, probably, would never be able to make effective use of it.

Although Pete felt that he was progressing very slowly, he continued working with the Optacon during the rest of the semester. From comments on the data returned to AIR, it seems as if Pete probably was very dependent on contextual cues. He seemed to have the most difficulty with unconnected words and the least problems with the connected text in each unit. He finished all of the basic units, but did not work on any of the supplementary materials.

Overview of the special cases group. As described in the individual case studies, several of the students used the Optacon in other classes. In one school two Optacon students had used the Optacon in three foreign language classes. A school originated questionnaire was given to all students in each of these classes. Items on the questionnaire explored the reactions of other students to the class use of the Optacon by the blind student. It was felt that both teacher and student could be heard adequately when the Optacon was used. Generally, students gave positive rather than negative remarks about the Optacon. Approximately half the sighted students felt the sound of the Optacon bothered them when they were working individually. A complete summary of responses to each of the ten items is given in Appendix F.

Six special cases were compared with the main study group with respect to performance. Excluded were the forty-year-old subject and the six-year-old who was taught with other materials as well as the two students who had a previous semester or more of Optacon experience.

Table 14 displays the performance of both groups on overall criteria of rate, accuracy and variety, as well as the five affective measures. No significant differences between the means were found.

The two students who had had previous experience with the Optacon displayed marked superiority of performance in reading speed. Their average speed on the Criterion Test was 22 WPM. These two students appeared to be approaching a functionally useful level with the device. Furthermore, these two experimental students displayed highly favorable attitudes toward use of the Optacon. In contrast, the special cases who had not had previous experience had a mean of 7.9 WPM. This further adds support to the argument presented throughout this report that something more than 24 hours per semster instructional time is necessary before useful speeds are attained.

TABLE 14

COMPARISON OF CRITERION PERFORMANCE
OF MAIN STUDY GROUP VERSUS SPECIAL CASES

	Main Study (N = 71) Mean	Special Cases (N = 6) Mean	Significance
Average WPM	6.3	7.7	NS
Average Accuracy	.86	.91	NS
Variety of Use	2.0	2.3	NS
Self-Concept*	24.1	21.8	NS
Attitude toward Education*	25.5	26.7	NS
Attitude toward Optacon*	17.8	17.5	NS
Optacon Present Use*	5.0	5.2	NS
Optacon Preference*	3.0	2.7	NS

*Second administration of these measures

SYNTHESIS OF FINDINGS

The foregoing Results section revealed a number of provocative findings which warrant further discussion. Since the results were presented in sections dealing separately with overall criterion performance, predictors, treatment effects, affective relationships, Optacon operation, instructional materials, and case studies, it is appropriate to interrelate these findings. An attempt will be made to point out findings of practical importance and to suggest why particular results should be held in abeyance until further data are available.

Time

One overrriding point which we have brought out repeatedly is that the results shown herein are based on an insufficient exposure time (24 hours on the average) which precludes many final judgments in this interim report. We have assumed since the beginning of the study that time per se contributes a great deal to attained mastery. It was graphically shown that those students whose time was spent primarily in the basic units did poorer than those who moved quickly through them and into the supplementary units. The overall amount of study time was important as well.

When the effect of time is analyzed in detail it becomes clear that <u>how</u> time is spent is as important as how <u>much</u> time is spent. In other words, mastery of a particular skill, be it speedier reading, accurate reading of materials, or reading varieties of materials, is directly consequential of the time and effort put in on practicing <u>relevant</u> materials. Inasmuch as the mean reading rate in this study was relatively slow, it would appear that special emphasis on improving overall speed would be profitable in the future. Presumably, further practice with materials of diverse type and format will lead to a better operational proficiency with the kinds of items utilized in Part V of the Optacon Criterion Test.

Optacon usage time is a limited commodity in the schools. Noting that one-half hour daily was the maximum concession that some schools could make in allowing for Optacon study time in the regular school day, and recognizing

that a greater proportion of the school day should be sought, it would seem that valuable additional study time could be obtained by encouraging the use of Optacons at home, elsewhere in the community or in school. This suggests a need for individually tailored programs of study that do not constrain the learner to "a certain time and certain place for practice."

Selection Criteria

An analysis of predictor variables revealed that IQ and tactile ability measures as used in this study are highly related to success on speed, accuracy and variety. Conversely, braille reading speed, which some have thought to be a good predictor, does not seem very useful. It is tempting to use intelligence and tactile ability measures as selection tools, identifying students who would most stand to benefit from Optacon use. This may prove to be the case, but it would seem premature to rule out students merely because of low scores on these indices. For example, one student who had a 94 IQ not only showed that she could read mysteries and textbooks with ease and pleasure after a year's practice but also showed that she could teach the Optacon skills to others.

Similarly, if the tactile test is passed easily, other problems may work contrary to mastery. A large portion of the index finger is utilized for sensory input when it is laid down flat upon the matrix of vibrators, but the "scrubber" (person who moves the tip of the index finger around on the vibrating field) can only feel the parts of letters piecemeal, not simultaneously. He may feel the tactile test with only his fingertip and still achieve a good score, but he definitely cannot master the Optacon with this habit; it must be extinguished during training.

The high correlation obtained with the tactile measure is largely attributable to the portion of the instrument dealing with similarity of shapes. It would seem important to build upon this finding through systematic test development techniques so that other tactile factors would be taken into account. The Optacon display is a dynamic pattern of spaced points, but the tactile measure deals with static continuous lines. This difference should be examined more closely so that test results can be

properly interpreted. Research by Nolan and Morris (1969) and by Foulke and others (1970) should be helpful in this regard.

In spite of the foregoing cautions about selection of students on the basis of these two measures, they are highly correlated with criterion performance and represent the best predictors yet identified in this study.

Teaching Procedures

Both elementary (grades 4-8) and secondary (grades 9-12) students seem basically able to cope with learning to use the Optacon, though functional mastery for daily use has yet to be demonstrated. Observation of these cohorts will continue, but it would seem that any differences in the present data that might seem to favor the secondary students may be discounted by their relatively higher IQ scores. Also, the students' own comments that the Optacon should be taught at the primary and upper elementary grades is an indication that they do not view it as a task restricted to "grown-ups." In this respect, it should be noted that first and second graders among the special cases achieved at encouraging levels.

There is little doubt left by the findings, even at this interim stage of assessment, that both the 1:1 and 3:1 student/teacher ratios are viable ways to learn the Optacon. Apparently, what one gives up in the 3:1 ratio in terms of personalized attention and tutelage by a teacher (including a priority on her time) is offset by the compelling aspects of teamwork, competitiveness and mutual reinforcement. Real logistic considerations are encountered in this kind of learning station, however. In part, this is due to the "tied down" nature of equipment that is interconnected in a somewhat complex manner, and in part due to the need for rotating students through the "master" Optacon position so that all students have ample experience in tracking.

Apparently, instruction did not suffer when student teachers were used. Indeed, some benefits were noted in relation to accuracy, but these may have been spurious results. This would suggest that the teaching of Optacon sills may not require lengthy teaching experience, but it by no means indicates that professional training is not important.

Local Contingencies and Uncontrolled Variations

It has been said that all educational programs have one thing in common...their differences. It is important and relevant to note that no two schools or school districts in this project operate in the same way, nor do they have the same resources to draw upon. It was with great interest that the project staff observed the ways that the various Optacon learning stations were utilized by the schools.

Even where the local resources are similar and the teaching approach is the same, i.e., a 3:1 student/teacher ratio, events may alter the learning efficiency for several days. For example, one school typically had enthusiasm and competition among the learners, but for a brief period a kind of infectious concern set in. This took place when one student seemed to have a sensation of shock in his index finger and conveyed his concern to the teacher and the other two students; soon the other two students also "felt" something about which they expressed concern. The episode undoubtedly had some negative effect upon learning for that day and several others. (It should be noted that the manufacturer promptly responded to the problem and took steps to head off similar problems occurring in the future.)

In the illustrative school cited above, and in others with different experiences, the obtained criterion data seems to be well in line with that from other schools. Therefore, while equipment problems or other short-term problems which interfere with learning did occur in a few cases, in this instance they did not reach a stage where they jeopardized the project or the overall learning opportunities of the students.

In only two sites did a local problem have a marked effect on results. In one situation an extended teacher strike delayed the start of instruction and this late start was compounded by an early departure of student teachers at the end of the school year. For this reason these students had to be excluded from this year's sample.

The other local problem was a teacher's mistaken use of the reverse switch for about five hours of instruction, during which time students progressed only at painfully slow rates. Their performance remained below

that which would have been expected according to intelligence and tactile predictors. Since this error resulted from inexperience and unfamiliarity with operation of the Optacon equipment, it underscores the importance of adequate teacher training in this regard.

In one of the schools where a 1:1 learning station was set up the experienced "teacher" was actually a blind student with one year of prior Optacon experience, who was a better than average student in terms of Optacon skills and who had a patient manner. In this cross-age tutorial situation the special education teacher initiated the relationship between the two students but thereafter they were essentially on their own, with occasional checking by the teacher and frequent observation by the mother of the tutee. The student tutor would use the slave Optacon and the tutee the master Optacon, and the visual display was plugged in simply for the benefit of any sighted observer. This experiment worked very well and both students profited, no doubt in part due to the ambitiousness of the tutee but also undoubtedly due to the prior experience of the tutor and her familiarity with the equipment. More important, it raises the possibility that once an Optacon training program has been in place in an adopting school there can be cross-age tutoring, freeing the teacher from much of the time-consuming monitoring of student progress.

The above examples, drawn both from the 3:1 and from the 1:1 ratio learning stations, are only illustrative of the variety of instructional approach and incidents affecting learning that characterize all schools, including those in this study. The three treatment variables (elementary and secondary cohorts, student/teacher ratio and use of student teachers) showed the feasibility of all these approaches.

Since the project staff knew many other operational differences existed across the sites (which were not controlled by the study) and some were known to be residential, itinerant and resource type programs, an inspection of the data was made to determine whether any particular site varied sharply from the performance of all other sites taken as a whole. If such a difference was noted then staff knowledge of the contingencies at the sites might be used to interpret this variation. In fact, the only site that

differed markedly from the others was the one in which the reverse switch problem interfered with learning.

Instructional Materials

It was evident from the summary of teacher ratings on activity logs that both the elementary and secondary instructional materials were deemed appropriate to meet student needs. This approval was indicated by an extremely high proportion of the teachers. A clear majority of students were also favorable in their ratings of the materials as shown on items imbedded in the Optacon attitude measure.

By design, teachers were able to take students more rapidly through the materials, bypassing some drill and practice or enrichment, if the student showed high facility at character and word recognition. Alternatively, if the student was encountering difficulty the materials were designed to help the teacher to diagnose the problem, regardless of whether it was in tracking or in character recognition, and allow her to loop the student through relevant remedial lessons. In the later supplementary units, students were given some choice about what sequence they wanted to follow (with some logical constraints imposed by the subject matter interrelatedness of certain units). This flexibility in the training materials was not utilized by all teachers, of course, but it probably explains why some students had greater study time in certain units and why the number of students who studied in the later units varied considerably.

Anecdotal comments and observations, both collected in abundance, have suggested certain content portions of the materials which would benefit from revision (and this will be done early in Phase II). It would seem, as indicated in Table 11 of the Results section, that the bulk of the materials are both effective and adaptable to the individual needs of a very wide variety of students involved. Therefore no changes in the overall instructional strategy seem required for elementary (4-8) and secondary (9-12) students.

It is believed that minor changes will reduce repetitiveness in the learning of lower case, facilitate the building of reading speed, and smooth the transition from guided to independent reading involving varied typefaces and spacing.

In sum, it would seem that the schools were able to assimilate the Optacon training program, or adjust to it, quite satisfactorily in spite of a wide variety of approaches. This must be viewed as an encouraging sign.

Overall Consistency of Findings

One of the most striking overall results of the analysis using Phase I data, when students were only partway through a training program and still far from reaching functional reading speeds, was the consistency of certain findings.

Performance. Most obviously, the students consistently read with high accuracy but relatively low rate; while variety of use seemed indeterminate due to insufficient study time.

Given a wide range of observed reading rates (2-18 WPM), there was a somewhat surprising similarity of attained reading rate and accuracy across the several Optacon reading criterion measures even though the passages were known to be of different levels of difficulty. Our own feeling is that performance was still well below any functional level, at which time difficulty of the passage might begin to play a more important part.

Consistency was generally evident in the levels of performance reached by the treatment groups, regardless of whether the treatment was defined by elementary or secondary cohorts, 1:1 or 3:1 student/teacher ratios, or the involvement of student teachers. Age was a predictor of Optacon reading accuracy and the treatment findings did show a tendency for higher scores by secondary students, though only at the .05 significance level. This may be due to the treater inconsistency of age/grade relationships among blind students than is customary for the sighted, e.g., a 20-year-old student was in the high school group.

The various sites, with one explainable exception, seemed to show consistent performance results in spite of differences that are acknowledged to exist among any set of schools which include residential, itinerant and resource programs.

Time. Consistency was shown in terms of the impact of time upon attained performance. Overall, it was positively related. Internally, and quite reasonably, the higher the proportion of time spent in the lettered supplementary units (usually indicative of a faster study rate in the earlier numbered units) the better the students' performance. Thus both absolute time and appropriate use of time are evidently important.

Prediction indices. Intelligence and tactile ability consistently were predictive of performance regardless of the type of Optacon skill being assessed. Taken together, they accounted for 44% of the variance on words per minute. Braille ability was not a consistent predictor.

Attitude. Though some changes were noted, stability or consistency of attitudes were noted across the two administrations of these measures indicating that the Optacon experience had no pervasive effect upon self-concept, attitude toward education, nor attitude toward the Optacon. These findings are best thought of as preliminary, of course, until skill levels are reached where the students could reasonably begin to see the payoffs from their study.

Materials. Consistently favorable comments and ratings were noted concerning the appropriateness of the materials. Although the items and lines of inquiry were not directly comparable this favorableness held true both for teachers and students. Even where anecdotal suggestions were given these tended to be consistent and helpful, making revision fairly easy.

CONCLUSIONS

The researchers were bound to undertake an impartial investigation of the educational potential for a device which was already receiving considerable publicity and marketing effort in response to widespread curiosity and interest. We freely admit to a hope that any and all devices which may facilitate the normalization of the lives of blind persons prove "successful." Nevertheless, we realize that there is not likely to be a universal acceptance of any particular device, nor is any particular device so potentially valuable that constructive criticism should not be invited. We feel that the identification of realistic estimates of accomplishment is probably more beneficial to the advancement of the field than are idealized estimates which focus on upper limits, and it is in this spirit that we attended more to the typical than to the extreme cases.

The findings of this study tend to be clear and consistent with respect to a number of the initial research questions. Several conclusions can be drawn which bear directly upon the conduct of the study during Phase II. Because this report is interim rather than final in nature, other conclusions are necessarily tentative, to be confirmed or changed by data yet to come in Phase II.

The major conclusions at this interim stage are listed below.

- Blind elementary and secondary age students can learn to use the Optacon to read standard print with high accuracy, typically 82-90%.
- After 24 class hours of training, the average time available during the semester of study being evaluated, elementary and secondary students' reading rates vary from 1 to 17 words per minute but average between 6 and 7. This is not yet a functional reading rate. However, two students in the study who had prior exposure (in the preceding school year) were able to attain an average of 22 words per minute. This would appear to be a low but functional reading rate for many kinds of applications.

