EXPERIMENTAL RESEARCH IN READING AND COMPREHENSION SKILLS OF SUB-LITERATE ADULT STUDENTS

A Thesis

Presented to

the Faculty of Graduate Studies

Saint Mary's University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts (Education)

by

Michael Robert Kent

December 1971

Abstract

The hypothesis generated by earlier research that sub-literate adult students will show a greater gain in the development of reading and comprehension skills when taught by a multimedia program than a gain in achievement made by a matched group taught by the teacher-text book method was tested using adult students chosen from the local population of Cape Breton Island, Nova Scotia.

A control group and an experimental group each comprising of 20 adult students were selected and equated on the basis of their age, Intelligence Quotient, and scores obtained on Level E, Form 1 of the Test of Adult Basic Education (TABE). The control group was taught reading and comprehension skills by an instructor at Dingwall, Nova Scotia, using materials prepared by Follett Publishing Company, Science Research Associates, and Readers Digest Publishing Company. The experimental group was taught the same skills using a multimedia, multimodal, and multilevel communication skill system designed by the Educational Developmental Laboratories (EDL), a Division of McGraw-Hill Company. Instruction was carried out at Point Edward, Nova Scotia. Both groups received an average of 265 hours of instruction.

On completion of the study, both groups were posttested using Form 2 of the TABE. The t-values were calculated using the gain in scores between the pretest and

the posttest. Results were significant at the five percent level of confidence. A mixed analysis of variance was also carried out which confirmed this level of confidence and thus supported the hypothesis that adult sub-literate students tend to respond more favorably to machines and programmed instruction than to the conventional classroom approach.

ACKNOWLEDGEMENTS

This study could not have been conducted without the cooperation of many persons. The researcher wishes to express his gratitude for the interest and cooperation extended to him by the instructors, head instructors and guidance section responsible for the instruction and guidance of both groups. The researcher also wishes to thank the students who took part in this study.

Greatest appreciation is due to Professor F.J. Dockrill for his patient direction of this study from its inception.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER I

INTRODUCTION

Historical Background of Sub-Literacy

The Problem

In order to develop an effective method of teaching basic reading and comprehension skills to sub-literate adults of Nova Scotia, experimental research was conducted on two equally matched classes of students referred for training by the Canada Manpower Centre to measure the gains in literacy achievement resulting from two different methods of lesson presentation over a prescribed period of time.

Definition of Terms

Bruno (1965) states that sub-literate adults may be classed under three broad groups, namely: (1) the illiterate, (2) functionally illiterate, and (3) non-English speaking.

He defines the illiterate as one who cannot read nor write. The functionally illiterates are those whose "functional level is so low that it is impossible to give them any kind of vocational training. On a standardized test, the functional illiterate usually would fall below the fifth year of school achievement (p. 10)." This experimental study deals with sub-literate adults, or those who fall in the range between the illiterate and functionally illiterate.

Canada's Sub-Literacy

It is almost impossible to devise accurate means by which one could assess the educational level of Canada to determine the number of persons who fall into the sub-literate category. Dominion Bureau of Statistics (1961) attempted to group the number of persons in each category of literacy without administering any tests. At that time the number of persons who were 15 years of age and over in Nova Scotia totalled 480,679. Out of this figure 6,382 had no schooling while 29,013 had less than five years of schooling.

In 1970 Canada Manpower surveyed 5,024 clients applying for work. This figure represented over 16% of all clients registered in the Province of Nova Scotia. As of December 31, 1970 the survey indicated that clients who were less than 20 years of age and had achieved less than grade six comprised 10.6% of the total number of persons surveyed. Those who had less than grade six but were in the 45-64 year age bracket comprised 38.3% of the total. These figures are alarming, particularly in Canada where education has been compulsory and free for decades.

Reasons for the High Rate of Sub-Literacy

Interviews carried out by the researcher with most of the adults entering the upgrading programs in the Cape Breton area revealed that basically there were three general factors that contributed to the low level of academic

standing, They were:

1. Economics - Poverty in the home making it necessary for school-age children to earn money to help support the family. This was predominantly the reason in localities where families earned their living through coal mining, fishing, agriculture and lumbering.
2. Lack of Facilities - Remote areas with no means of transportation to distant schools, or inadequate resources of the school, such as lack of books and teaching staff.
3. Personal Reasons - Low level of motivation toward education because it was considered "bookish". Inability to get along with autocratic teachers, and the lack of ability to relate school learning to economics and future employment opportunities.

The Need for Upgrading Adults

With the advent of automation and the increasing orientation of the country's economy toward technology, the Department of Manpower and Immigration has indicated that there is a continual diminishing number of opportunities of employment for the sub-literate group. Economic Council of Canada (1968) states that there is a positive relationship between low incomes and persons whose education is below the elementary level. The report goes on to say that

heads of families whose education was less than the secondary level also were in the low income bracket.

With reference to poverty, the Council states that it became clear that human resources had to be upgraded. The government had to institute programs such as "adult retraining and manpower mobility programs to help families and individuals escape from the low-income circumstances which entrap them (p. 117)."

Adult Occupational Training Act

On the eigth day of November 1967 the Government of Canada and the Government of the Province of Nova Scotia entered into an agreement whereby the Province was given the authority to organize, conduct and maintain agreed-upon occupational training courses. This agreement gave the Minister of Manpower and Immigration, the authority to pay the Province all costs incurred by the Province in providing occupational training courses to adults whose enrollment was arranged by the Manpower Officers.

The Statutes of Canada (1967) defines occupational training as "any form of instruction, other than instruction designed for university credit, the purpose of which is to provide a person with skills or proficiency therein .... Occupational training shall provide not more than fifty-two weeks of full time instruction or 1,820 hours of part-time instruction (p. 1205)."

Any adult who is at least a year older than the

regular school leaving age and has been out of school for at least 12 months may apply for training. If an adult has been a member of the labour force for not less than three years, or if he has one or more persons wholly or substantially dependent upon him for support, he may also be elligible for training allowances.

Basic Training for Skill Development

Canada Manpower manual (1967) states that the "aim of the manpower training is to prepare a person for placement in employment where he can make his most effective contribution to the national economy (p.54, sec. 4.05)." Before an individual can apply for vocational training, he has to meet the educational prerequisites laid down for each occupational course. If the individual fails to meet the entrance requirements he must enter a special program called the Basic Training for Skill Development (BTSD). The manual states that the "basic educational courses are special, intense or accelerated courses in designated 'educational'subjects, and should not be confused with the full courses provided in the regular primary and secondary school systems. The emphasis is on the mathematics, science and written and oral skill necessary for occupational skills (p. 54, sec. 4.05)."

Provincial Responsibility

Under the Federal-Provincial Training agreement, the Province was charged with the responsibility for devising the curriculum and the methodology which was to be

used for the training of adults. The BTSD program expanded rapidly. Courses were established in abandoned high schools, Vocational Training Centres at Dartmouth and Point Edward, and as evening classes in various high schools throughout the Province. Each unit or module consisted of 60 students divided up into three classes of 20 students each. By late 1969 approximately 2000 students were enrolled in the BTSD program.

Upon testing and evaluating, it was soon revealed that up to 30% of the adults referred for training were in the range of being illiterate to functionally illiterate. This group presented a problem to the instructor both in the selection of suitable training material and in an approach to the teaching of adult sub-literates.

As considerable sums of money were spent on student allowances, rental of buildings, and training materials, an economical and efficient method of instruction had to be devised without delay. Each module experimented independently using some of the materials and techniques devised by the educators of adults in the United States.