- Both tutorial (1:1 ratio) and small-group (3:1 ratio) instructional approaches are viable alternatives.
- Student teachers, under supervision, can be used for training students in the use of the Optacon without loss of learning outcomes.
- Intelligence (WISC and WAIS verbal scale) and tactile ability (Tactile-Kinesthetic Form Discrimination Test) are useful predictors of Optacon reading rate, accuracy and variety of use, at least during initial training.
- According to teacher and student evaluations, the newly-developed AIR instructional materials appear to be quite suitable for the purposes of teaching the Optacon, and they can be further improved through limited revision.
- Although most students state that they find the Optacon relatively easy to use and believe it should be taught in the lower grades, they tend to have a rather pessimistic view about its present usefulness to them, at least during the early stages of their learning.
- There does not appear to be an important difference between elementary and secondary students in terms of learning to use the Optacon, vis a vis rate, accuracy or variety of application.
- The use of the Optacon seems to be as easily learned by "special" blind students as "regular" blind students. That is, students who did not meet the criteria for inclusion in the main study nevertheless learned on a par with the others. They included the following seemingly successful cases:
  (a) first grader who was learning to read, using draft materials,
  (b) second grader using fourth grade materials,

(c) fourth grader taught by a blind eighth grader with prior Optacon experience,

(d) fifth grader with a severe orthopedic condition,

(e) sixth grader on an infrequent training schedule, using pilot materials,

(f) seventh grader reading Spanish and French,

(g) eighth grader serving as a tutor.

(h) eleventh grader taught by blind instructor,

(i) twelfth grader with very severe hearing loss.

- Initial attitudes of students toward themselves, toward education and toward their future use of the Optacon do not seem to be markedly changed by involvement in Optacon study. Initial attitudes may be changed when minimally functional reading rates are attained, e.g. 20 words per minute or more.
- The training of Optacon teachers can be brief provided that well designed instructional materials are available to them and they are fully taught the proper operation of the equipment.
- Optacon instruction seems to be equally implementable in residential schools, public schools with itinerant programs, and public schools with resource programs.

RECOMMENDATIONS

At the close of the first phase of this research study, it would seem that educators interested in the Optacon for their schools and blind students could act upon these recommendations.

- Schools should feel free to implement Optacon instructional programs without constraint as to whether the teaching is on a personalized or small-group basis, whether the students are in the elementary grades (4-8) or secondary grades (9-12), whether they have other handicaps (so long as these are not obviously detrimental to learning), whether or not a student teacher is involved, whether they are taught by a blind or sighted teacher or even by a peer tutor (so long as braille versions of the instructional materials and a slave Optacon are available to them).

- Teacher training requirements can be fairly brief, lasting several days, provided that the instructional materials are sufficiently structured so that they have clear directions about what must be done to guide the learner. It is important, however, that training be thorough, especially regarding operation of the Optacon equipment and the ancillary training devices.

- If decisions are to be made between prospective Optacon students or costs preclude purchase for each, preference should be given to those with higher verbal intelligence scores on the WISC or WAIS and higher tactile ability as shown by the Tactile-Kinesthetic Form Discrimination Test. Based on findings in this study, braille reading speed need not enter into the selection criteria.

  From a research viewpoint, further work in improving the component parts of the tactile test is appropriate.

- Considerable positive reinforcement and encouragement is important during initial training for the brighter as well as the slower students. As one might expect, the latter may need to apply themselves for a relatively longer period to achieve mastery; the former may have a humbling experiency during the period in which they are far from a functional use of the device.

- Sufficient time should be allowed (and scheduled by the schools) to make real progress feasible. One-half hour daily, while expedient for this study, should be exceeded both in terms of supervised and nonsupervised study time; perhaps an hour daily would be sufficient. Tentatively, it would seem that two years of such experience may be enough for individuals to begin approaching a functional use of the Optacon.

  Although it is important to increase the total time, it should be borne in mind that from an educational point of view it would seem that spaced practice over the school year would be preferable to heavy concentrations of time for shorter periods. In particular, educational efficiency would seem to be greatest when duration of daily study (a) emphasizes alertness and avoids mental fatigue and/or numbness or "soreness" in the index finger, (b) allows variety rather than a sameness of activity, and (c) encourages the building of memory and habit through repeated practice. Of course, summer programs may be utilized and these would likely occur for shorter periods. Similarly, adult training schedules may have to be somewhat more condensed to coincide with vacations from work.

- It would appear that the instructional strategy and instructional materials produced by AIR for use within this study are appropriate for their target reference groups. Upon revision, taking anecdotal comments into account, these materials should be made available to the schools on an inexpensive basis.

- Insofar as Phase II of the project is concerned, it would appear that continued distinctions between 1:1 and 3:1 ratios, and whether face-to-face instruction is done by a student teacher or a credentialed teacher, are no longer necessary. Similarly, it would seem that the six special cases that differed from the main study students on a priori grounds did not differ in fact when performance criteria were analyzed. Therefore, any of these students who continue in the project could well be considered as part of the main study sample.
- Further systematic research is needed to test the feasibility of the Optacon with young children, particularly those who have not yet developed a dependence on braille as a reading technique. The draft instructional materials developed within this study for use by a first grader represent a starting point in this effort.

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APPENDIX A

EXCEPTS FROM OPTACON INSTRUCTIONAL MATERIALS
(STUDENT'S COPY)

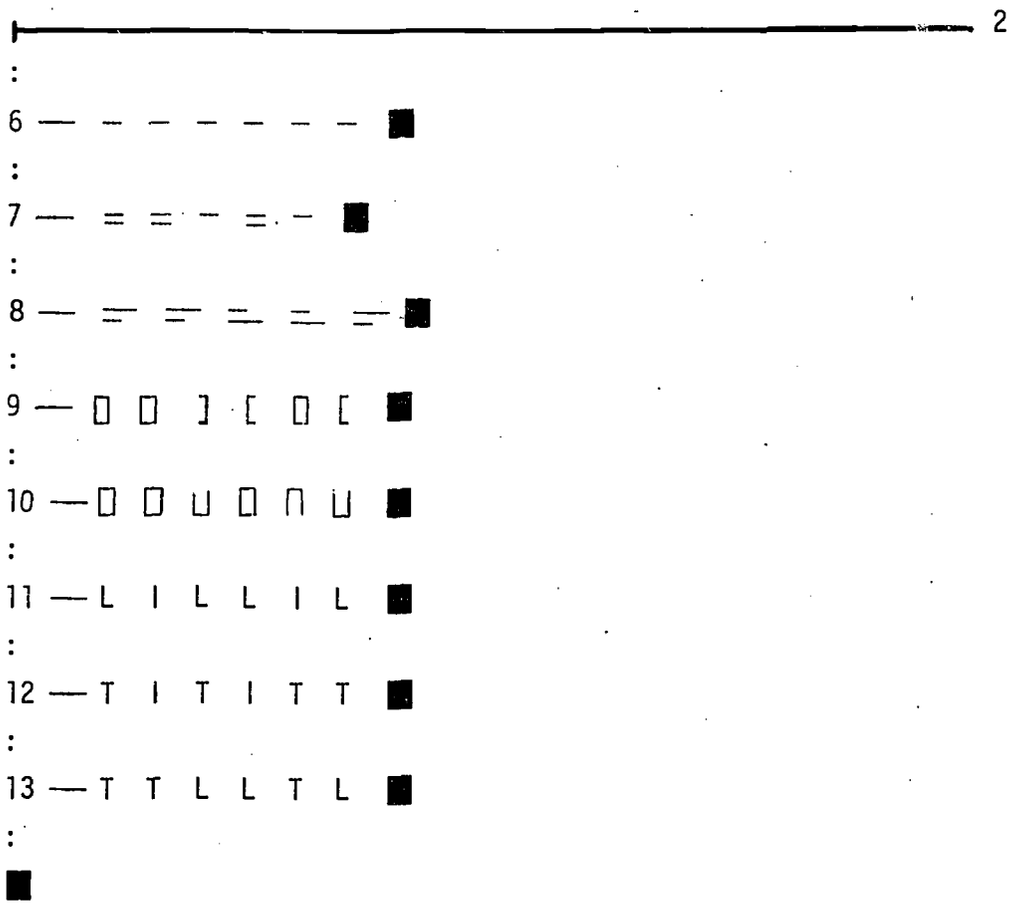
TABLE OF CONTENTS

Student's Materials

BASIC INSTRUCTIONAL UNITS

Student's Materials (Con't.)

Student's Materials (Con't.)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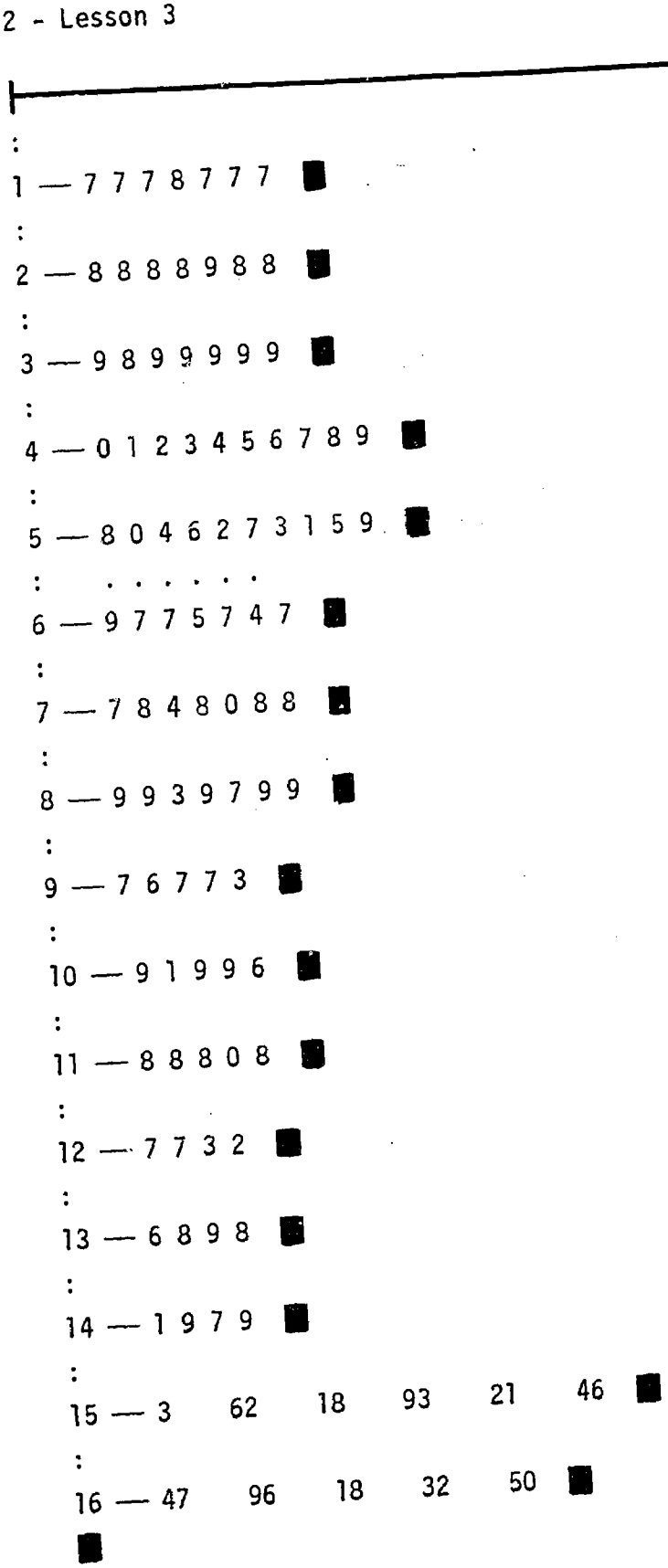
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3 — 9 8 9 9 9 9 9
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5 — 8 0 4 6 2 7 3 1 5 9
6 — 9 7 7 5 7 4 7
7 — 7 8 4 8 0 8 8
8 — 9 9 3 9 7 9 9
9 — 7 6 7 7 3
10 — 9 1 9 9 6
11 — 8 8 8 0 8
12 — 7 7 3 2
13 — 6 8 9 8
14 — 1 9 7 9
15 — 3 62 18 93 21 46
16 — 47 96 18 32 50

32

:
1 — J J J / J J / J / J ■
:
2 — X X X J X J X X J X ■
:
3 — Z Z Z X Z J X Z J Z ■
:
4 — X J Z C E J O X D S Z F I M J A R Z H X ■
:
5 — J A B J O B J A M F O X B O X M I X ■
:
6 — J U G J A R Z O O Z I P Z E R O ■
:
7 — J A C K J E A N J A N E F I Z Z F U Z Z ■
:
8 — E X P E C T E X T R A E X C I T E D J U M P ■
:
9 — D O Z E N F R O Z E N L I Z A R D J U N G L E ■
: . . . . . .
10 — J A N E, J O H N, J E A N, A N D J O E ■
:
11 — W E N T O N A J E T T O M E X I C O. ■
:
12 — W H I L E C R A Z Y F R E D A N D H I S Z E B R A Z U L U ■
:
13 — C A U G H T T H E N E X T J E T F O R H O N O L U L U. ■
■

33

1 — j j j / j j / j / j

2 — x x x j x j x x j x

3 — z z z x z j x z j z

4 — x j z c e j o x d s z f i m j a r z h x

5 — j a b j o b j a m f o x b o x m i x

6 — j u g j a r z o o z i p z e r o

7 — j e r k j u m p j u s t f i z z f u z z

8 — e x p e c t e x t r a e x c i t e d l a z y

9 — d o z e n f r o z e n l i z a r d j u n g l e

10 — w h e n I h a v e n o j o b t o d o

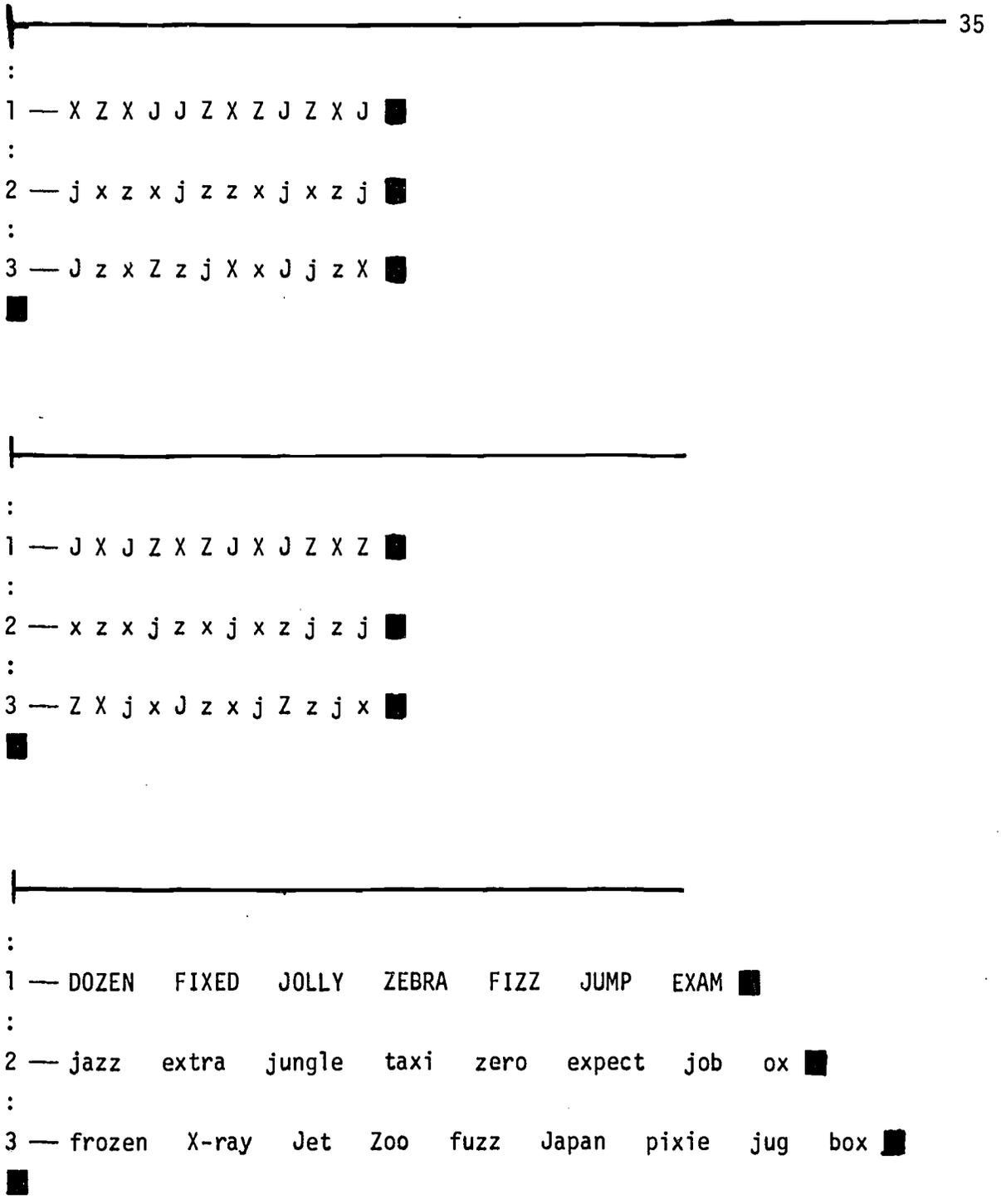
11 — y o u c a n f i n d m e a t t h e z o o,

12 — j u s t r a p p i n g w i t h m y f r i e n d t h e o x

13 — a n d e a t i n g p o p c o r n f r o m a b o x.

34

:
1 — J J J j j J j j J j J j ■
:
2 — X X x x X x X X x x X x ■
:
3 — Z Z Z z z Z z z Z Z z z ■
:
4 — Z x j X J z x Z j X Z z J x X J ■
:
5 — j x X j Z z x J z X Z j x J X z ■
:
6 — j o y J a r b o x O x j a m ■
:
7 — z e r o J o k e X - r a y j u m p ■
:
8 — Z e b r a m i x J a n e z o o ■
:
9 — b u z z E x t r a J a p a n d o z e n ■
:
10 — j u n g l e M e x i c o l i z a r d ■
: . . . . . .
11 — Last June Artie won a pizza as a prize on a quiz show. ■
:
12 — As an extra prize, he also got a box of jam and jelly, ■
:
13 — But that didn't exactly make him jump for joy. Any- ■
:
14 — way, he fixed it with Marge to go with him to the pizza parlor. ■
:
15 — His "prize" was a six-inch pizza, plain, with no junk on it. ■
:
16 — Marge wanted the jumbo-size with everything. ■
:
17 — She also ordered frozen dessert and a fizzy drink. ■
:
18 — So Artie's "free" pizza cost $4.75, plus tax. ■
■


35
1 — X Z X J J Z X Z J Z X J
2 — j x z x j z z x j x z j
3 — J z x Z z j X x J j z X
1 — J X J Z X Z J X J Z X Z
2 — x z x j z x j x z j z j
3 — Z X j x J z x j Z z j x
1 — DOZEN FIXED JOLLY ZEBRA FIZZ JUMP EXAM
2 — jazz extra jungle taxi zero expect job ox
3 — frozen X-ray Jet Zoo fuzz Japan pixie jug box

Artie has a hard horse to steer. He shouted, "Turn! Turn! Don't hit that tree!"

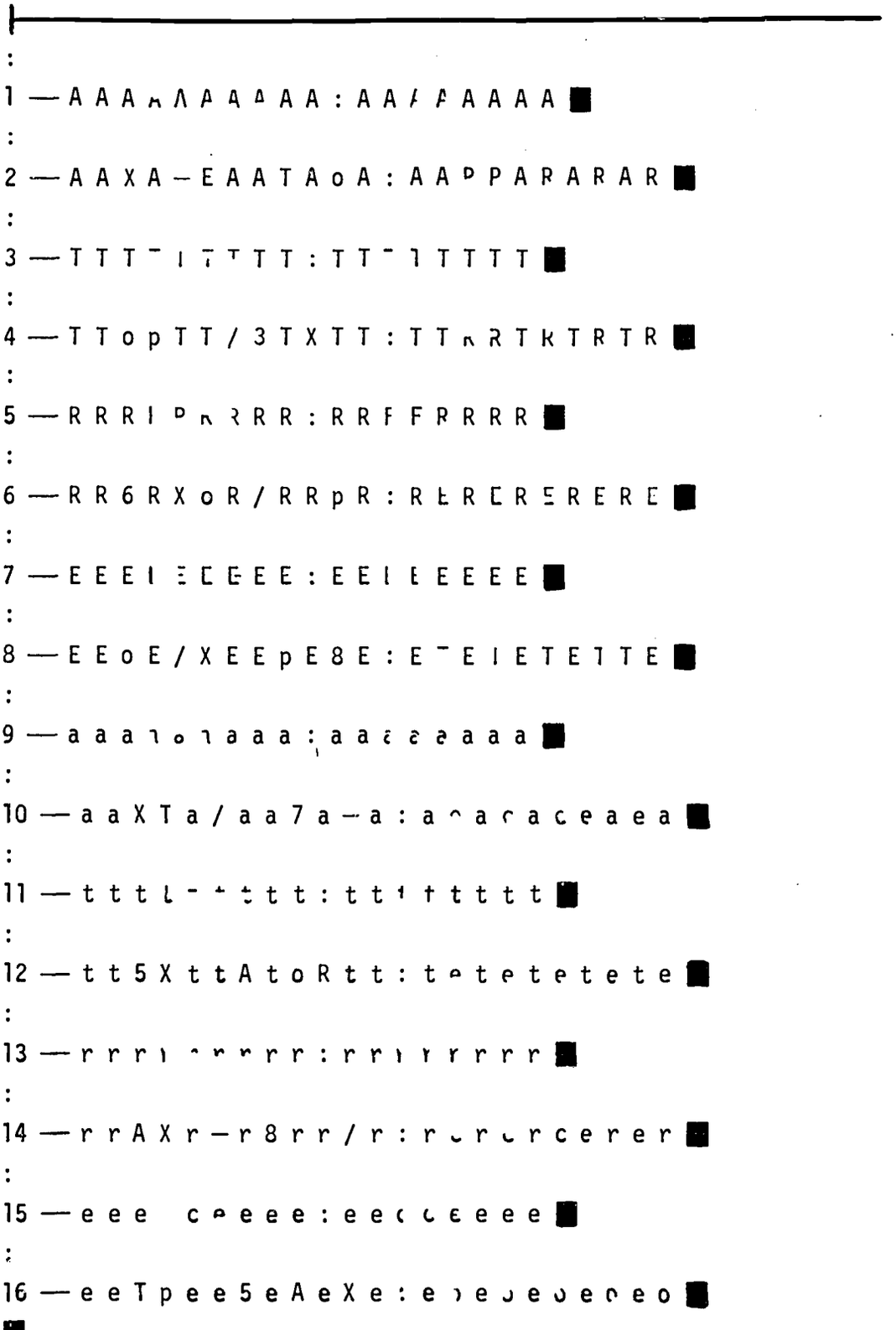
Rio didn't turn, he had his radio too loud and he didn't hear Artie. He didn't see the tree either.

Thud!

Artie tried to return Rio to the store. The store didn't need a dented horse.

1.	hid	6.	dirt	11.	dollar
2.	shirt	7.	did	12.	toad
3.	letter	8.	sad	13.	hid
4.	snail	9.	dad	14.	noon
5.	horse	10.	still	15.	no

	A	B	C	D	E
1.	27	0	631	4	38
2.	55	370	6	63	129
3.	714	89	43	5	11
4.	4	90	278	64	971



Here are some paragraphs to check your reading speed. They come from different kinds of reading material. Try to read each selection in five minutes. How fast can you read?

25 words from a newspaper horoscope:

Keep at whatever you are doing since you seem to be close to what you want to achieve. This is a day for fast action. STOP.

- -

50 words from a history textbook:

The earliest homes in New England were simple cottages with wooden sides. The roof was made of leaves and branches. There was a dirt floor. Holes were cut in the boards for windows and doors. The window spaces were covered with oiled paper. The furniture was made from split logs. STOP.

- -

100 words from Aesop's Fables:

A farmer was once driving a heavy load along a very muddy way. At last he came to a part of the road where the wheels sank halfway into the mud, and the more the horses pulled, the deeper the wheels sank. So the farmer threw down his whip, and knelt down and prayed to Hercules the Strong. "Oh Hercules, help me in my hour of need," the farmer said. But Hercules appeared to him, and said: "Tut, my good man, don't sprawl there. Get up and put your shoulder to the wheel. The gods help them that help themselves." STOP.

- -

200 words adapted from A Christmas Carol, by Charles Dickens:

After several turns around the room, Scrooge sat down again. As he threw his head back in the chair, his eyes happened to rest upon a bell that hung in the room. It was with great surprise and fear that he saw this bell begin to swing. It swung so softly at first that it made hardly a sound; but soon it rang out loudly, and so did every bell in the house. All at once the bells stopped. Then he heard a clanking noise, deep down below, as if somebody were dragging a heavy chain over the floor in the cellar. The cellar door flew open with a booming sound. Then he heard the noise much louder, on the floor below, then coming up the stairs, then coming straight toward his door. "It's humbug still!" said Scrooge. "I won't believe it." He grew pale when, without a pause, it came on through the heavy door and passed into the room before his eyes. As it came in, the flame in the fireplace leaped up. "What do you want with me?" Scrooge whispered. "Much," said the ghost. "Who are you?" asked Scrooge. "Ask me who I was," the ghost replied. STOP.

In this lesson you will learn letters printed in italic type face. Italic letters slant to the right. Italic letters are often used to show words that are more important, or to show that someone is being quoted. First you will read all the letters of the italic alphabet in capitals and then in small letters. Next you will read some common words. Last of all, there are some sentences written by famous people. At the very bottom of the page, the type of letters you first learned about are printed so that you can compare them with the italic letters.

A A A B B B C C C D D D E E E F F F G G G H H H I I I
J J J K K K L L L M M M N N N O O O P P P Q Q Q R R R
S S S T T T U U U V V V W W W X X X Y Y Y Z Z Z

a a a b b b c c c d d d e e e f f f g g g h h h i i i
j j j k k k l l l m m m n n n o o o p p p q q q r r r
s s s t t t u u u v v v w w w x x x y y y z z z

at is to On in if of Up by be as he or We my go
are His the You for Can put Ask but and Say box jar
here sits Loud from Come much knew with have Only zero
still under Might among would quiet Which found there about
Either inside letter During better square looked Always school
learned without Nothing however Because himself Through another

The only thing we have to fear is fear itself. (Franklin D. Roosevelt)

The world is a fine place and worth fighting for. (Ernest Hemingway)

If a man has a talent and cannot use it, he has failed. (Thomas Wolfe)

Those who bring sunshine to the lives of others cannot keep it from themselves. (James Matthew Barrie)

I would sooner read a time-table or a catalog than nothing at all. (W. Somerset Maugham)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

On this page and the next page are two poems written by Optacon students. Can you read them? After you do, read the instructions that come after the second poem.

How Soft Is Soft?
As soft as a caterpillar,
As soft as a hare,
Who runs so fast
To I don't know where.

How soft is soft?
As soft as a sponge,
As soft as some willows,
As soft as the softest
of Mommy's pillows.

How soft is soft?
As soft as a leaf,
As soft as a dove,
As soft and as nice
As your family's love.

(Go to the next page for the second poem.)

This lesson will help you learn how to find a book in the library. Every library has a card catalog with separate cards for every book that the library owns. There are usually three sections in the card catalog. In one, books are listed by the last name of the author, in alphabetical order. In another section books are listed by their titles, also in alphabetical order. In the third section, books are listed by their subject matter, in alphabetical order again. For example, if you want a book about the Civil War, you might find it in the subject catalog under "Civil War" or "U. S. History."

There is one catalog card in the folder at the back of your notebook. It has a hole in the bottom of the card. The author's name is at the top of this card. The book title is on the next line. The numbers telling where to find the books are printed in the upper left hand corner of the card. If you want help in finding a book tell the librarian the number and the letter just below the number.

Now, take the catalog card out and try to read the author's name and book title with your Optacon. Then ask your teacher for your next assignment.

APPENDIX B

EXCERPTS FROM OPTACON INSTRUCTIONAL MATERIALS
(TEACHER'S COPY)

TABLE OF CONTENTS

Teacher's Materials

Teacher's Materials (Con't.)

RESOURCE MATERIALS (SUPPLEMENTARY INSTRUCTIONAL UNITS)

Teacher's Materials (Con't.)

6 - Here is a horizontal line. A horizontal line is a line that runs from side to side. Tell me each time a horizontal line passes your finger.

7 - Some of the shapes you will feel now are single horizontal lines. Others are in pairs. Tell me which of the horizontal lines are in pairs.

8 - The shapes you will feel now are paired horizontal lines. One of the lines in each pair is shorter than the other one. Of each pair, which line is shorter, the top one or the bottom one?