Research of Learning

Cross-Modal Transfer of Learning

Cole, Chorover, and Ettlinger (1961) state that "little is known about transfer between different sensory systems during learning of complex material. Positive

cross-modal transfer implies that learning to discriminate between a pair of stimuli in one modality leads to accelerated discrimination between the same stimuli in a second modality (p. 1225)." Their experiment was designed to investigate whether learning of rhythm discrimination in one modality (audition) led to a more rapid learning of the same rhythm discrimination in the second modality (visual). They used four groups of adults and exposed each group to the stimuli in the following manner:

Group I - received no auditory training

Group II - learned an irrelevant discrimination of the auditory rate before both groups learned the visual discrimination.

Group III - learned the auditory and visual forms of the rhythm discrimination concurrently, the same pair of rhythms being given in auditory and visual form on alternate trials.

Group IV - were specifically instructed to determine, in each trial, whether a visual rhythm was identical with an auditory rhythm which immediately preceded it.

Results indicated that there was no significant difference in the number of trials required among the groups to learn the required discrimination. Their experiment confirmed the findings of Hebb (1949) in that there is poor

cross-modal matching performance in human subjects, and that "discrimination learning of complex material is largely modality-specific (p. 1226)."

Research into memory modality was conducted by Wallach and Averbach (1954). They set out to prove that in order to have cognition of a stimuli by a memory modality, the stimuli presented for test purposes must be of the same modality that originally left the memory trace. They state that:

> A novel verbal item has been presented auditorily should not be recognized directly when the second presentation is a visual one. Only if the nonsense word is now 'read', that is, if the visual experience is translated into some verbal mode, may the trace of the original auditory experience be aroused (p. 250).

Their experiment dealt with the reading of sixteen two-syllable nonsense words on a memory drum. Three groups of students were used for the experiment who performed in the following manner:

Group A - were asked to read the first word forward; the second word backward, and so on.

Group B - had to do the same except that they started the list by reading the first word backward.

Group C - were asked to read all words backwards.

The experiment was followed by a recognition test. It was assumed that mental traces were formed with words read forward. Also on the verbal level the words read back-

ward (visually) should not have left any memory traces for recognition except on the visual mode. Test results confirmed the initial assumptions.

Wallach and Averbach conclude that:

> Content of memory are usually defined in terms of the external events to which they refer ... when nonsense syllables are visually presented S will not only see each syllable, he will also silently pronounce it and two psychological processes will then result from an objective event, each of which may leave its trace .... In the absence of a set, recognition is based on the similarity between the perceptual process which gives rise to recognition and the memory of the pertinent previous experience. No direct recognition should, therefore, occur between a process and a trace of different modality. Although the two pertain to identical external events. Predictions derived from this premise were confirmed (p. 257).

The foregoing studies in cross-modal transfer seem to indicate that there is little or no transfer between modalities. It could thus be concluded that more than one modality should be used in the learning process. It was this study that prompted the use of multimedia approach to develop the students' reading and comprehension skills.

Selected Previous Research in Adult Education

At this time, various programs to upgrade sub-literate adults were rapidly being instituted in all provinces of Canada. Each province was experimenting with a variety of systems and approaches and claiming mediocre success. Godwin (1969) visited many localities across Canada in order to obtain some feedback on all Manpower

Upgrading Programs in existence. She confirmed that "what was being taught was similar in content to what was being taught in grade school. In many cases, the instructional materials were the same with slight modifications (p. 7)." In an effort to discover an effective method of instruction a close examination was made of the more outstanding trial programs that have been evaluated on adult students in the United States of America. The following is a brief review and findings of research into adult programs and materials.

Greenleigh Associates (1966) made a comprehensive evaluation of adult basic education systems. After thoroughly investigating all available materials suitable for adults which would take them from about a grade five through to grade eight level, four were chosen. The systems tested in actual practice were:

1. American Incentive to Read (AIR Program)
2. Science Research Associates (SRA Program)
3. Allied Educational Council or (MOTT)
4. The Follet Publishing Company "Systems for Success"

There were thirty-six classes of fifteen students each in three participating states namely: New Jersey, New York, and California. There were nine classes using each of the four reading systems selected for testing. Instruction was given to the 1620 students over a period of seventeen weeks of two and one-half hours per day. Instructors

consisted of trained teachers, college graduates and high school graduates.

It is noted that in their findings, "none of the four systems were able to bring the majority of students from the 4.9 grade level or below to the eight-grade level.... However, all of the systems brought some students to the eight level (p. 15)." It was further noted that "certified teachers had the most skill in dealing with learning problems, grouping students and class management (p. 15)", but that their classes did not show any greater achievement over the classes taught by the other two categories of teachers.

It was intended to have a control group of 125 students but difficulties arose in recruiting suitable participants hence studies using the control group had to be discontinued.

Peerson (1961) at Florence State College in Alabama involved the use of television instruction over state educational television stations. This program involved the teaching of functionally illiterate adults. For his study, 600 students over 40 years of age were exposed to a study course of 98 television programs, three nights a week for eight months. Only 254 out of the 600 individuals completed the program. The average reading level of those who completed the course was grade two. Students who were instructed using the television approach did not do as well as the control group who were taught by the formal class

method. It was found that overall achievement of adults in the formal class surpassed the television taught class by one-half of one grade level. Peerson concluded that television instruction is only suitable in the area of supplementing class instruction and not suitable as the sole media for teaching functionally illiterate adults.

Henney (1964) used two experimental groups and a control group to determine whether individual or group instruction would exert a greater influence on progress and reading performance. With the use of a phonetic system which he developed himself, he conducted his study in the Indiana State Reformatory with thirty inmates randomly assigned to a control group which received no phonetic instruction but continued in the regular classroom teaching atmosphere. Of the two experimental groups that were used, Group A received one to one reading instruction by the phonetic method while Group B received instruction using the phonetic method in a group setting.

Group A showed a mean gain in reading performance of 1.33 grade levels, and Group B showed a mean gain in reading performance of 1.21 grade levels. Computed t-values for both experimental groups exceeded the critical value at the five percent level of significance.

McKee et al. (1967) reported on an experiment conducted to measure the gains in reading achieved by an experimental group using teaching machines and programmed instruction as compared to the gains in reading achievement

of a group that received teacher-centered instruction. The experiment was conducted in Elmore, Alabama, at the Draper Correctional Institution. The report indicated that after 40 hours of reading instruction, the experimental group showed an average increase of 2.5 grade levels as compared with an average increase of 1.1 grade levels for the control group. Although no level of significance was presented by the authors, one could assume that adults tend to benefit from a programmed type of instruction.

Scheier and Senter (1969, Bulletin 11) conducted a research to evaluate the effectiveness of using a multimedia, multilevel, and multimodal system to assist undereducated adults to develop their communication skills. Learning 100 (L-100) was chosen. It was designed by the Educational Developmental Laboratories, Inc., a Division of McGraw-Hill Company. This system places heavy stress on audiovisual techniques. Approximately 255 hours of instruction were available to the adults using the L-100 system. However, because of frequent absenteeism, the hours of instruction ranged from 54 to 223 for the 64 subjects in the study. No control group was available.

Stanford Achievement Tests were administered to measure the gains in achievement due to exposure to L-100. In seven out of ten sub-tests, t-values indicated that a significant change had taken place in the achievement. The remaining three t-values showed no significant difference

between the pretest and posttest.

The authors of the bulletin state that subjective evaluation showed that the L-100 system is easily managed even by the inexperienced instructor, and that the adult students developed independent work habits and increased self assurance.

Brickner and Senter (1969, Bulletin 3) conducted an experimental training program on a sample of 353 young men inducted into the American Army. The research was callet "Project 100,000". It was designed to correct academic deficiencies in communication skills over a training period of 90 hours using the L-100 system. This multimedia, multimodal and multilevel system is identical to that used in the Scheier and Senter study.

On entry into the project, it was ascertained that on the average all subjects had completed more than ten years of schooling. However, according to the results obtained by the United States Armed Forces Institute (USAFI) pretest, it was discovered that their reading level ranged from the third to the fourth grade.

After being exposed to the L-100, the average raw score from the USAFI posttest indicated a significant gain ($p < .01$). The grade placement now was comparable to the seventh grade.

Scheier and Senter (1969, Bulletin 15) conducted a research study to compare the effectiveness of L-100 in a

ghetto situation with that of a more conventional reading program with subjects of similar backgrounds. Both groups were subjected to 200 hours of instruction. The experimental group used the L-100 system whereas the control group used as their basic reading materials Science Research Associates (SRA) Kits and the Lippincott Reading for Meaning Series as well as other supplementary reading materials.

Both groups were pretested using the Metropolitan Achievement Test. Prior to the commencement of the project, the L-100 group indicated a mean standard score of about three points lower than was the control group score. On administering the posttest, it was shown that the L-100 students gained 13 standard score points while the control group gained only six standard score points. Statistical analysis showed that students utilizing the L-100 system of instruction scored at a significant ($df=60$, $p < .01$) level above the control group on the Metropolitan Achievement Test, Reading Intermediate level.

Not all research studies support the fact that teaching machines and programmed instruction increase the reading rate more effectively than teacher-centered instruction. Berger (1966) investigated the effectiveness of four methods of increasing reading rate, comprehension and flexibility. He involved 255 freshmen at Syracuse University, 179 of whom were given instruction in increasing efficiency in reading through one of the four methods, namely: (1) tachistoscope,

(2) controlled reader, (3) controlled pacing and, (4) paperback scanning. After eight weeks it was shown that:

(a) all four methods produced significant gains in rate.

(b) paperback scanning was superior.

(c) no significant change appeared in comprehension level.

(d) all but the tachistoscopic method produced gains in reading flexibility.

On conclusion of several studies in the area of adult education, Berger considers that, at present, when teaching groups of students, what can be done with machines can be done as well, if not better without.

Limited Population Studies

Much effort has been put forth by educationalists in the United States and Canada to evaluate the effectiveness of various programs designed to raise the educational level of the sub-literate adult. In an effort to get to the root of the reasons for the large numbers of illiterate adults, attention has been focussed on the disadvantaged citizen. Anderson and Niemi (1970) defined the term "disadvantaged" as applicable "to those who are members of a poverty sub-culture and thus handicapped with respects to the mode of the dominant society". In this category is included, "the hard-core poor", "the low income people", "the culturally deprived", "the hard-core unemployed", and "the

functionally illiterate" (p. 4). These people have been subjected to tests and new materials under varying conditions. Most of the programs were terminal in that the subjects saw no further means to improve their communication skills beyond that given during the research.

To spark enthusiasm and motivation in the functionally illiterate adult, the basic educational program must provide a foundation upon which future programs can be built.

Projects cited dealt with adults serving sentences in Reformatories, Correctional Institutions, military inductees and in the very deprived ghetto situations. Their academic backgrounds in most cases were higher than the academic backgrounds of subjects in the present study.

Relationship of the Present Study to Previous Studies

Present study deals with functionally illiterate adults of Cape Breton Island who have been unemployed because of the phasing out of their old jobs or because of seasonal employment.

The objective of this upgrading program was to raise the adult's educational standing in science, mathematics and communications to a level whereby he could enter employment or occupational training under Canada Manpower agreement. Pay and allowances were given to the students as applicable.

Hypothesis

Studies cited, for example, McKee et al. (1967),

Henney (1964), and Brickner and Senter (1969) have indicated that adults learn faster when subjected to machine teaching. Therefore, the hypothesis will be that the posttest scores earned on the Test of Adult Basic Education (TABE) by the experimental group using the multimedia equipment will be higher than the posttest scores earned by the control group taught by the conventional teacher-text book method.

SUMMARY

Records of schooling received by individuals in Canada compiled by the Dominion Bureau of Statistics, and surveys carried out by the Department of Manpower and Immigration dealing with persons seeking employment indicate an alarmingly high rate of adults who are considered as functionally illiterate by the present society standards. In order that these adults may function effectively in the community and contribute to the economy of the country, the Government of Canada set out to educationally upgrade these people to a standard whereby they can enter employment or undertake occupational training of their choice.

Under the Federal-Provincial Training agreement signed in 1967, the Province was charged with the responsibility of devising the curriculum and methodology, and effectively upgrading the selected adults in the areas of science, mathematics and communications.

Studies in cross-modal transfer of learning in humans have indicated that it would be beneficial to employ multimodal methods in teaching adults complex materials.

Evaluation of various research studies conducted in the United States on adults has indicated that student achievement using multimodal and multimedia equipment showed significant gains over the achievement of the classes using the teacher-text book approach. This thesis deals with adult subjects of Cape Breton Island of Nova Scotia in an effort to confirm this hypothesis.

CHAPTER II

RESEARCH METHODS AND PROCEDURES

Personnel Selection

Introduction

In order to test the hypothesis that adult students instructed by the multimedia method will manifest a significantly higher achievement in reading and comprehension skills than students instructed by the teacher-text book method; an experimental group of 20 adult students, taught by teaching machines, was compared with a control group of equal size and taught by the conventional teaching method. The comparison between groups was made on the basis of a gain in scores between the pretest and posttest shown on an achievement test designed to measure reading and comprehension improvement of functionally illiterate adults.

Population Used for the Study

Research was confined to a sample drawn from the population of unemployed, unskilled male and female adults living on Cape Breton Island. Both groups contained adults from the areas between Sydney, Nova Scotia through to Dingwall, Nova Scotia. The experimental group was selected first. It was composed of 20 students who were chosen out of 36 candidates as they were referred for training by the Canada Manpower Centre located in the Sydney area. Because physical facilities did not permit the establishment of a control group in the Sydney area, it was composed of 20 candidates

selected from a group of 60 referred for training two months later.

The control group received instruction in a public high school at Dingwall while the experimental group received instruction at the Adult Vocational Training Centre , Point Edward, Nova Scotia.

Tests Administered and Equating of Groups

Because of the very low level of the entire sample with respect to literacy, the Intelligence Quotient (IQ) had to be measured by a non-verbal standardized test. The test used was the Revised Beta Examination which was designed to test the intellectual ability of persons who were illiterate. Gains in reading and comprehension skills of both groups were measured by administering the Level E of of the Test of Adult Basic Education (TABE).

Perfect matching of the two groups was impossible because of the limited number of students referred for training. Since the experimental group was chosen first, the control group candidates were matched as closely as possible to the experimental group on the basis of non-verbal IQ scores, the mean raw score of the pretest, age, marital status and their occupational competence, see Tables 1 and 2.