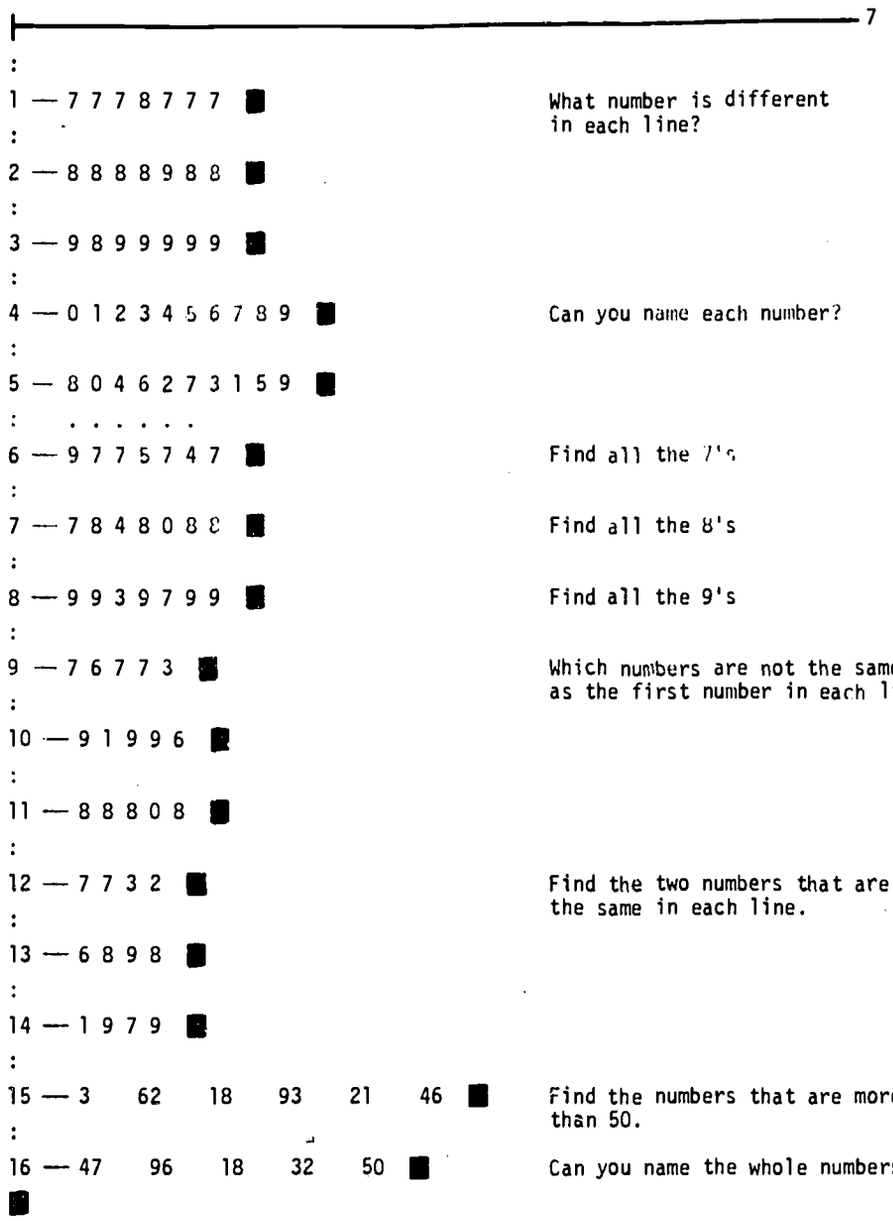
9 - Here is a row of boxes. Some of the boxes have a side missing. Tell me each time you find one that is missing a side. Which side is missing?

10 - Here is another row of boxes. Tell me each time you find one that is missing a top or a bottom. Which is missing, the top or the bottom?

11 - Here is part of the box you just felt. It is a vertical line with a horizontal line at the bottom. Some of the lines don't have a line attached at the bottom. Tell me which ones don't have a bottom line.

12 - Here is a vertical line with a horizontal line at the top. Tell me which ones are missing tops.

13 - Tell me which vertical lines have horizontal lines at the top and which ones have horizontal lines at the bottom.


7
1 — 7 7 7 8 7 7 7
What number is different in each line?
2 — 8 8 8 8 9 8 8
3 — 9 8 9 9 9 9 9
4 — 0 1 2 3 4 5 6 7 8 9
Can you name each number?
5 — 8 0 4 6 2 7 3 1 5 9
6 — 9 7 7 5 7 4 7
Find all the 7's
7 — 7 8 4 8 0 8 8
Find all the 8's
8 — 9 9 3 9 7 9 9
Find all the 9's
9 — 7 6 7 7 3
Which numbers are not the same as the first number in each line?
10 — 9 1 9 9 6
11 — 8 8 8 0 8
12 — 7 7 3 2
Find the two numbers that are the same in each line.
13 — 6 8 9 8
14 — 1 9 7 9
15 — 3 62 18 93 21 46
Find the numbers that are more than 50.
16 — 47 96 18 32 50
Can you name the whole numbers?

32

1 — J J J / J J / J / J

2 — X X X J X J X X J X

3 — Z Z Z X Z J X Z J Z

4 — X J Z C E J O X O S Z F I M J A R Z H X

5 — J A B J O B J A M F O X B O X M I X

6 — J U G J A R Z O O Z I P Z E R O

7 — J A C K J E A N J A N E F I Z Z F U Z Z

8 — E X P E C T E X T R A E X C I T E D J U M P

9 — D O Z E N F R O Z E N L I Z A R D J U N G L E

10 — J A N E, J O H N, J E A N, A N D J O E

11 — W E N T O N A J E T T O M E X I C O.

12 — W H I L E C R A Z Y F R E D A N D H I S Z E B R A Z U L U

13 — C A U G H T T H E N E X T J E T F O R H O N O L U L U.

Don't expect much from this next poem, except practice in J's, X's, and Z,s!

33

1 — j j j / j j / j / j

2 — x x x j x j x x j x

3 — z z z x z j x z j z

4 — x j z c e j o x d s z f i m j a r z h x

5 — j a b j o b j a m f o x b o x m i x

6 — j u g j a r z o o z i p z e r o

7 — j e r k j u m p j u s t f i z z f u z z

8 — e x p e c t e x t r a e x c i t e d l a z y

9 — d o z e n f r o z e n l i z a r d j u n g l e

10 — w h e n I h a v e n o j o b t o d o

11 — y o u c a n f\i n d m e a t t h e z o o,

12 — j u s t r a p p i n g w i t h m y f r i e n d t h e o x

13 — a n d e a t i n g p o p c o r n f r o m a b o x.

This poem is even sillier than the last one, but you do need practice in j's, x's, and z's.

|——————————————————————————— 34

:

1 — J J J j j J j j J j J j ■

:

2 — X X x x X x X X x x X x ■

:

3 — Z Z Z z z Z z z Z Z z z ■

:

4 — Z x j X J z x Z j X Z z J x X J ■

Name the capital letters.

:

5 — j x X j Z z x J z X Z j x J X z ■

Name the small letters.

:

6 — j o y   J a r   b o x   O x   j a m ■

Say the word and tell whether it's capitalized.

:

7 — z e r o   J o k e   X - r a y   j u m p ■

:

8 — Z e b r a   m i x   J a n e   z o o ■

:

9 — b u z z   E x t r a   J a p a n   d o z e n ■

:

10 — j u n g l e   M e x i c o   l i z a r d ■

: . . . . . .

11 — Last June Artie won a pizza as a prize on a quiz show. ■

In this story, Artie starts out to have a cheap date. As usual, something goes wrong.

(NOTE: The hyphen is introduced in this lesson--in compound words and in word division (line 13). The dollar sign is also used.)

:

12 — As an extra prize, he also got a box of jam and jelly, ■

:

13 — But that didn't exactly make him jump for joy. Any- ■

:

14 — way, he fixed it with Marge to go with him to the pizza parlor. ■

:

15 — His "prize" was a six-inch pizza, plain, with no junk on it. ■

:

16 — Marge wanted the jumbo-size with everything. ■

:

17 — She also ordered frozen dessert and a fizzy drink. ■

:

18 — So Artie's "free" pizza cost $4.75, plus tax. ■

■

35

1 — X Z X J J Z X Z J Z X J

2 — j x z x j z z x j x z j

3 — J z x Z z j X x J j z X

Name all the letters.

1 — J X J Z X Z J X J Z X Z

2 — x z x j z x j x z j z j

3 — Z X j x J z x j Z z j x

Name the letters that were previously missed.

1 — DOZEN FIXED JOLLY ZEBRA FIZZ JUMP EXAM

2 — jazz extra jungle taxi zero expect job ox

3 — frozen X-ray Jet Zoo fuzz Japan pixie jug box

Name the words.

Teacher Instructions Say:

Line 1 — The first exercise is a practice reading a story in usual paragraph form. Most books and magazines will be in this form, just as in braille. When you come to a line of print that is very short and is followed by a blank space you are probably at the end of a paragraph. Move the camera down to the next line of print and move back until you find the beginning of the line. There are no lines or numbers on this page to use as guides. The paragraphs are very short. Now read the story.

2 — The second exercise is a practice with lists that are in columns. There are three vertical columns of numbers with a word after each number. Read each number and the word that follows it. When you come to the end of the first column return to number 1. If you move the camera straight across to the right you will find the beginning of the second column. What words are after number 3, 8, and 14?

3 — The third exercise is a practice reading a table. This table has four numbered horizontal rows. It also has five lettered vertical columns. If you look at row 1, column A you will find the first thing in the table. What is it? Now tell what you find in row 2, column E; row 3, column D; and row 4, column C.

4 — The fourth exercise is a practice in reading a diagram. In this section there are four clocks which represent the times in four different cities. Suppose it were 4 p.m. in New York, as shown by the first clock. What time would it be in the other three cities and what are the cities?

5 — The last exercise is a short poem in which the lines are not lined up evenly. Read the poem.

Teacher Instructions

Materials: Tracking aid, raised letters

Orientation:

1. Explain the purpose of the lesson and describe the materials to be used.
2. Show the student the raised letters.
3. Describe the format of the odd and even lines of the lesson and assist the student to view both lines.

Format of the Lesson

In lesson 2, which covers the 26 letters, the same format has been used on each page.

- The materials follow the same sequence of presentation used in the basic units. For example, the first letters dealt with in remediation are A,T,R,E, followed by I,H,O,S. Within a set of letters capitals are presented first, and then the small letters. Each page contains one of the groups of characters presented in a basic unit of instruction.
- Only letters and characters to which the student has previously been exposed appear on a given page of remediation. Thus, a child who is having difficulty with the initial letters of Basic Unit 3 will not encounter P's, Z's, J's, etc.
- Each page of the lessons follows a consistent format in which the odd numbered lines deal with the recognition of the letter in question. The even numbered lines deal with the discrimination of that letter from others. It should be noted that the same marginal guides to tracking are presented here as they are in the initial basic units.

Here are some paragraphs to check your reading speed. They come from different kinds of reading material. Try to read each selection in five minutes. How fast can you read?

25 words from a newspaper horoscope:

Keep at whatever you are doing since you seem to be close to what you want to achieve. This is a day for fast action. STOP.

- -

50 words from a history textbook:

The earliest homes in New England were simple cottages with wooden sides. The roof was made of leaves and branches. There was a dirt floor. Holes were cut in the boards for windows and doors. The window spaces were covered with oiled paper. The furniture was made from split logs. STOP.

- -

100 words from Aesop's Fables:

A farmer was once driving a heavy load along a very muddy way. At last he came to a part of the road where the wheels sank halfway into the mud, and the more the horses pulled, the deeper the wheels sank. So the farmer threw down his whip, and knelt down and prayed to Hercules the Strong. "Oh Hercules, help me in my hour of need," the farmer said. But Hercules appeared to him, and said: "Tut, my good man, don't sprawl there. Get up and put your shoulder to the wheel. The gods help them that help themselves." STOP.

- -

200 words adapted from A Christmas Carol, by Charles Dickens:

After several turns around the room, Scrooge sat down again. As he threw his head back in the chair, his eyes happened to rest upon a bell that hung in the room. It was with great surprise and fear that he saw this bell begin to swing. It swung so softly at first that it made hardly a sound; but soon it rang out loudly, and so did every bell in the house. All at once the bells stopped. Then he heard a clanking noise, deep down below, as if somebody were dragging a heavy chain over the floor in the cellar. The cellar door flew open with a booming sound. Then he heard the noise much louder, on the floor below, then coming up the stairs, then coming straight toward his door. "It's humbug still!" said Scrooge. "I won't believe it." He grew pale when, without a pause, it came on through the heavy door and passed into the room before his eyes. As it came in, the flame in the fireplace leaped up. "What do you want with me?" Scrooge whispered. "Much," said the ghost. "Who are you?" asked Scrooge. "Ask me who I was," the ghost replied. STOP.

Teacher Instructions

The passages shown provide the student with a self check on reading speed. Introduce these to the student as a challenge he can try over and over.

Explain to him that if he reads at 5 words a minute he'll reach STOP on the newspaper horoscope in just 5 minutes.

Tell him that if he reads at 10 words a minute he will reach STOP on the history textbook selection in 5 minutes.

Similarly, by reading at 20 words a minute he will reach STOP in Aesop's Fables in 5 minutes.

Lastly, by reading at 40 words a minute he will reach STOP in the adaptation from A Christmas Carol in 5 minutes.

In this lesson you will learn letters printed in italic type face. Italic letters slant to the right. Italic letters are often used to show words that are more important, or to show that someone is being quoted. First you will read all the letters of the italic alphabet in capitals and then in small letters. Next you will read some common words. Last of all, there are some sentences written by famous people. At the very bottom of the page, the type of letters you first learned about are printed so that you can compare them with the italic letters.

A A A B B B C C C D D D E E E F F F G G G H H H I I I
J J J K K K L L L M M M N N N O O O P P P Q Q Q R R R
S S S T T T U U U V V V W W W X X X Y Y Y Z Z Z

a a a b b b c c c d d d e e e f f f g g g h h h i i i
j j j k k k l l l m m m n n n o o o p p p q q q r r r
s s s t t t u u u v v v w w w x x x y y y z z z

at is to On in if of Up by be as he or We my go
are His the You for Can put Ask but and Say box jar
here sits Loud from Come much knew with have Only zero
still under Might among would quiet Which found there about
Either inside letter During better square looked Always school
learned without Nothing however Because himself Through another

The only thing we have to fear is fear itself. (Franklin D. Roosevelt)

The world is a fine place and worth fighting for. (Ernest Hemingway)

If a man has a talent and cannot use it, he has failed. (Thomas Wolfe)

Those who bring sunshine to the lives of others cannot keep it from themselves. (James Matthew Barrie)

I would sooner read a time-table or a catalog than nothing at all. (W. Somerset Maugham)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

Lesson 2 is designed the same way as Lesson 1, except that Italic type face is used.

There are even sharper differences between Italic and Letter Gothic type faces than was true for the Delegate (compare i's and l's for example). Nevertheless, the teacher should introduce the Italics style as being "similar" to the other type faces except that it is slanted. Encourage the student to use context in deciding what a letter is. Of course, if he has a particular character recognition problem, you will need to provide prompting on the essential features of the letter.

Teacher Instructions

Show the student how to operate the on/off switch. Put the student's finger on the red battery check button on the back of the Optacon. Tell him that the Optacon should not be plugged in while checking the batteries. With the Optacon turned on have him turn the camera on its side so that the vibrators are buzzing. Have him press the battery check button. Explain that the pitch of the buzzing rises if the battery is well charged (see pages 18-19 of the Optacon Instruction Manual). He should keep the battery charged up. Plug the Optacon into the wall at night whenever possible. You cannot over-charge the battery. If the batteries are worn down to a point where the Optacon will not operate, the batteries must be recharged before the Optacon can be used. It will not run just by being plugged into the wall.

Line 1 — Show the student the intensity control and make sure he is aware of the raised dot on the front. Have him position the camera on the small "o" on line 1. Have the student turn the intensity knob to the right clockwise, turning up the intensity. Then, have him turn it all the way down until he feels no vibration at all. Have him find an intensity setting which is comfortable for him. Make sure that he notes the position of the raised dot.

Show the student the zoom adjustment on the camera. Explain that if he slides the knob up, away from himself, the image that he is feeling will get larger. With the camera on the small "o" have him push the knob all the way to the top of the camera.

Next, show him the control that adjusts for thickness of the image (threshold). Since he has made the "o" larger he should turn the control to the left, counterclockwise, to put the image in proportion by reducing the width (see pages 12-13 of the Optacon Instruction Manual). Now have him reduce the size of the image and increase the width. Explain that this threshold adjustment will also have to be adjusted in order to read type that is printed on colored paper. Encourage the student to practice using these controls. They will be very important to him as he begins to read materials in different type faces.