Description of Teaching Materials

The Control Group

Reading and comprehension skills were taught to

TABLE 1

DISTRIBUTION OF PARTICIPANTS BY
AGE, SEX, AND MARITAL STATUS

Subjects	Number of Students	Age				Sex		Marital Status	
		15-19	20-34	35-49	50+	Male	Female	Married	Single
Control									
Number	20	2	6	9	3	18	2	14	6
Percent		10	30	45	15	90	10	70	30
Experimental									
Number	20	1	6	10	3	20	0	13	7
Percent		5	30	50	15	100	0	65	35

TABLE 2

DISTRIBUTION OF PARTICIPANTS BY INTELLIGENCE QUOTIENT
LAST SCHOOL GRADE COMPLETED, AND OCCUPATION

Subjects	Number of Students	Revised Beta IQ				Last School Grade Completed			Occupation		
		70-	71-79	80-109	110+	0-2	3-5	6+	Fishing	Labour	Others
Control											
Number	20	1	2	16	1	3	11	6	10	5	5
Percent		5	10	80	5	15	55	30	50	25	25
Experimental											
Number	20	1	4	15	0	2	13	5	4	10	6
Percent		5	20	75	0	10	65	25	20	50	30

the control group by the instructor on an individual and group basis using the prescribed ready-made materials, and by using daily newspapers, periodicals and common knowledge offered by the instructor and the members of the class.

The following materials were used:

1. Science Research Associates (SRA) Reading Laboratory, Parker (1960).

   These kits are published by the Science Research Associates of Chicago. They are multilevel laboratories designed to accomodate individual difference normally found in all students. Through the use of short stories, each laboratory's aim is to improve the student's performance in reading rate, comprehension, vocabulary, word attack skills, and skills of listening. There are 12 laboratories in the series designed to accomodate students from grade one through to grade 12. The stories are color coded to indicate the level of difficulty. All stories are of high interest to the adult thus they help to maintain motivation. The student corrects his own work and in this way he has immediate feedback on his progress.

2. Getting Started, On the Way, and Full Speed Ahead, Bauer (1965). Published by the Educa-

tional Opportunities Division of the Follett Publishing Company of Chicago, and are designed to enable the adult student to acquire adequate communication skills as rapidly as possible with a minimum of outside assistance. Getting Started presents monosyllabic letter patterns, stresses spelling patterns as well as presents an attack on the derivation of new words from the words that the student already knows. The concepts of new words are reinforced with pictures of objects which they represent. The first book teaches both writing and block printing. The second book expands on the basic concepts learned in the first book, while the third book uses the context as cues to new words and develops the ability to follow directions.

3. Systems for Success, Book I Revised, and Book II, Henney (1965). Also a Follett publication designed to give the student a working knowledge of the phonic system, spelling exercises, arithmetic, handwriting and sentence structure. The material is essentially adult in nature and contains practical exercises in completing application forms and in letter writing.

4. Basic Goals in Spelling, Kottmeyer, Ware, and Purvis (1965). This is a McGraw-Hill publication and is used as a supplement to develop basic skills in spelling. This series uses illustrations, handwritten and printed words, puzzles, the use of dictionary for pronunciation, and the word-in-context in a sentence to illustrate word usage. Homonyms, synonyms and antonyms are also introduced in this series.
5. Readers Digest Series. These books are published by the Readers Digest Services Inc., and are designed to introduce and reinforce basic reading skills for the functionally illiterate, drop-outs, and poor readers. The stories are of high calibre, usually involving feats of courage and daring adventure. A set of these readers will provide reading material for grade levels one to 10. Each story has an overview, followed by the episode, word meaning, exercises showing the use of words in sentences, and questions on comprehension.

Experimental Group

The experimental group used commercially produced material and equipment called Learning 100 (L-100) produced by the Educational Developmental Laboratories Inc., a Division of McGraw-Hill, Huntington, New York. In the

literature describing the equipment, its function and application, Scheier (1969) states that L-100 is:

> A multimedia, multimodal, multilevel communication skill system specifically designed for the use by the uneducated or undereducated young person or adult who is unable to function effectively in school or in the working world because he lacks basic literacy and is deficient in communication skills. The total systems approach to basic education combines audiovisual and instrument techniques with a variety of printed materials in interdependent, interlocking cycles of instruction designed to facilitate the accomplishment of specific learning in the areas of reading, writing, listening, speaking, observing, and in thinking skills which underlie these acts (p. 10).

The system is multimedia because of the carefully planned sequence of various instrument oriented media giving the student instruction in perceptual skills, word recognition and reading fluency. The system is multimodal in that it enables the subliterate student to capitalize on his preference in the learning approach. He may listen to the words being sounded through a speaker, look at the words as they are flashed on the screen, or write the words as they are sounded and check them as they are flashed on the screen later. Frachenpohl and White (1968) describe the equipment in the instructor's manual in detail. The following is a brief description of the equipment used.

Tachistoscope (Tach-X)

Through the use of a specially designed 35 mm. film-strip projector with a preset timing device, the Tach-X provides accuracy training in the development of high-level visual discrimination and visual memory. By using

film-strips containing lines of letters, symbols, words, or numbers, the projector will initially project the image which is out of focus on the screen, will automatically bring it into focus for a preset length of time, and then take it out of focus again. The instrument may be set to keep the symbols in focus for a duration ranging from 1.5 to 0.05 of a second. These timed exposures train the student to become alert and focus his attention on the written form (see Appendix A).

Flash-X

This is a flat circular instrument about five inches in diameter which resembles a disc. It contains a spring-loaded shutter and a window. Into this instrument circular paper discs may be inserted each containing lines of words. By depressing the shutter lever, this window is opened for a predetermined period thus exposing the word. By advancing the paper disc, a new word is placed into position which will be viewed when the shutter is depressed again. Flash-X is used by individual students as additional practice to the Tach-X for skill building in accuracy training, and "look and write the word" training.

Controlled Reader

This instrument is similar to a 35 mm. film-strip projector. It has an additional motor that actuates a moving slot which scans the printed words on each line from left to right. At the end of the line, the next line is automatically advanced without projection on the screen.

When in place, the scanning slot moves again from left to right uncovering words on this line.

The projector may be set to project from five to 25 letters on the screen from left to right at rates from 15 to 90 lines per minute. This instrument further extends the perceptual accuracy initiated by the Tach-X.

Aud-X

This instrument utilizes 35 mm. film-strips in cartridges. They contain printed words and stories with a sound disc which may be made either audible to the entire class or heard by individual students through a system of outlets and earphones. The words presented on the screen are supported auditorily from the sound disc which is synchronized to the visual presentation thus combining the auditory and visual senses. This machine is used for the introduction of new sounds and concepts through drill and stories.

The "GO" BOOK

Each level has a specially prepared manuscript called the "GO" book. Based on the theory of reinforcement, the student can partake in independent reading or directed reading in this book on completion of skill building exercises. The stories in the "GO" book are written with the same vocabulary as the portion of the cycle in which the student is working. In some instances the stories in this book may require preparation of the student by the instructor but in

most cases the student will complete the prescribed readings himself and do the exercises in the book by himself. The stories are written in adult setting using adult experiences.

Program Description

Frachenpohl and White (1968) state that the total L-100 program is divided into seven levels. Each level is designated by a letter of the alphabet followed by the letter "A" to denote that this is an adult program. The levels of the program are as follows:

RA - Readiness Level

AA - First Level

BA - Second Level

CA - Third Level

DA - Fourth Level

EA - Fifth Level

FA - Sixth Level

The first unique program, or the RA level, contains ten cycles or sessions and is designed for non-readers. These sessions, through the use of the prescribed equipment, deal basically with basic auditory and visual discrimination skills. This cycle also provides for the establishment of a basic sight vocabulary, and some word recognition.

The second program embraces the AA, BA, and CA reading levels. Each level contains 10 sessions. These sessions strengthen the basic auditory and visual discrimination skills, build extensive sight vocabulary, deal with word

attack skills, as well as help build comprehension and study skills.

The third program which takes in DA, EA, and FA reading levels also contains 10 cycles each. These levels help the students to enlarge their sight vocabulary, develop critical and appreciative reading, and develop advanced reading comprehension, listening, and study skills.

Instructor Qualifications

Two instructors were engaged in the experimental program. The male instructor had Grade XI education, three years of theological training and one year experience in teaching adults. The female instructor had Grade XI education, one Summer School of teacher training, and one year experience in teaching adults. The instructors of the experimental program received a 10 day orientation course to familiarize themselves with the L-100 equipment and materials.

The male instructor engaged in teaching communications to the control group had Grade XI education, part-time courses in English and Economics, two years of University credits toward an Arts degree, and nine months experience in teaching adults at all levels of literacy.

No extra training was given to the instructor of the control group.

It was difficult to equate the teaching experience

of the instructors of the two groups because they had been teaching in the adult educational programs at the time and hence had to be utilized for the project. On the basis of educational qualifications, personality, and teaching experience, subjective evaluation by the researcher, head instructors, and guidance staff indicated that they were matched quite closely.

Revised Beta Examination

This non-verbal examination is a revised version of the Army Group Examination which was developed during World War I for army inductees. The test has been designed to measure the general intellectual ability of persons who are illiterate or who are non-English speaking.

The test is divided into six subtests enabling one to examine the candidates' ability in the following areas:

(a) Maze

(b) Digit Symbol

(c) Error Recognition

(d) Formboard

(e) Picture Completion

(f) Identities

Goldman (1965) states that validity of this test was carried out yielding two correlations. "One coefficient of .92 based upon 168 prisoners is reported between the Revised Beta Examination and the Wechsler-Bellevue Intelligence

Scale, the second, a coefficient of .71 between the Beta and the Otis Self-Administering Test of Mental Ability, utilized 198 prisoners (p. 494)." He goes on to say that reliability coefficients of .81 and .75 based respectively on 199 and 104 prisoners have been reported, and that the test uses the same Intelligence Quotient (IQ) classification as does the Wechsler.

This test was administered to all trainees in order that both groups could be matched more closely as far as their mental capacity was concerned.

Test of Adult Basic Education (TABE)

This test has been adapted from the California Achievement Test (CAT) by the California Test Bureau, a Division of McGraw-Hill Company. TABE was designed primarily for analysing and evaluating adults who were preparing to undertake vocational-technical training. There are three levels of the TABE, namely: Level E (Easy), Level M (Medium), and Level D (Difficult). In order to ascertain which level should be given to the students, a Locator Test is first administered to all students. Depending on the score earned on the Locator Test, the appropriate level of the TABE is then chosen. All students in both groups obtained scores which indicated that the Level E test had to be administered.

TABE Level E contains two major divisions. The first deals with communication skills while the second

deals with arithmetic skills. The communication skills division determines the candidate's reading vocabulary and reading comprehension while the arithmetic division determines the candidate's arithmetic reasoning ability and his knowledge of arithmetic fundamentals.

Efforts to locate critical analysis and evaluation of the test's reliability and validity coefficients proved unsuccessful. The California Achievement Test from which the TABE was derived itself has been highly rated. Neidt (1959) states in his concluding remarks that "the 1957 edition of the California Achievement Test represents a well constructed achievement test battery designed to measure the basic fundamentals of reading, mathematics, and language from grades 1 through 14. This battery has many desirable features and can be recommended for the measurement of general achievement at the grade levels indicated (p. 3)."

After citing the reliability coefficients of .95 to .98 as calculated by the Spearman-Brown formula for the California Achievement Test, Merwin (1965) concludes that "the 1957 edition of the California Achievement Test is suitable for use by schools that want to focus their achievement measurement and diagnosis on the traditional, fundamental skills and content in the areas of reading vocabulary and comprehension, arithmetic and English (p. 4)." Since the TABE was adapted from the 1957 edition of the CAT,

it was chosen as a measuring instrument for achievement in communication skills by the experimental and control groups.

Outline of Procedures

Methods of Instruction - Control Group

The control group was tested using the Revised Beta Examination and the TABE Level E Form 1 examination on entry. The group was instructed in three separate subjects, namely: communications, arithmetic, and basic science in a classroom of a public high school at Dingwall, Nova Scotia. Classes commenced at 3:30 p.m. after the regular youth program vacated the classrooms. Two, fifty minute periods were allocated for each of the three subjects per day. Instruction in arithmetic and science was in the form of reading numbers and performing basic computations of whole numbers and fractions, and discussing science topics of general interest. Group discussions in science helped to strengthen the skills in communication.

All students were at different stages of reading and comprehension ability and had to be grouped into smaller groups for various phases of the communication skills. The material described in the relevant section of this research report was presented as required to increase the individual's reading, spelling, writing, listening, new word attack, and comprehension ability. Because of the uneven rate of progress by various students in their mastery of subskills, periodic

regrouping was necessary thus enabling the instructor to present some new material to the entire class, get the most advanced group started on their assignments, and to circulate from group to group to assist them as required at their particular level.

In addition to the standard teaching material used throughout the course, students who became advanced enough to read with any degree of fluency were encouraged to use the local newspaper for further reading and comprehension exercises.

The study was carried out over a period of 140 days out of which approximately 260 hours were devoted to the improvement of communication skills while the remainder was devoted to arithmetic and science which included social problems of every-day life. On completion of the study, the trainees were tested using TABE Level E Form 2. Continual subjective evaluation of the students and the program was recorded by the instructor.

Methods of Instruction - Experimental Group

The experimental group was also tested using the Revised Beta Examination and the TABE Level E Form 1 on entry. Instruction of the experimental group was carried out at the Adult Vocational Training Centre, Point Edward, Nova Scotia in a room fitted with the L-100 equipment. A total of 36 trainees were divided into two groups, A and B of 18 students each. Group A spent two and one half hours

on L-100 (with appropriate time breaks) in the learning laboratory while Group B spent part of the time on arithmetic and science of similar content as that presented to the control group. If any of the students in Group B missed any time from the communication classes the previous day, he would go to the remedial room fitted with additional L-100 equipment and would catch up on the material that he missed. Out of the entire group, 12 students from Group A and eight students from group B completed the program.

In the afternoon, Group B would use the L-100 laboratory while Group A would follow the same procedure as Group B did in the morning.

It was discovered after a short trial period that an assistant to the L-100 instructor had to be provided to handle the various individuals working on Tach-X, Aud-X, and other equipment in the remedial room.

The L-100 instructor's manual has outlined the recommended daily schedule. However, other schedules may be developed to suit the particular class at hand. Normally a day's schedule may consist of a five-minute training period with Tach-X on symbols and numbers, letter exercises, motility training, or accelerated discrimination training. This is followed by a 15 minute period on instructor guided discussion with the use of audiovisual presentations followed by a 90 minute skill building period. The content of the skill building period would vary depending on whether

it was a first level program, a second level, or a third level program. Normally students would be at various levels and hence the content of each level may be as follows:

(a) First Level - This program makes use of the word recognition training through the use of Tach-X, eye-hand coordination through "look and write" procedure in the students' GO book, and followed by word recognition and introduction through Aud-X story lessons, and Aud-X word study lessons.

(b) Second Level - This program concentrates on the word introduction program through Aud-X story lessons and Aud-X word study lessons; followed by word recognition training through Tach-X word recognition and controlled reader process training; followed by reading fluency development through the use of the controlled reader.

(c) Third Level - This level concentrates on the reading fluency development through the controlled reader. Listening, reading and writing are taught through the use of Aud-X listening and lesson book exercises. This is followed by word recognition training and spelling through instructor directed Tach-X words-in-context of stories.