Teacher Instructions

The Approach

This approach has been used in different forms since the early 1900's for both remedial and enrichment reading with a variety of students. It is designed to make both the content and language of reading lessons become relevant to the student's own experience. A variety of techniques may be used; however, the basic strategy is that the students dictate their own stories, poems, or articles. These are transcribed and returned to the student to become the reading lesson. Alternatively, students can read stories they have typed themselves.

Rationale

This approach can overcome a major objection to typical reading lessons, particularly reading lessons for the beginner, i.e. that the material is often irrelevant and boring to the student. By using his own language and selecting his own content, the student can create lessons that are meaningful to him. The concepts and the vocabulary are self-selected from the student's own oral repertoire and working language pattern.

The personally dictated selection also allows the learner to concentrate on reading. The distraction of unfamiliar syntax, words whose meanings are obscure to the student, etc. are minimized.

To the blind student whose sensory experience differs from that of sighted readers, the personalized approach offers unique advantages in developing individualized learning materials and in helping the student to discover his potential.

When to Use the Unit

Students need some proficiency in the basic units before they can usefully read their own materials. As a general rule, the personalized language unit is designed for use after students complete Unit 9.

Lesson 1 - Reading New Materials (Page G-1 and G-2)

This unit is designed to give the student some familiarity with the kinds of materials he will encounter in his reading outside of the classroom. In selecting these materials the major criterion has been their utility for the independent reader. No concessions have been made for the handicapped student through editing or rewriting, since this unit is intended to be a slice of the real world. Some of the lessons will be more difficult than others, and you should offer assistance when needed.

In Lesson 1 some guidelines or principles about printing formats have been given to prepare the student for the following lessons. In the other lessons he is given instructions.

Lesson 2 - Tape Recorder Guarantee (Page G-3)

This lesson may include words the student needs help with, such as "defective," "guarantee," or "negligence," and he may not realize that Channel Master is the company name. The decoration around the print will also be a new experience for him which may require explanation.

Lesson 3 - Using a Card Catalog (Page G-4)

If the cataloging system in your school library or the public library is different than the example, this should be explained to the student. If possible, a trip to the library so that the student can examine the card file might be worthwhile.

Lesson 4 - Reading a Pamphlet (Page G-5)

The student may be puzzled by the way in which this pamphlet is folded. Be sure the pamphlet is in the right position for reading.

APPENDIX C

NUMBER OF PARTICIPANTS

Regular cases (main study)	71	
Special cases (case studies)	10	
Total cases reported		81
Regular cases, late participation and insufficient study time	8	
Dropouts, extended absence*	9	
Cases not included		17
Initial N		98

*Initial data were obtained on two students who entered the study late in the semester as replacements for two of those who dropped out.

APPENDIX D

BACKGROUND INFORMATION ON MAIN STUDY STUDENTS

Grade Equivalent:		4	5	6	7	8	9	10	11	12
	N	5	7	6	9	9	7	12	14	2
	%	7.0	9.9	8.5	12.7	12.7	9.9	16.9	19.7	2.8

Age:		9	10	11	12	13	14	15	16	17	18	19
	N	2	7	4	3	7	9	9	7	14	7	2
	%	2.8	9.9	5.6	4.2	9.9	12.7	12.7	9.9	19.7	9.9	2.8

Sex:	Male		Female
N	37	N	34
%	52.1	%	47.9

Number of Years Sighted:	0	1	2	3	4	5	6	7	8	9	10	11	12
N	57	2	0	1	1	0	1	2	1	1	3	1	1
%	80.3	2.8	0	1.4	1.4	0	1.4	2.8	1.4	1.4	4.2	1.4	1.4

Prior Experience with Print:	Yes		No
N	26	N	44
%	37.1	%	62.9

Typing Experience:	Yes		No
N	58	N	11
%	84.1	%	15.9

Additional Handicap:	No handicap	Handicap Would Not Affect Performance	Handicap Might Affect Performance*
N	63	4	1
%	92.6	5.9	1.5

*Cerebral palsy determined subsequently not to be a problem affecting performance.

APPENDIX D (Continued)

Student/Teacher Ratio:	1 to 1	3 to 1
N	36	35
%	50.7	49.3

Student Teacher Involved:	Yes	No
N	20	51
%	28.2	71.8

Program Type:	Residential, Itinerant	Public, Itinerant	Public, Resource Room
N	33	8	30
%	46.5	11.3	42.3

	ATTAINED SCORES					
	N	Minimum	Maximum	Median	Mean	Std Dev.
IQ Score:	62	85.0	158.0	109.5	109.7	15.0
Diagnostic Spelling (Correct English)	71	0.0	30.0	27.2	25.1	6.0
Tactile Test A (Which One is Different?)	71	4.0	12.0	11.2	10.7	1.7
Tactile Test B (Which Two are the Same?)	71	5.0	13.0	10.5	10.1	2.3
Tactile Test (Total Correct)	71	10.0	25.0	21.7	20.9	3.7
Braille Reading, Part 1 WPM	69	10.0	118.0	77.0	70.1	30.3
Braille Reading, Part 2 WPM	69	6.0	134.0	61.5	64.3	33.7

APPENDIX D (Continued)

	ATTAINED SCORES					
	N	Minimum	Maximum	Median	Mean	Std.Dev.
Braille Reading, Part 1 Total Correct (Accuracy)	71	1.0	8.0	5.6	5.5	1.8
Braille Reading, Part 2 Total Correct (Accuracy)	69	1.0	8.0	5.1	5.0	1.5

APPENDIX E

SPECIMEN DATA COLLECTION INSTRUMENTS AND SCALING OF THE MEASURES

WOULD YOU?

Attitude Toward Learning and Self Concept

Teacher Copy
(Student folder contains braille version)

Student _____

Date _____

School _____

WOULD YOU?

Directions: See how well you can describe yourself.
Mark the box that tells how you feel about yourself.
Here is a sample:

How often do you have a dollar in your pocket?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost Always

If you think you have a dollar in your pocket about half the time, put a mark in the [] before "about half the time."

Remember, none of the questions have right or wrong answers. They are just ways to describe yourself. Raise your hand if you have any questions.

---

1. How often do you feel free to say what you really think?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

2. How often do you try to make things turn out the way you want?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

3. How often are you a leader when friends are around?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

4. How often do you feel left out of things because of your blindness?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

5. How often do you think that good grades are important to you?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

6. How often do you think the teacher likes to teach you?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

7. How often do you feel smart enough to solve hard problems?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

Would You?

8. How often do you learn from your mistakes and try not to do them again?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

9. How often, when you are home, do you and your parents talk about your school work?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

10. How often do you read books or magazines, other than for school work?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

11. How often do you feel like coming to school in the morning?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

12. How often do you make up your own mind instead of listening to other kids?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

13. How often do you stick to a hard job until you finish it?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

14. How often do you feel happy to be who you are?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

15. How often do you work hard even if the reward or payoff isn't soon?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

16. How often do you like to decide things for yourself?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

Instrument: Optacon Questionnaire

When Used: March/April
Again : May/June

Mode of Administration: Teacher tests all children in a group session

Materials Required:

1. Brailled Optacon Questionnaire for each child.
2. Pencil for each child.

Directions:

1. Read general directions for administering tests.
2. Write student name, date and school on each test sheet.
3. Distribute test sheets and pencils to students.
4. Begin testing.
5. When completed, give materials to local project coordinator to mail to AIR.

OPTACON QUESTIONNAIRE

Teacher Copy
(Student folder contains braille version)

Student _____

Date _____

School _____

OPTACON QUESTIONNAIRE

The following questions are about your opinions of the Optacon. Express your own feelings. There are no right or wrong answers.

Below you will find some statements about the Optacon. Under each statement are some boxes. Mark the box that tells how you feel about that statement. Remember, there are no right or wrong answers. Just describe how you feel. Raise your hand if you have any questions.

1. I enjoy reading with the Optacon.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

2. I use the Optacon to read my school work.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

3. I would use the Optacon next year to read my school work.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

4. I use the Optacon to read for pleasure.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

5. I would use the Optacon next year to read for pleasure.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

6. I would use the Optacon after I graduate from school.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

7. I use the Optacon outside of school for other things, such as finding phone numbers and reading labels.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

8. I would use the Optacon next year outside of school for other things, such as finding phone numbers and reading labels.

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

9. Learning to track with the Optacon is:

[] Very hard [] Hard [] Easy [] Very Easy

10. Learning to read different kinds of print with the Optacon is:

[] Very hard [] Hard [] Easy [] Very Easy

11. Adjusting the Optacon for different kinds of print is:

[] Very hard [] Hard [] Easy [] Very Easy

12. At what grade level should children learn to read with the Optacon?

[] Grade 1 to 3 [] 4 to 6 [] 7 to 8 [] 9 to 12 [] College [] Never

NOTE: The following questions are about the reading lessons you have been using.

13. Were the lessons interesting?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost Always

14. The length of each lesson was:

[] Too long [] About right [] Too short

15. Were the raised letters useful?

[] Very useful [] Some use [] Not much use [] No use

16. Did you enjoy the stories and games in the lessons?

[] Almost never [] Not very often [] About half the time [] Most of the time [] Almost always

Suppose that you had some new lessons to learn at school and you could learn them by any of these ways: Braille, tape, Optacon, readers, talking book.

17. Which way would be your first choice?

[] Braille [] Tape [] Optacon [] Readers [] Talking Book

18. Which way would be your second choice?

[] Braille [] Tape [] Optacon [] Readers [] Talking Book

19. Which way would be your third choice?

[] Braille [] Tape [] Optacon [] Readers [] Talking Book

20. Which way would be your fourth choice?

[] Braille [] Tape [] Optacon [] Readers [] Talking Book

Instrument: Tactile-Kinesthetic Form Discrimination Test

When Used: January

Mode of Administration: Teacher tests each child individually. There is a set of the raised forms to be used for this test at your school. See your Optacon coordinator to obtain them. Sorry, but we could not complete enough of these 3-dimensional forms for each folder.

Materials Required:

1. Five thermoform sheets with five rows of geometric figures on each sheet.
2. Sheet containing directions and place to record student's name and responses.
3. Pencil for the teacher.

Directions:

1. Read general directions for administering tests.
2. Write student name, date and school on the test sheet.
3. Provide the student with the first thermoform sheet and begin administration.
4. Child is to touch forms with left hand only, using the index finger, for this test.
5. Try to put the child at ease. Do not give any negative comment. Do not tell the child he is wrong.
6. Do not give prompts or helps.
7. Record each response as right (C) or wrong (X). Count first choice only. However, child may go back and forth over a row before making a choice.
8. When completed, give materials to local project coordinator to mail to AIR.

TACTILE-KINESTHETIC FORM DISCRIMINATION TEST

Name ______________________________

Date ______________________________

School ______________________________

The following sheets, marked 1-5, contain facsimiles of the test figures. The actual figures for administration to blind students are embossed on 3-dimensional plastic sheets.

Instructions for Administration

Sheets 1 & 2

Give the child embossed sheet number one.

Say: There are some forms. Put your fingers on the top row. (Assist the child to locate row if necessary.)

Find the form that is different from the others. Show me the different one.

Then repeat instructions for each row on sheets 1 and 2 and for the top two rows of sheet 3.

Sheets 3, 4, & 5

Beginning on row 3 of sheet 3,

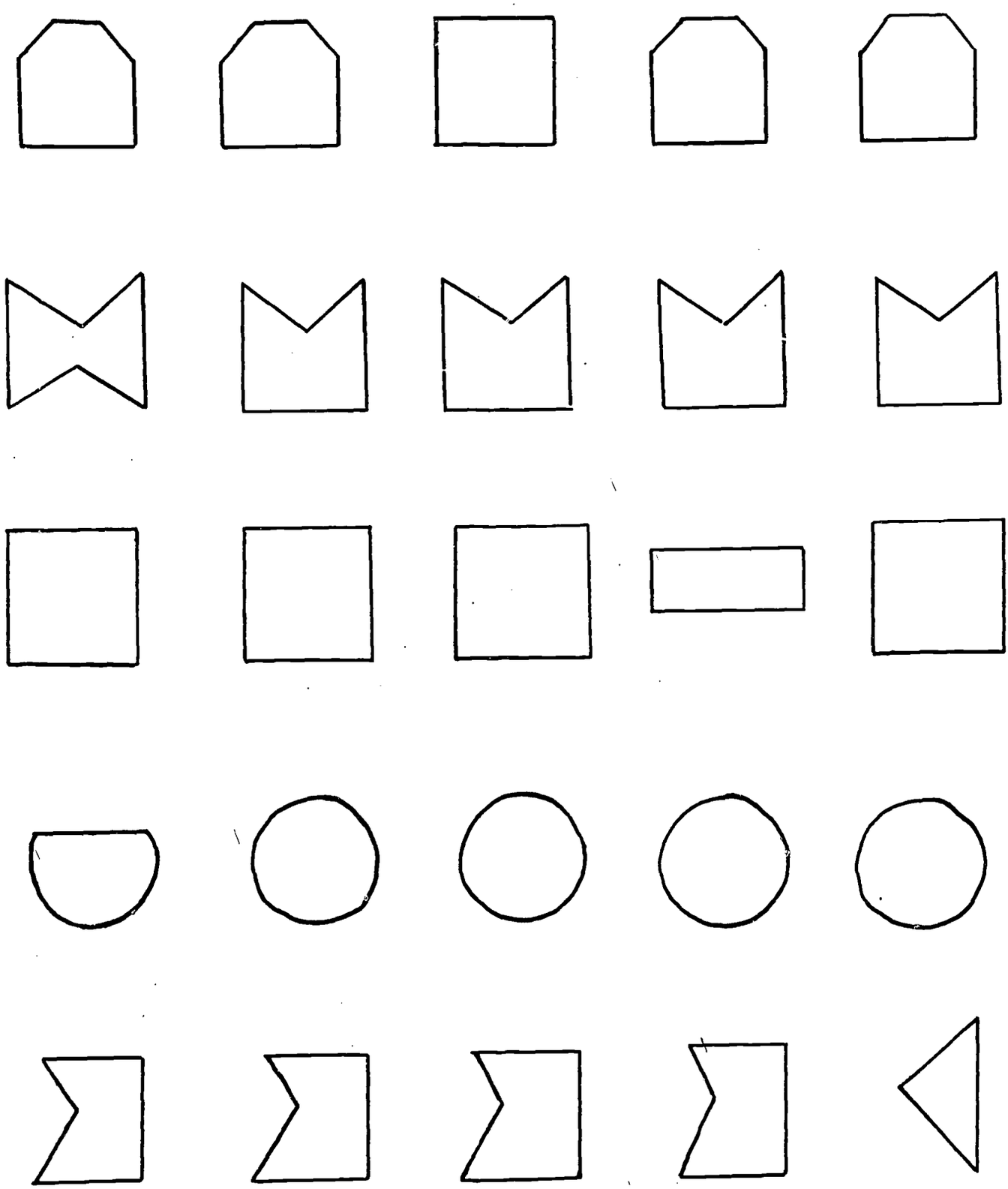
Say: Here are some more forms. This time find the two that are the same in each row.

Put your fingers on the top row (assist if necessary). Now find the two forms that are the same. Show them to me.