The last period would be spent on application of acquired skills through independent reading, directed reading, class discussion, and individual Flash-X word recognition exercises.

A total of 20 students completed the study which devoted approximately 265 hours to communication skills. On completion of the study the experimental group was tested using the TABE Level E Form 2. Continual subjective evaluation of the students and the program was recorded by the instructors.

Treatment of Data

The data obtained from the investigation were treated in the following manner:

Group Comparison Evidence

1. Participants in the control and experimental groups were compared on the basis of age, sex, and marital status.
2. Participants in both groups were compared on the basis of IQ, last grade completed in school, and occupation held prior to the entry into the program.
3. Comparison of entry level and the achieved level of the experimental group during this study.
4. Comparison of student attendance.

Statistical Treatment

1. A t-test on the pretest of both groups was calculated.
2. A mixed analysis of variance was calculated on the difference of the scores between the pretest and the posttest for both groups.
3. A t-test on the posttest of both groups was calculated.

SUMMARY

Participants in the study were selected from a population living on Cape Breton Island, Nova Scotia. Both groups were selected from Canada Manpower referrals and were matched as closely as possible on the basis of their IQ, age, marital status, and pretest scores in reading comprehension.

The control group was taught communication skills by an instructor at Dingwall, Nova Scotia, using commercially prepared materials. The experimental group was taught at Point Edward, Nova Scotia, using L-100 equipment and materials as produced by the Educational Developmental Laboratories.

Standardized tests were administered to obtain student achievement in communication skills on completion of approximately 260 hours of instruction. Student IQ was obtained at the beginning of the program with the Revised

Beta Examination. Data was treated statistically by calculating the t-values, and by carrying out a mixed analysis of variance on the scores obtained from the TABE.

CHAPTER III

RESULTS AND CONCLUSIONS

The major purpose of this experimental research was to find out if sub-literate adults can learn to read with greater comprehension if taught by a multimedia approach than if they were taught in a classroom using the teacher-text book method. In Chapter II it was stated that the control group and the experimental group were formed as matched groups for this study. The results of the study are quantitative scores determined by the pretest examination given at the commencement of the study and the posttest examination given at the completion of the study.

All results are in the form of scores obtained on the actual tests which were interpreted and corrected in accordance with the manuals prescribed for the administration of the tests. The study was conducted commencing January 1970 and completed in August after approximately 265 hours of instruction had been administered.

Experimental Data

The first four Tables list data which deal with students' characteristics and their observable behavior as they progressed through the study. The remaining four Tables provide statistically treated data resulting from test results and the calculations of t-tests and analysis of variance.

It can be seen from Table 1 of Chapter II that

the participants of the experimental group were all males. There were two females in the control group. There were more participants in the 35-49 year bracket in the experimental group as indicated by an increase of five percent over the control group. The summarized data also indicates that the number of married participants in the control group was higher by five percent over the experimental group.

Table 2 in Chapter II indicates that there was an increase in IQ scores of 10 percent in the 71-79 range in the experimental group over the control group. It is also evident that there were no students in the experimental group whose IQ was 110 or over, whereas there was one student in the control group in this category. In the area of unskilled occupation, it is noted that the majority of students in the control group were engaged in the fishing industry, while a greater majority of the students in the experimental group were engaged as labourers. Remainder of the students were classified as "others" denoting various occupations such as: housewives, taxi drivers or those engaged in farming.

Table 3 shows the progress of the experimental group through the L-100 levels. Two students were at a level considered below the level at which the program started and had to receive instruction in basic letter formation before they could function at the RA level. On completion

of the study, the majority of the students were working at the CA and DA level with four students at the FA level.

It was impossible to assign such levels to the control group. They progressed through the prescribed material up to the time of the posttest.

Table 4 indicates that the average hours of attendance for both groups were closely matched since all students participating in the study were paid allowances by the Canada Manpower Centre for the number of days attended, and any prolonged absenteeism without a valid reason meant discontinuation from the program. It is not possible to determine from the data what influence the additional five hours credited to the experimental group had on their final achievement as measured by the posttest.

Statistically Treated Data

Table 5 shows that the subjects of the control group had a pretest mean score of 55.15. They had a posttest mean score of 60.60. The mean gain in reading comprehension due to instruction was 5.45 score points. All subjects showed some gain in posttest scores.

Table 6 indicates that the subjects of the experimental group had a mean score of 53.10. They had a posttest mean score of 72.20 points. The mean reading gain was 19.10 score points. All subjects also showed some gain in the posttest scores.

TABLE 3

L-100 LEVELS AT WHICH STUDENTS ENTERED THE PROGRAM AND L-100 LEVELS ATTAINED AFTER APPROXIMATELY 265 HOURS OF READING AND COMPREHENSION INSTRUCTION

L-100 Level	Student Placement at Beginning of Study	Number of Students at Each Level on Completion of Study						
		RA	AA	BA	CA	DA	EA	FA
Pre RA	2			1	1			
RA	16				5	6	2	3
AA	2						1	1
BA	0							
CA	0							
DA	0							
EA	0							
FA	0							
TOTAL	20			1	6	6	3	4

TABLE 4

COMPARISON OF STUDENT ATTENDANCE

Group	Number of Students	Average Hours of Attendance			
		First 100 Hours	Second 100 Hours	Third 100 Hours	Total
Control	20	91	95	74	260
Experimental	20	96	93	76	265

TABLE 5

PRETEST AND POSTTEST TOTAL READING SCORES AND DIFFERENCES FOR SUBJECTS OF THE CONTROL GROUP

Subject	Pretest Scores	Posttest Scores	Difference
01	86	90	4
02	86	89	3
03	77	83	6
04	77	81	4
05	69	74	5
06	68	71	3
07	66	71	5
08	66	70	4
09	61	70	9
10	55	65	10
11	48	57	9
12	46	49	3
13	43	49	6
14	41	48	7
15	39	47	8
16	39	46	7
17	35	40	5
18	34	38	4
19	34	38	4
20	33	36	3
Mean	55.15	60.60	5.45

TABLE 6

PRETEST AND POSTTEST TOTAL READING SCORES AND DIFFERENCES FOR SUBJECTS OF THE EXPERIMENTAL GROUP

Subjects	Pretest Scores	Posttest Scores	Difference
01	86	96	10
02	80	95	15
03	78	94	16
04	76	90	14
05	70	89	19
06	67	89	22
07	64	86	22
08	60	84	24
09	57	81	24
10	51	79	28
11	45	70	25
12	42	67	25
13	42	65	23
14	40	64	24
15	39	62	23
16	38	61	23
17	33	60	27
18	32	44	12
19	32	34	2
20	30	34	4
Mean	53.10	72.20	19.10

Results of the experiment were expressed graphically in Figure 1. The figure shows that there was very little difference between the pretest scores of both groups. On completion of the experiment the graph shows a marked increase in score points for the experimental group over the control group which tends to indicate that the experimental treatment was more effective than the control treatment.

To confirm this impression, a series of statistical analysis were carried out. A t-test on the pretest results of both groups (see Tables 5 and 6) indicated no significant gain as shown in Table 7.

In accordance with Winer (1962) a mixed analysis of variance was carried out which yielded a significant increase from pretest to posttest and a significant interaction between treatment scores and test scores, Table 8. A further t-test was carried out on the posttest scores shown in Tables 5 and 6 of the control and experimental groups. This result indicated a significant difference as shown in Table 7.

The analysis confirm that two groups, which started from about the same point, both showed that learning had taken place. Furthermore, it showed that more learning took place in the experimental group than in the control group. The statistical analysis indicate that the difference in this achievement was due to the treatment received by the experimental group.

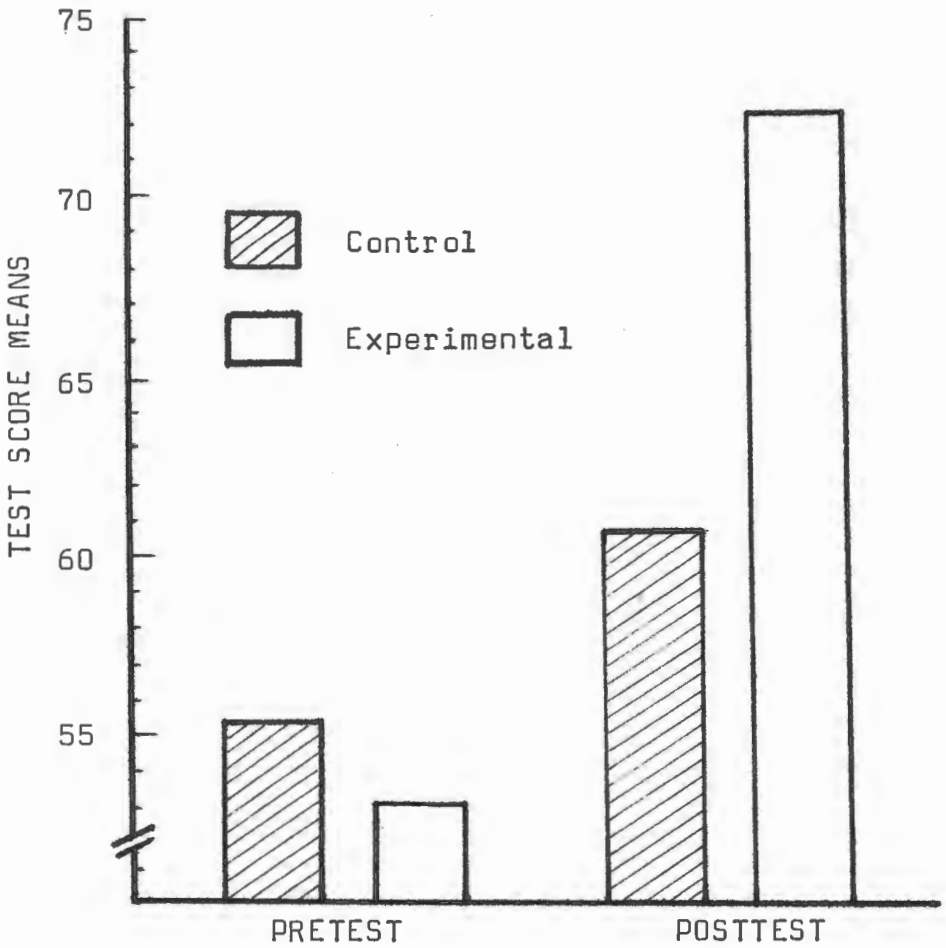


FIG. 1. Graphic Representation of Pretest and Posttest Score Means for Both Groups.

TABLE 7

TEST OF SIGNIFICANCE OF THE MEANS OF PRETEST SCORES AND POSTTEST SCORES BETWEEN THE CONTROL GROUP AND THE EXPERIMENTAL GROUP

Group		Computed t-values	Degrees of Freedom	Critical t-value at 5 percent level
Control- Experimental	Pretest	1.302	38	1.684
Control- Experimental	Posttest	1.901	38	1.684 *

* $p < .05$

TABLE 8

SUMMARY OF THE ANALYSIS OF VARIANCE OF READING SCORES FOR THE SUBJECTS OF THE EXPERIMENTAL AND CONTROL GROUPS

Source	df	SS	MS	F	p
Total	79	30245.46			
Between Ss	39	25727.97			
Treatment (T)	1	456.01	456.01		
Error (b)	38	25271.96	665.05		
Within Ss	40	4517.49			
Tests	1	3013.50	3013.50	200.10	<.001
Test x T	1	931.61	931.61	61.86	<.001
Error (w)	38	572.37	15.06		

The findings confirm the hypothesis that adult students instructed by the L-100 method will manifest a significantly higher achievement in reading and comprehension skills than students instructed by the teacher-text book method.

Subjective Evaluation of the Control Group

Subjective evaluation was made by the instructor of the control group and the researcher during his visits to the school. It is summarized as follows:

1. Considerable difficulty was experienced in handling 20 sub-literate adult students in one classroom by one instructor. At times the group had to be subdivided into five or six smaller groups all working at various levels of the communication skills. Those whose reading and writing ability was the lowest, required constant attention from the instructor in order to make progress. While engaged in assisting the lowest level group, other groups could not progress by themselves.
2. By using a variety of commercially prepared materials, the instructor was able to be more flexible and keep the majority of the groups satisfied and challenged, however, since the teaching material was developed by several publishers; there were times when the content

and methodology of several systems used together was conflicting and not continuous.

3. Much of commercially prepared material supposedly developed for the illiterates was considered too advanced for those who were unable to read, or those who were working in a group awaiting assistance of the instructor.
4. Motivation of the control group was high; however, it was found that adult students would easily become restless and bored if they had to wait for an instructor to help them out, or if the same approach and material was used for a prolonged period of time.

Subjective Evaluation of the Experimental Group

Subjective evaluation was made by the instructors of the experimental group, the head instructor for the communications course, and the researcher during his visits to the training centre. It is summarized as follows:

1. Majority of the students were fascinated by the L-100 equipment, while some were timid and reluctant to operate the equipment for fear of breakage.
2. Logical sequencing of skill acquisition and the variety of instruments used to acquire

these skills kept student interest at a very high level.

3. The 10 day orientation period for the instructors designed to teach them equipment handling skills is considered insufficient to give them confidence and flexibility necessary to deal with adults at such low level of literacy.
4. It was found that students were not able to advance through the levels in the time recommended by the manufacturer of the equipment.
5. It was found that the RA level was too difficult for those who were totally illiterate; hence they had be grouped into a Pre-RA level using materials in phonics and writing.
6. L-100 program provided a closer instructor-student relation than did the teacher-centered program.
7. Program provided for individual differences in that each student could advance at his own pace.
8. A remedial room provided the opportunity for the slower student, or one who missed a class to catch up on material that he missed or did not understand.

9. Filmstrips were too flimsy and many mechanical failures occurred.
10. Students whose IQ was below 75 found considerable difficulty in remembering the work they covered the day before. Some had to repeat a cycle several times.

Subjective Evaluation of Both Groups

This evaluation is equally applicable to both groups in the study. It is summarized as follows:

1. Those who could read and write for the first time showed a tremendous pride in their achievement.
2. Students brought to class their concepts of justice, equality and values that in many cases were not in keeping with those commonly accepted in a normal society.
3. Personal problems requiring immediate attention had a retarding effect on their academic progress.
4. In many instances powerlessness, helplessness and social isolation tended to create attitudes of "live for today" with their chances of obtaining a job being a goal almost out of reach.

CHAPTER IV

IMPLICATIONS AND RECOMMENDATIONS

The hypothesis stated that there would be a greater gain in reading and comprehension skills as obtained by adults who were instructed by a multimedia method over the gains obtained by a control group who were taught by the teacher-text book method during the same period of time. Statistical analysis showed that this gain was significant beyond the five percent level of confidence. The results of this study indicate that adult sub-literate students tend to respond better to machines and programmed instruction than to the conventional classroom method.