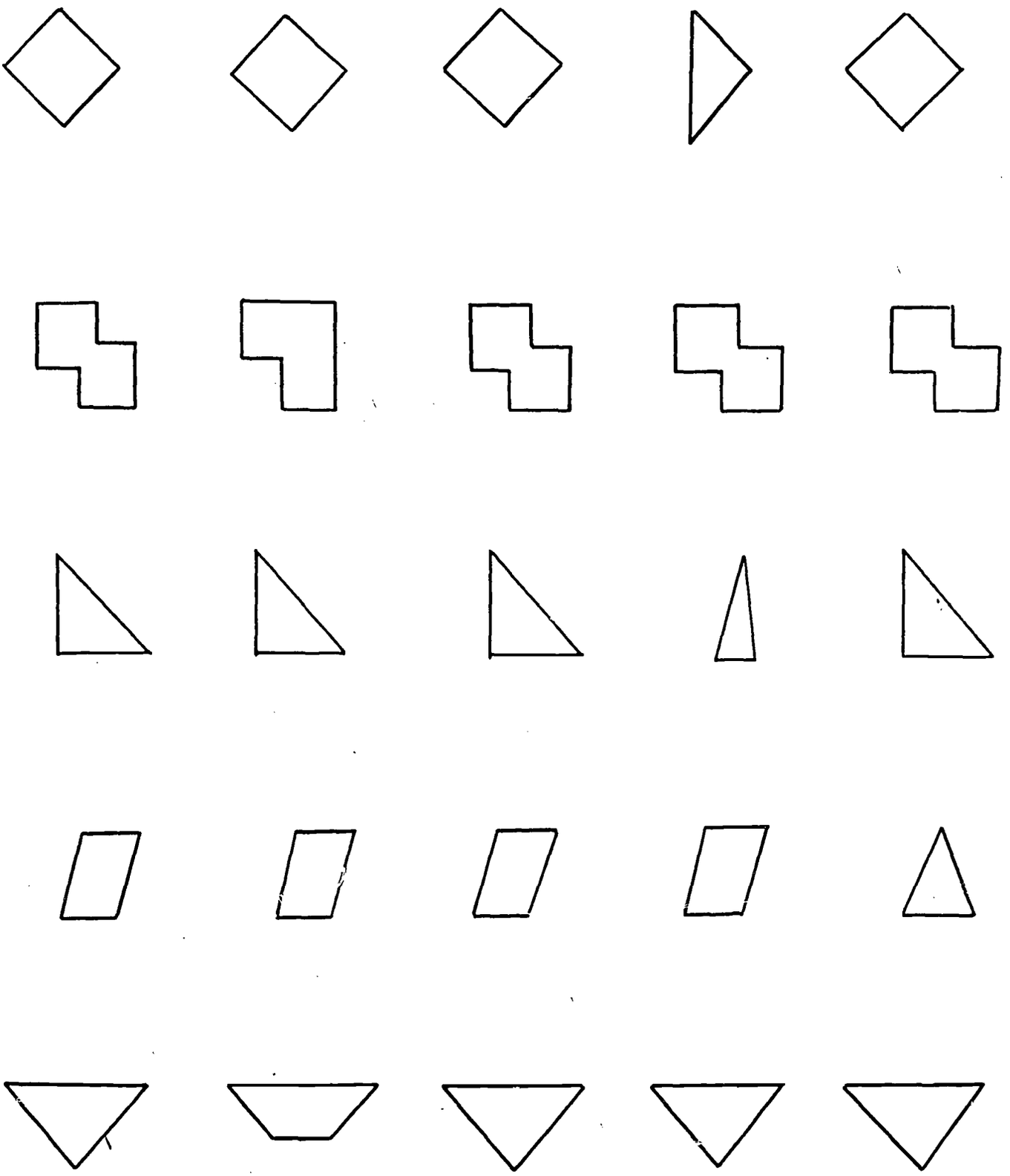
Mark a "C" if correct and an "X" if the student's answer is wrong:

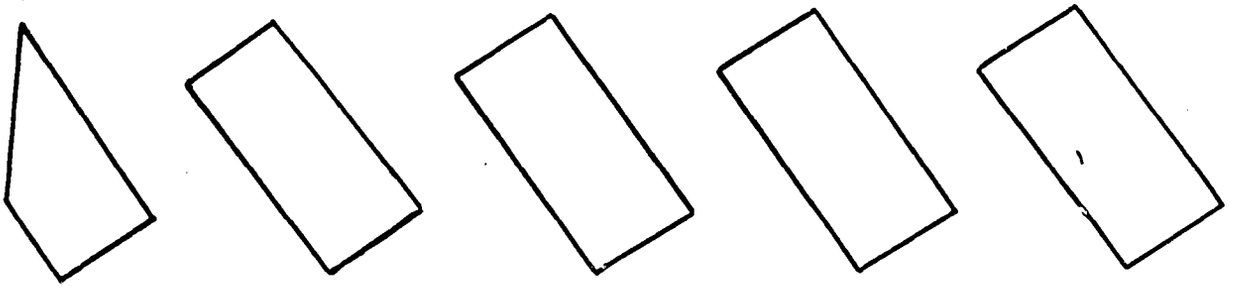
	Sheet 1	Sheet 2	Sheet 3	Sheet 4	Sheet 5
Row 1	[]	[]	[]	[]	[]
Row 2	[]	[]	[]	[]	[]
Row 3	[]	[]	[]	[]	[]
Row 4	[]	[]	[]	[]	[]
Row 5	[]	[]	[]	[]	[]

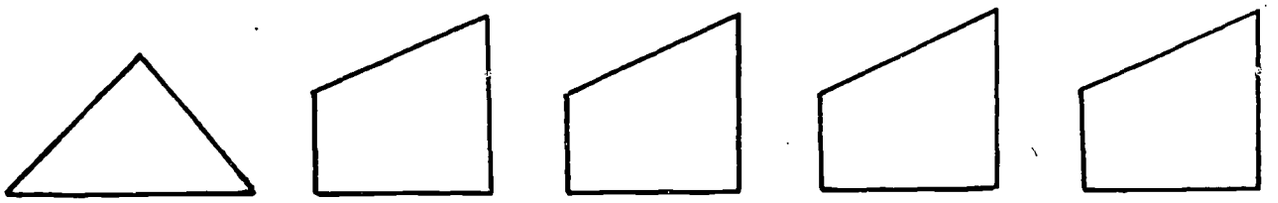
FACSIMILE SET (Use raised version for testing)

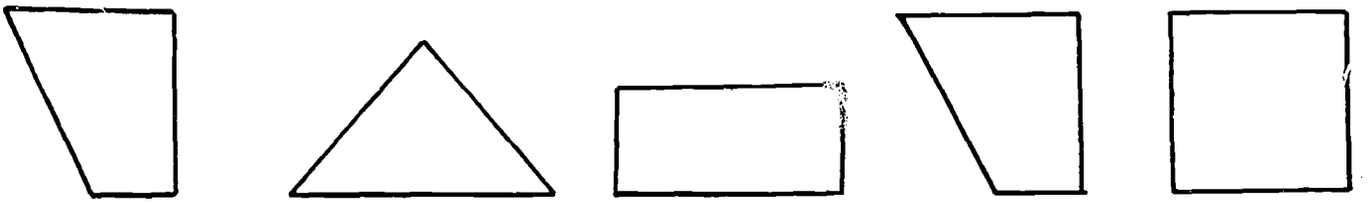


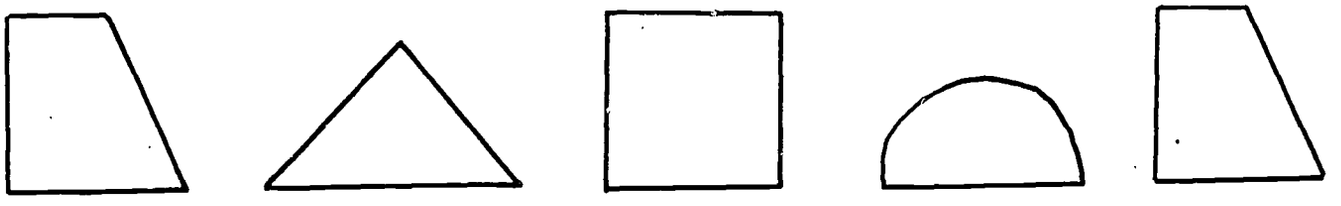
(2)

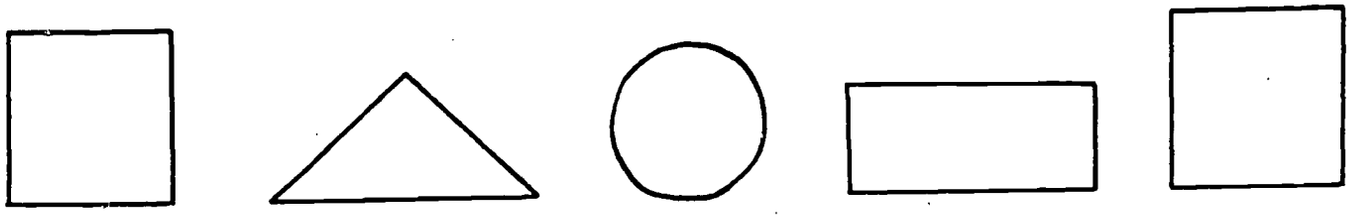


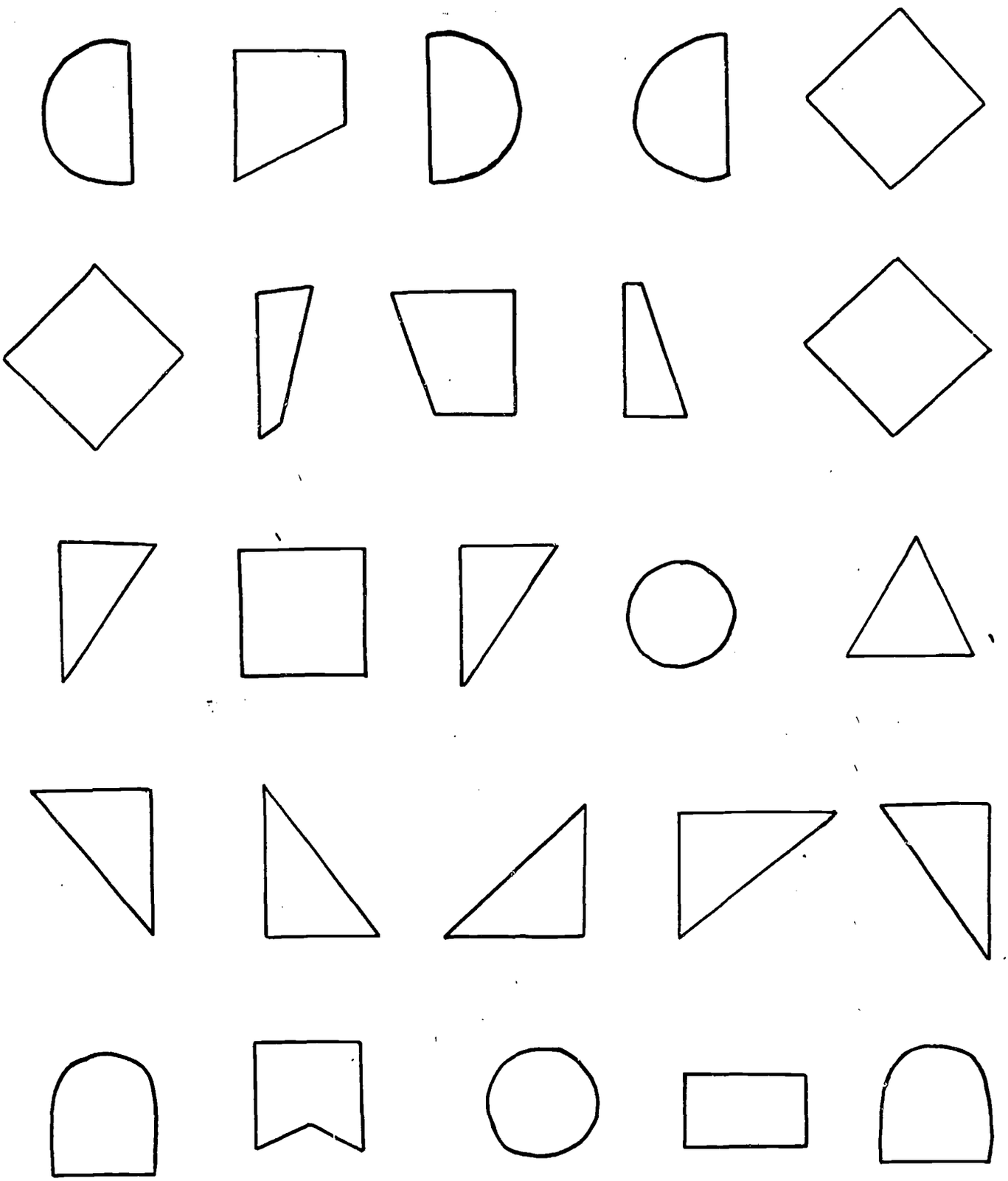


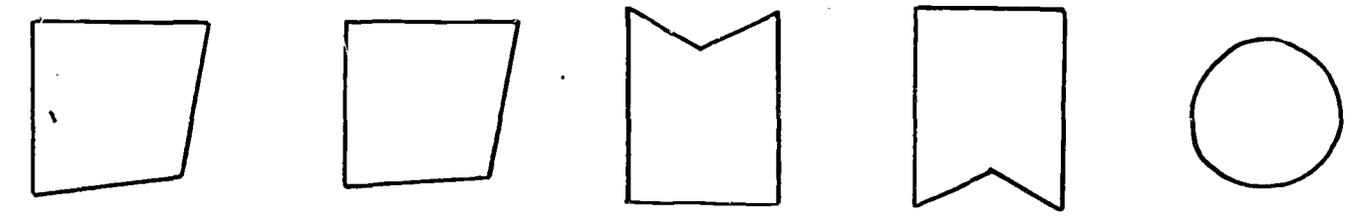


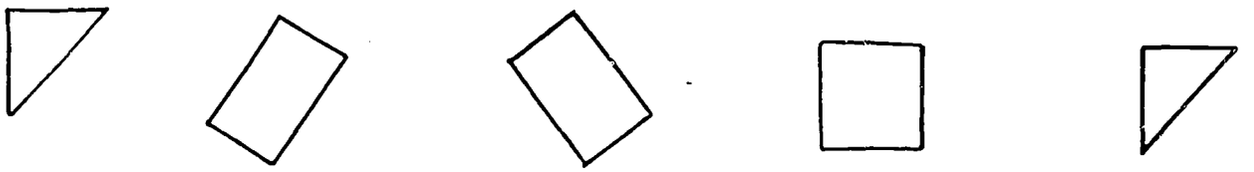


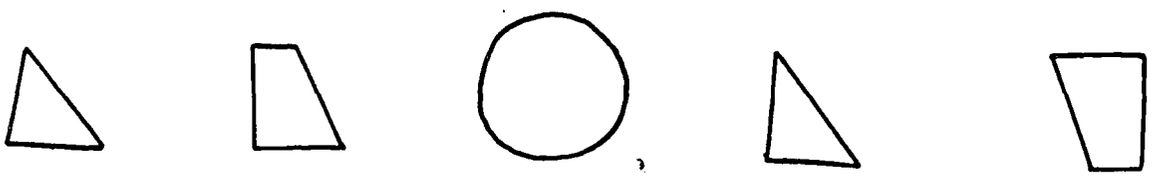












BRAILLE READING COMPREHENSION

TEACHER INSTRUCTIONS

Each student should receive the Reading Comprehension Test appropriate for his or her grade level. The student's name and other identifying information should be filled in by the teacher. Make sure that each student has a sharpened pencil.

Say: This test will show how well you understand what you read.

Say: You are to read the story and do the items following it. Be sure you choose the best answer for each item. Make a mark in the space next to the letter of the answer you choose. Are there any questions?

Say: Now do the Sample Item.

After students have had time to complete the Sample Item, check to be sure that all students know how they are to mark their answers.

Say: When I say "BEGIN," start reading. At the end of two minutes I will say "MARK." You are to circle the last word you have read and then continue reading and answer the items.

Say: Do you have any questions?

Say: All right, BEGIN.

Note the time and after two minutes say: MARK. Circle the last word you have read. Then continue. When you have completed Question #8, stop and wait for further directions.

When everyone has completed Part 1, go on to Part 2.

Say: This is the second part of the test. When I say "BEGIN," start reading. At the end of two minutes I will say "MARK." You are to circle the last word you have read and then continue reading and answer the items.

Say: Are there any questions:

Say: All right, BEGIN.

Note the time and after two minutes say: MARK. Circle the last word you have read. Then continue.

When everyone has completed Part 2, collect the tests.

BRAILLE READING COMPREHENSION

Elementary Level

Grades 4, 5, 6, 7, 8

Teacher Copy
(Student folder contains braille version)

Student _____

Date _____

School _____

Braille Reading Comprehension

SAMPLE ITEM: Read the sample item below and mark the answer.

Be sure you mark

( ) A all the answers
( ) B a good answer
( ) C many answers
( ) D the best answer

Part 1

A king had a daughter named Shining Moon. She was so tall and strong that she was almost a giant. She could wrestle with any young man in the kingdom and win. Her father wanted her to marry. But she said she would only marry a man who could wrestle better than she. Her father then gave her a written promise that she could marry of her own free will. This was proclaimed all over the kingdom. Men came from everywhere. The first man who could defeat her could have her as his wife. Any who lost must forfeit to her a hundred horses. Before long she had more than ten thousand horses.

At last, as in all such legends, there came a young and handsome prince, son of a powerful king. He brought with him a thousand beautiful horses. The king very much wanted this rich youth as his son-in-law. He privately asked his daughter to let herself be beaten this time. She said she would not do so for anything in the world.

In the great hall the audience gathered, the king and the queen sitting above them. In the rules of the contest it was decided that because the young prince was of such high rank, he should forfeit all his horses if he were beaten. Everyone in the hall wanted the prince to win. But Shining Moon won again!

1. From the story, we can decide that Shining Moon

( ) A did not marry the prince
( ) B wrestled the prince again
( ) C married another man later
( ) D never wrestled again

2. In most of her wrestling matches, the man Shining Moon defeated had to give her

( ) A 10 horses
( ) B 100 horses
( ) C 500 horses
( ) D 1,000 horses

3. Shining Moon defeated

( ) A fewer than 10 men
( ) B no more than 50 men
( ) C as many as 100 men
( ) D no less than 150 men

4. How many horses did Shining Moon win from the prince?

( ) A 10
( ) B 100
( ) C 1,000
( ) D None

(continued on next page)

5. The best title for this story would be

( ) A The Land of Strong Women
( ) B Shining Moon
( ) C Strange Ways of Courting
( ) D Wrestling

6. The prince can be described as

( ) A popular
( ) B merry
( ) C old-fashioned
( ) D poor

7. Shining Moon can be described as

( ) A ugly
( ) B humble
( ) C practical
( ) D powerful

8. A conclusion about the end of the story would be that it

( ) A has a happy ending
( ) B ends the way we expect
( ) C has a surprise ending
( ) D suggests the prince wins

STOP

Part 2

Our first consideration has been safety. The Orion is made only in a 2-door sedan. You don't have to worry about setting automatic back door locks that come on 4-door cars--your children can't fall out of an Orion!

Both front and back seats are furnished with shoulder-type safety straps at no extra cost. The dashboard is deeply padded with foam rubber and all the instruments on the front panel are recessed. The steering wheel gives six inches under a moderate impact. There is even a safety light which flashes when you reach 60 miles an hour, and a gentle bell rings when you pass 72.

Our second consideration has been to provide you with an economical but not a cheap car. The interior finishes are durable and washable. There is a minimum of extra trim and all of it is either aluminum or stainless steel. These are easier to maintain than chrome. All cars come with the same 160 horsepower, straight 6 motor. This gives adequate pick-up for safe passing and is cheaper to maintain than a V-8.

Optional extras? Most of them are standard. But you can purchase a radio or automatic transmission (only slightly less economical on gas than manual) if you wish.

9. An optional extra would be

( ) A turn signals
( ) B windshield wipers
( ) C automatic transmission
( ) D manual transmission

10. From the things claimed for this car, we can say that it is

( ) A a sturdy car for thrifty buyers
( ) B a cheap car which will not stand up
( ) C a costly car, since it includes so many extras
( ) D about the cheapest car in America

11. The manufacturer claims that the upkeep is less expensive on a car with

( ) A front-wheel drive
( ) B turbo-jet engine
( ) C a V-8 motor
( ) D a straight 6 engine

12. The car comes equipped with

( ) A chrome
( ) B a radio
( ) C recessed instruments
( ) D a large V-8 engine

13. This ad implies that the seat covers on the Orion are

( ) A washable
( ) B beautiful
( ) C temporary
( ) D removable

14. The expression "adequate pick-up" means sufficient

( ) A weight of the car
( ) B load capacity
( ) C color and appearance
( ) D increase in speed

15. Although many claims are made for the Orion, the only evidence given is about

( ) A comfort
( ) B safety features
( ) C exact price
( ) D performance

16. A good title for this ad would be

( ) A Orion--America's 4-Door Car!
( ) B Information About Fastbacks!
( ) C Orion--The Car for the Young Family
( ) D The Supersonic Speedster!

STOP

BRAILLE READING COMPREHENSION

Secondary Level

Grades 9, 10, 11, 12

Teacher Copy
(Student folder contains braille version)

Student _____

Date _____

School _____

Braille Reading Comprehension

SAMPLE ITEM: Read the sample item below and mark the answer.

Be sure you mark

( ) A all the answers
( ) B a good answer
( ) C many answers
( ) D the best answer

Part 1

Our first consideration has been safety. The Orion is made only in a 2-door sedan. You don't have to worry about setting automatic back door locks that come on 4-door cars--your children can't fall out of an Orion!

Both front and back seats are furnished with shoulder-type safety straps at no extra cost. The dashboard is deeply padded with foam rubber and all the instruments on the front panel are recessed. The steering wheel gives six inches under a moderate impact. There is even a safety light which flashes when you reach 60 miles an hour, and a gentle bell rings when you pass 72.

Our second consideration has been to provide you with an economical but not a cheap car. The interior finishes are durable and washable. There is a minimum of extra trim and all of it is either aluminum or stainless steel. These are easier to maintain than chrome. All cars come with the same 160 horsepower, straight 6 motor. This gives adequate pick-up for safe passing and is cheaper to maintain than a V-8.

Optional extras? Most of them are standard. But you can purchase a radio or automatic transmission (only slightly less economical on gas than manual) if you wish.

1. An optional extra would be

( ) A turn signals
( ) B windshield wipers
( ) C automatic transmission
( ) D manual transmission

2. From the things claimed for this car, we can say that it is

( ) A a sturdy car for thrifty buyers
( ) B a cheap car which will not stand up
( ) C a costly car, since it includes so many extras
( ) D about the cheapest car in America

3. The manufacturer claims that the upkeep is less expensive on a car with

( ) A front-wheel drive
( ) B turbo-jet engine
( ) C a V-8 motor
( ) D a straight 6 engine

4. The car comes equipped with

( ) A chrome
( ) B a radio
( ) C recessed instruments
( ) D a large V-8 engine

5. This ad implies that the seat covers on the Orion are

( ) A washable
( ) B beautiful
( ) C temporary
( ) D removable

6. The expression "adequate pick-up" means sufficient

( ) A weight of the car
( ) B load capacity
( ) C color and appearance
( ) D increase in speed

7. Although many claims are made for the Orion, the only evidence given is about

( ) A comfort
( ) B safety features
( ) C exact price
( ) D performance

8. A good title for this ad would be

( ) A Orion--America's 4-Door Car!
( ) B Information About Fastbacks!
( ) C Orion--The Car for the Young Family
( ) D The Supersonic Speedster!

STOP

Part 2

America's favorite heroes go far toward vindicating the whole democratic theory of careers open to talents. We believe that character is more important than brains. Hard work, tenacity, enterprise, and firmness in the face of odds are the qualities that Americans most admire, rather than originality or eloquence of tongue and pen.

The hero must be a man of good will and also a good neighbor, preferably something of a joiner. The public likes to think of its idol as simple in greatness. Manliness, straightforward manners, and salty speech are approved. Love of the soil, of dogs and horses and manual hobbies and fishing is better understood than absorption in art, literature, and music. (The public distrusts Presidents who are photographed fishing in their store clothes.) The hero must not lose touch with his birthplace and origins, however humble; the atmosphere of small towns and front-porch campaigns, cultivated by so many candidates for President, pays tribute to this demand. "I really believe there are more attempts at flattering the farmers than any other class," Lincoln, as candidate for President, remarked at the Wisconsin State Fair; "The reason for which I cannot perceive, unless it be that they cast more votes than any other."

Also, the touch of versatility and homely skills is applauded in a hero. Jefferson is most remembered as an inventor of gadgets from which he plainly got a great deal of fun. "Tinkering" is American. Famous Europeans have testified to the fascination that Franklin held for them. A hero's achievements (unlike those of the artist, philosopher, and pure scientist) must lie open to everyman's comprehension.

9. The American hero described in this passage must love things that are

( ) A beautiful
( ) B complicated
( ) C expensive
( ) D ordinary

10. The author believes that Americans are likely to respect a man more for

( ) A originality than courage
( ) B patience than initiative
( ) C hard work than a smooth tongue
( ) D a large vocabulary than plain speech

11. In the second paragraph, the author quotes Lincoln's

( ) A explanation of the flattery of farmers by politicians
( ) B explanation of his popularity
( ) C opinion of farmers
( ) D opinion of politicians who constantly flatter farmers

12. In the first paragraph, the qualities Americans most admire are listed in

( ) A a footnote
( ) B an example
( ) C an illustration
( ) D a series

(continued on next page)

13. According to this article, Americans believe that a hero must

( ) A be friendly with his neighbors
( ) B retreat occasionally into solitude
( ) C be generous to his neighbors
( ) D respect his neighbor's privacy

14. The expression "simple in greatness" means

( ) A slow but sure to get there
( ) B complex in minor ways
( ) C unassuming though famous
( ) D friendly to everybody

15. "Manual hobbies" are hobbies that are

( ) A liked by boys
( ) B done with the hands
( ) C enjoyed outdoors
( ) D used to build muscles

16. According to the article, which of the following is best suited to become an American hero?

( ) A a philosopher born on a farm
( ) B a writer born in a mansion
( ) C a research scientist born in Europe
( ) D a tinkerer born in a small town

STOP

OMB 51-52
EXP 12 7

DIAGNOSTIC SPELLING TEST

Name _____

Date _____

School _____

Teacher Instructions:

Say: Here are some words to spell. I will say the word and you spell it correctly, without using any contractions. Ready?

(Say each word twice, slowly. The teacher marks the appropriate box for each answer.)

	Braille spelling (uses braille code)	Correct spelling (uses English code)	Other (makes mistake)
1. after	[]	[]	[]
2. city	[]	[]	[]
3. should	[]	[]	[]
4. some	[]	[]	[]
5. friend	[]	[]	[]
6. father	[]	[]	[]
7. children	[]	[]	[]
8. many	[]	[]	[]
9. sing	[]	[]	[]
10. their	[]	[]	[]
11. had	[]	[]	[]
12. this	[]	[]	[]
13. much	[]	[]	[]
14. mean	[]	[]	[]

Diagnostic Spelling Test
(cont.)

		Braille spelling (uses braille code)	Correct spelling (uses English code)	Other (makes mistake)
15.	your	[]	[]	[]
16.	work	[]	[]	[]
17.	across	[]	[]	[]
18.	and	[]	[]	[]
19.	word	[]	[]	[]
20.	mission	[]	[]	[]
21.	together	[]	[]	[]
22.	those	[]	[]	[]
23.	the	[]	[]	[]
24.	found	[]	[]	[]
25.	name	[]	[]	[]
26.	really	[]	[]	[]
27.	every	[]	[]	[]
28.	question	[]	[]	[]
29.	along	[]	[]	[]
30.	still	[]	[]	[]

Instrument: Activity Log

When Used: With each lesson and at end of each unit

Mode of Administration: Teacher completes form for each child Individually

Materials Required:

1. Activity Log sheet
2. Pencil for self
3. Stop watch or watch with sweep second hand

Directions:

1. At beginning of unit, fill in student name, teacher name, and unit number.
2. At the end of the first lesson, circle the elapsed time to the nearest 10 minutes. For example, if pupil takes 28 minutes to do the lesson, circle 30. If pupil takes 35 minutes, circle next highest number, i.e., 40.
3. At the end of the second lesson, add on the amount of time from the first lesson. For example, if 30 minutes were used to do Lesson 1 and 23 minutes were used to do Lesson 2, circle 50. Similarly, cumulate for each subsequent lesson.
4. If more than 150 minutes of study are used in the unit, show the total time in the blank provided to the right of 150.
5. At the end of the unit or when criterion exercises have been completed, fill in remainder of the form. (See Definitions of Student Performance and Materials Adequacy Variables.)
6. When completed, give to local project coordinator to mail to AIR.

OMB 51-S7300
FYP 12-73

ACTIVITY LOG

Unit #: _____ Student name: _____

Lesson subsections used: _____ Teacher name: _____

Elapsed time: 10 20 30 40 50
60 70 80 90 100
110 120 130 140 150

Criterion exercise: _____ # Correct _____ Date _____
Correct _____ Date _____
Correct _____ Date _____

TEACHER EVALUATION OF:

Student Performance

	Excellent	Average	Poor
Tracking technique	○	○	○
Tactile technique	○	○	○
Letter recognition	○	○	○
Word attack	○	○	○
Interest level	○	○	○
Attention span	○	○	○

Materials Adequacy

	Very appropriate	Usable	Inappropriate
Drill & practice materials	○	○	○
Enrichment materials	○	○	○
Criterion exercise	○	○	○
Difficulty level	○	○	○
Inherent interest	○	○	○

Other use of Optacon (time and description): _____

Remarks, observations, suggestions about the lesson (turn over for more space): _____

EQUIPMENT:

	Optacon	Optacon	Visual Display	Tracking Device	Cable
Equipment # :	_____	_____	_____	_____	_____
Minutes used:	_____	_____	_____	_____	_____

Equipment problem (if any): _____

Corrective action taken: _____

Remarks, observations, suggestions about the equipment (turn over for more space): _____

Definitions of Student Performance and Materials Adequacy Variables

Student Performance

Tracking Technique:

Excellent: Moves camera smoothly and in good alignment; finds new lines without help.

Average: Moves camera and locates new lines with occasional help.

Poor: Moves camera in a jerky manner or retraces camera frequently; finds new lines with difficulty and often requires help.

Tactile Technique:

Excellent: Maintains index finger in proper placement on tactile vibrators.

Average: At times moves finger on image but most of the time is steady.

Poor: Rolls finger or rotates finger to feel image outline.

Letter Recognition:

Excellent: Recalls letter forms after initial introduction of letter shape with very few mistakes.

Average: Recalls most letters after introduction but has trouble with some.

Poor: Needs continuous help and prompting on letter recognition.

Word Attack:

Excellent: Remembers the sequence of letters until the word is completed; quickly recognizes letter patterns.

Average: Remembers sequences if words are short; recognizes a few letter patterns.

Poor: Has difficulty with short term recall of letters read; has frequent retracing of words; does not recognize letter patterns.

Interest Level:

Excellent: Looks forward to the lesson; expresses enthusiasm; shows desire to continue.

Average: Does not express either strong enthusiasm or strong criticism.

Poor: Seems reluctant to initiate and complete the lessons; needs frequent encouragement to continue.

Attention Span:

Excellent: Sustains attention throughout a full lesson period (approximately 30 minutes).

Average: Sustains attention only for shorter time periods (approximately 15 minutes).

Poor: Sustains attention only briefly (approximately 5 minutes or less).

Materials Adequacy

Drill and Practice Materials are

Very Appropriate: Just right for this child.

Usable: Mostly right for this child.

Inappropriate: This child has frequent trouble with drill and practice materials.

Enrichment Materials are

Very Appropriate: Just right for this child.

Usable: Mostly right for this child.

Inappropriate: This child has frequent trouble with the enrichment materials.

Criterion Exercise is

Very Appropriate: Just right for this child.

Usable: Mostly right for this child.

Inappropriate: This child has frequent trouble with the criterion exercise.

Difficulty Level:

Very Appropriate: The overall unit is at the right difficulty level for this child.

Usable: The overall unit is mostly at the right difficulty level for this child.

Inappropriate: The overall unit does not seem to be at the right difficulty level for this child.

Inherent Interest:

Very Appropriate: The overall unit has inherent interest for this child.

Usable: The overall unit is mostly interesting to this child.

Inappropriate: The overall unit does not seem to interest this child.

Guidelines for Completion of the Activity Log

Each time a student begins a new instructional unit the teacher should identify herself and the student on a fresh Activity Log sheet. As the student progresses through the material a tally of cumulative time should be kept at the top of the sheet. If the time exceeds the amount shown (150), write the number of excess minutes in the adjacent blank.

When the student finishes each instructional unit the Activity Log should be completed and forwarded to AIR through the local Optacon Project Coordinator. Most of the items call for check marks or other short answers. Information about the equipment should be filled out as well. Completion of the form will typically take from 3-5 minutes depending on the amount of teacher comments added.

Note carefully the definitions of terms that are used on the form and try to adhere closely to these definitions. Some additional explanations are:

1. In judging tracking technique be conscious of the fact that beginning students will often retrace letters or words before attempting to name them. This is a natural action at first, but should decrease as the student progresses. Perhaps more important as a sign of poor tracking is the retracing of words because of poor alignment of the camera. That is, if the student is unable to track with a consistent orientation of the line within the field he will find it necessary to retrace in order to align the type properly.

2. Duration of attention span is meant to refer to the student's attention to the lesson, not simply to the amount of time he has his finger on the Optacon vibrators. For example, he may still be giving his attention if he is discussing the lesson, feeling the raised letters, or touching the tracking equipment. It is quite possible, too, that the teacher may deliberately want to provide relief during the lesson with rest periods of a minute or so. This is still reasonable use of time within the meaning of "attention span."

3. Keep in mind that the evaluations on the Activity Log should be as complete and as "objective" as possible. The focus of the attention here is the student, the materials, and the equipment. In no way is it a reflection of the teacher's performance or ability to have the student learn.

Instrument: Optacon Reading Criterion Test, Elementary Level (Grades 4, 5, 6, 7, 8)

When Used: May/June

Mode of Administraton: Teacher tests each child individually

Materials Required:

1. Optacon Reading Criterion Test, Elementary Level, Teacher's copy.
2. Optacon Reading Criterion Test, Elementary Level, Student's copy.
3. Pencil for self.
4. Stop watch or watch with sweep second hand.

Directions:

1. Read general directions for administering tests.
2. Write student name, date and school on teacher's copy.
3. Give student's copy to student.
4. Begin testing. Have the child read aloud.
5. In Parts I through IV you may prompt the child on any word not read in a reasonable time (about 15 seconds) but mark the word the same way as any word not read correctly.
6. Record times and answers on teacher's copy.
7. Part V is not timed.
8. When completed, give materials to local project coordinator to mail to AIR.

OPTACON READING CRITERION TEST
ELEMENTARY LEVEL
Grades 4, 5, 6, 7, 8
Student's Copy

Part I-A

Often people are different. Some children like to work together but others do not. No one can live in just his own world. If we think other people are never right, it is time to find out more about their life. We can study them and the things they do. STOP

Part I-B

Father read parts of the page. Mother heard several hard words in the sentence. They could see something to change which would make my answer better. I need to study their example to see if the whole story should be said again. Many of my words were good but long. STOP

Part II-A

Ned has a letter from Utah. He is excited because it is from Jane, who is coming to visit. They both like horses and going to the zoo. Jane is fun. She always knows quite a few jokes. She also likes to yell and to keep busy with loud games. STOP

Part II-B

Yesterday a letter came from Jack, who has been in Mexico for a year now. He says it is very hot there. However, he has fun in the busy stores and the loud streets. He is excited about going to the jungle, where he expects to pick up a lizard. STOP

Part III

A king had a daughter named Shining Moon. She was so tall and strong that she was almost a giant. She could wrestle with any young man in the kingdom and win. Her father wanted her to marry. But she said she would only marry a man who could wrestle better than she. Her father then gave her a written promise that she could marry of her own free will. This was proclaimed all over the kingdom. Men came from everywhere. The first man who could defeat her could have her as his wife. Any who lost must forfeit to her a hundred horses. Before long she had more than ten thousand horses. At last, as in all such legends, there came a young and handsome prince, son of a powerful king. STOP

Part IV

Our first consideration has been safety. The Orion is made only in a 2-door sedan. You don't have to worry about setting automatic back door locks that come on 4-door cars—your children can't fall out of an Orion! Both front and back seats are furnished with shoulder-type safety straps at no extra cost. The dashboard is deeply padded with foam rubber and all the instruments on the front panel are recessed. The steering wheel gives six inches under a moderate impact. There is even a safety light which flashes when you reach 60 miles an hour, and a gentle bell rings when you pass 72. STOP

Part V

1. *Jane asked me if I would loan her a dollar. I said yes, but I never got it back. Jane is no longer my friend.*

   My dog is big and barks at everything. Once he jumped on an old lady. Now he goes to school to learn how to behave.

2.
Hansen Vance 1060 Day rd.....842-7088
Hanson Earl 8695 Morey av.....842-6553
Hardcastle Ira 8282 Murray av.....842-4944
Harker Robert D 240 2nd.....842-5274
Harmon Paul 8030 Swanston Ln.....842-3539
Harms Dwayne 8313 Kelton dr.....842-7850
Haro Antonia 7361 Forest.....842-5807

3. ***Eating High Priced Foods***

4. **Wollensak 4000 cordless cassette**
The lowest-priced Wollensak ever!
Weight 3 lbs.
Price (less batteries) $49.95

5.
Our Town, 258
Out of My League, 85
Out of the Deeps, 152
Out of the Silent Planet, 149
Out of the Strong, 270
Out on a Limb, 89

6. **ASPIRIN**
WARNING: Keep this and all medicines out of children's reach. In case of accidental overdose, contact a physician immediately.

First Aid
& Burn Cream

CAUTION: As with all medicines keep out of reach of children.

DANGER POISON
KEEP OUT OF REACH OF CHILDREN
Harmful or Fatal if swallowed
SEE ANTIDOTE & PRECAUTIONS ON BACK PANEL.

Instrument: Optacon Reading Criterion Test, Secondary Level (Grades 9, 10, 11, 12)

When Used: May/June

Mode of Administration: Teacher tests each child individually

Materials Required:

1. Optacon Reading Criterion Test, Secondary Level, Teacher's copy.
2. Optacon Reading Criterion Test, Secondary Level, Student's copy.
3. Pencil for self.
4. Stop watch or watch with sweep second hand.

Directions:

1. Read general directions for administering tests.
2. Write student name, date and school on teacher's copy.
3. Give student's copy to the student.
4. Begin testing. Have the child read aloud.
5. In Parts I through IV you may prompt the child on any word not read in a reasonable time (about 15 seconds) but mark the word the same way as any word not read correctly.
6. Record times and answers on teacher's copy.
7. Part V is not timed.
8. When completed, give materials to local project coordinator to mail to AIR.

OPTACON READING CRITERION TEST

SECONDARY LEVEL

Grades 9, 10, 11, 12

Student's Copy

Part I-A

Often people are different. Some children like to work together but others do not. No one can live in just his own world. If we think other people are never right, it is time to find out more about their life. We can study them and the things they do. STOP

Part I-B

Father read parts of the page. Mother heard several hard words in the sentence. They could see something to change which would make my answer better. I need to study their example to see if the whole story should be said again. Many of my words were good but long. STOP

Part II-A

Ned has a letter from Utah. He is excited because it is from Jane, who is coming to visit. They both like horses and going to the zoo. Jane is fun. She always knows quite a few jokes. She also likes to yell and to keep busy with loud games. STOP

Part II-B

Yesterday a letter came from Jack, who has been in Mexico for a year now. He says it is very hot there. However, he has fun in the busy stores and the loud streets. He is excited about going to the jungle, where he expects to pick up a lizard. STOP

Part III

Our first consideration has been safety. The Orion is made only in a 2-door sedan. You don't have to worry about setting automatic back door locks that come on 4-door cars—your children can't fall out of an Orion! Both front and back seats are furnished with shoulder-type safety straps at no extra cost. The dashboard is deeply padded with foam rubber and all the instruments on the front panel are recessed. The steering wheel gives six inches under a moderate impact. There is even a safety light which flashes when you reach 60 miles an hour, and a gentle bell rings when you pass 72. STOP

Part IV

America's favorite heroes go far toward vindicating the whole democratic theory of careers open to talents. We believe that character is more important than brains. Hard work, tenacity, enterprise, and firmness in the face of odds are the qualities that Americans most admire, rather than originality or eloquence of tongue and pen.

The hero must be a man of good will and also a good neighbor, preferably something of a joiner. The public likes to think of its idol as simple in greatness. Manliness, straightforward manners, and salty speech are approved. Love of the soil, of dogs and horses and manual hobbies and fishing is better understood than absorption in art, literature and music. (The public distrusts Presidents who are photographed fishing in their store clothes.) The hero must not lose touch with his birthplace and origins, however humble. STOP

Part V

1. *Jane asked me if I would loan her a dollar. I said yes, but I never got it back. Jane is no longer my friend.*

My dog is big and barks at everything. Once he jumped on an old lady. Now he goes to school to learn how to behave.

2.

Hansen Vance 1060 Day rd.....842-7088
Hanson Earl 8695 Morey av.....842-6553
Hardcastle Ira 8282 Murray av.....842-4944
Harker Robert D 240 2nd.....842-5274
Harmon Paul 8080 Swanston Ln.....842-3539
Harms Dwayne 8313 Kelton dr.....842-7850
Haro Antonia 7361 Forest.....842-5807

3. ***Eating High Priced Foods***

4.

Wollensak 4000 cordless cassette
The lowest-priced Wollensak ever!
Weight 3 lbs.
Price (less batteries) $49.95

5.

Our Town, 258
Out of My League, 85
Out of the Deeps, 152
Out of the Silent Planet, 149
Out of the Strong, 276
Out on a Limb, 89

6.

ASPIRIN

WARNING: Keep this and all medicines out of children's reach. In case of accidental overdose, contact a physician immediately.

First Aid
& Burn Cream

CAUTION: As with all medicines keep out of reach of children.

DANGER POISON
KEEP OUT OF REACH OF CHILDREN
Hormful or Fatal if swallowed
SEE ANTIDOTE & PRECAUTIONS ON BACK PANEL.

Scaling of the Measures

Prior to the analysis of the data embodied in these instruments, scales were developed for various subsections as appropriate.

- Part I and Part II of the Braille Reading Comprehension Test (CTBS adaptation) each yielded two scales, one of words per minute when reading silently for two minutes, and the other of overall comprehension, based on the number of questions correctly answered out of eight.
- The Diagnostic Spelling Test was collapsed into one scale, based on the total number spelled correctly in English, with braille contractions being considered as wrong for the purposes of reading standard print.
- The Tactile Ability Test was reduced to one scale by combining the number of correct choices in the part dealing with recognizing similar shapes and number of correct choices in the part dealing with identifying shapes that are different.
- The Would You? measure items 1, 2, 3, 4 (reversed), 7, 8, 12 and 16 were added to form a self-concept scale; while the items 5, 6, 9, 11, 13, 14 and 15 were added to form an attitude toward education scale.
- Items 2, 4 and 7 on the Optacon Attitude Inventory were added to form an index of current usage. Items 1, 3, 5, 6, 8 and a composite of items 17 through 20 (reversed and treated as a single item) were used to form a scale indicating projected use of the Optacon. Items 9 through 12 were not made into a composite scale for analysis purposes, but were reported in terms of the percent of positive responses regarding ease of use of the Optacon. Similarly, items 13 through 16 were not compositely scaled for analysis purposes, but were reported as percent of positive responses, that students expressed about the materials. These items were intended primarily as input to future revision of the training material.

- The teacher's evaluation of individual student performance, as shown on the unit Activity Logs, was not translated into an overall scale for analysis purposes, but instead each was treated in a dichotomous manner. These items were reported as the percent of responses marked favorable or excellent in describing the student's approach to the learning task.
- The amount of time recorded on the Activity Logs was used to create three scales--total time spent with the Optacon, time in the basic (numbered) units and time in the supplementary units (C, D, F and G--the expected optional series).
- The final criterion test yielded partial and whole test scales for words per minute, accuracy in reading words and variety of usage. Thus Part I was a composite of two five-minute oral reading samples in which speed was the total number of words completed divided by the number of minutes. Accuracy was the number of words read correctly divided by the total number of words read. Parts II, III, and IV were scaled in the same way. Part V, which measured variety of usage, was scaled within each item according to preset levels of acceptable performance. An overall scale was then obtained by averaging the item scales.

APPENDIX F

Summary of School Originated Questionnaire
in Three Foreign Language Classes

		Yes	No
1.	Can the teacher be heard when the Optacon is used?	75	9
2.	Can other students be heard when the Optacon is used?	72	12
3.	When you work individually does the Optacon sound bother you?	44	40
4.	Would you mind if someone used the Optacon in other classes?	16	67
5.	Are there classes where this would be a problem?	39	38
6.	Does it bother you when someone is using a braillewriter in class?	51	33
7.	Did you enjoy the demonstration of the Optacon?	77	5
8.	Did you like to feel letters with the Optacon?	66	12
9.	Do you think it would be easy to read with the Optacon?	12	63
10.	Do you have anything special to say about the Optacon? (positive = yes; negative = no)	41	19