Implications of This Study

Research studies in the field of adult basic education are difficult to conduct primarily because of the vast number of uncontrolled variables that are always present. In all of the adult upgrading programs, the researcher finds himself in a difficult position by not having the complete freedom to select participants for his study from a desired population because Canada Manpower Centers refer clients for training. Under the Federal-Provincial Training Agreement, unemployed individuals of all walks of life are eligible to enter the training program. Some adults may genuinely desire to be academically upgraded while others may apply for training only because of the allowances that he will receive while under training.

Unlike conducting an educational research study with high school students who are relatively homogeneous with respect to their age, school grades completed, mutual interests, and environmental and life experiences; adult students are at the opposite end of the spectrum. Classes of adult students are very heterogeneous in that there is a wide spread in the ages in each class, they bring with them to class a tremendous variety of past life experiences, time out of school, individual differences, last grade completed, social status, and marital status with its accompanying problems. In general, adult sub-literate students have unhealthy self concepts in relation to their ability to progress academically. The researcher finds considerable difficulty in trying to accomplish near-perfect matching of the control and experimental groups. The hidden personality factors are not easily evident and yet have a considerable bearing on the learning ability of each individual in an experimental study.

It is primarily for this reason that many researchers in adult education have conducted their studies using army inductees, prisoners in correctional institutions, college students, or the deprived citizens living in ghettos of large cities. Here one finds a large population from which to choose his groups. The results of these studies cannot be interpreted as valid when applied to the population supported by the Canada Manpower Program whose desire is to

upgrade the illiterate and unemployed people of Canada to a point whereby they can be employable or enter a skill training program. It is considered that taining allowance in time of high unemployment is a big incentive to enroll in this program. Although some wish to be upgraded in as short a time as possible, there are many who set their own pace of learning in order that they may not graduate too soon unless they can be assured of entry into a further upgrading program, obtain a job or enter a skill training program. If both the control and experimental groups are faced with similar situations, and if both groups could be closely matched, then these variables would be at a minimum and the experimental results would be more valid than those obtained from studies of subjects in prison or inductees in the armed forces who are there against their wishes.

Testing Materials

Despite the claims that the TABE was adapted from a highly recommended and validated 1957 edition of the CAT, there has not been an evaluation of the TABE itself. The test, besides measuring achievement in arithmetic, is purported to measure the following sub-skills in communication:

1. Reading Vocabulary
2. Reading Comprehension
3. Mechanics of English
4. Spelling

Both the control group and the experimental group

curriculum concentrated in at least the four areas that the test was designed to measure.

The manual for administering the test contains a conversion table to permit the conversion of raw scores into grade placements. In many cases several different raw scores are converted into the same grade placement. For example, raw scores of 29, 30, and 31 are all converted into grade 2.1. It was therefore decided to use raw scores as a measure of the individual's achievement. Furthermore, grade placement tables have been constructed for the general adult population of the United States and hence do not reflect the Canadian School system.

Recommendations for Implementation of Future Programs

Based on the quantitative and subjective evaluation of this experimental study which was designed to improve methods in teaching reading and comprehension skills, the following recommendations are offered:

1. Considerable time should be devoted to the careful testing of the student prior to his entry into the upgrading program to:

   (a) Determine intellectual ability to learn.

   (b) Diagnose any neurological impairment which is not immediately observable.

   (c) Determine his present reading skills and difficulties he may have in the areas of oral reading, silent reading, auditory

comprehension and word recognition.

(d) Determine his attitudes, interests and odd personality traits.

2. The total communication skill be broken down into its sub-skills and displayed on a chart.

3. Each student be counselled separately, and using the results of diagnostic tests, be given an indication of his location on the chart, as well as, an overview of the entire upgrading program.

4. The teacher-text book method be abolished in lieu of Individualized Prescribed Instruction whereby the students study in groups from resource materials and the help of the instructor as necessary.

5. Students should be guided through the skill chart in order that they may build new skills upon the already acquired skills.

6. Students who are below the RA level to be taught the basic skills of writing and phonetics by a competent instructor.

7. Materials should be adult oriented, and re-written to reflect Canadian Society, values, and judiciary system.

8. A life skills component, or human relations component be included to deal with common problems that plague the unemployed - such as credit buying, banking, law enforcement, and the knowledge of the environment.

Through the use of films, make the students aware of the various occupations that are available and the demands of each occupation on him in order that he may get a clear concept of what is expected of him.

Further Research

There is need for further research in the following areas:

1. Developing adequate achievement tests with Canadian and Provincial Norms.

2. Developing criteria for the selection of teachers of sub-literate adults.

3. Developing teacher training programs to cope with problems common to all unemployed and socially-deprived adults and their learning difficulties.

REFERENCES

Agreement Between the Government of Canada and the Government of the Province of Nova Scotia. November 8, 1967. (Available through the Department of Manpower and Immigration, Halifax).

Anderson, D., & Niemi, J.A. Adult Education and the Disadvantaged Adult. Syracuse: Syracuse University, 1970.

Bauer, J. Getting Started, On the Way, Full Speed Ahead. Chicago: Follett Publishing Company, 1965.

Berger, A. Effectiveness of Four Methods of Increasing Reading Rate, Comprehension, and Flexibility. Syracuse: Unpublished Doctoral Dissertation, Syracuse University, 1960.

Brickner, A., & Senter, D. Learning 100 System Use with Project 100,000 Inductees, Fort Polk Training Center. Information Bulletin 3. Huntington, New York: Educational Developmental Laboratories, September, 1969.

Bruno, L. Guidlines for Teaching the Under-Educated Adult. Olympia, Washington: Department of Public Instruction, 1965.

Canada Manpower Officer's Manual. Training Regulations. Ottawa: Queen's Printer, 1967.

Canada Manpower Survey. Educational and Age Characteristics of CMC Clients Seeking Full and Part-Time Employment in Selected Occupational Groups. Halifax: Department of Manpower and Immigration, 1970.

Cole, M., Chorover, S.L. & Ettlinger, G. Cross Modal Transfer in Man. Nature, 1961, 191, 1225-1226.

Dominion Bureau of Statistics. General Review. 7.1-12, 1961, VII, 108.

Economic Council of Canada. The Challenge of Growth and Change. Ottawa: Queen's Printer, 1968.

Frackenpohl, H., & White, C.E. Learning 100 Instructor's Manual. Huntington, New York: Educational Developmental Laboratories, 1968.

Godwin, R. Teaching Basic Skills of Communication to Adults. Education Canada. 1969, 9, 3-11.

Goldman, B.A. Revised Beta Examination. In O.K. Buros (Ed.). The Sixth Mental Measurements Yearbook. Hyland Park, New Jersey: The Grypton Press, 1965.

Greenleigh Associates. A Field Test of Evaluation of Selected Adult Basic Systems. New York: Greenleigh Associates, September, 1966.

Hebb, D.O. The Organization of Behavior. New York: John Wiley & Sons, 1949.

Henney, R.L. Reading Instruction by a Phonetic Method For Functional Illiterate Adults at an Indiana Reformatory. Unpublished Ph.D Dissertation, Bloomington, Indiana: Indiana University, 1964.

Henney, R.L. Systems for Success. Chicago: Follett Publishing Company, 1965.

Kottmeyer, W., Ware, K., & Purvis, N.M. Basic Goals in Spelling. Toronto: McGraw-Hill Company of Canada, 1965.

McKee, J.M. et al. Improving the Reading Level of Disadvantaged Adults. Elmore, Alabama, 1967.

Merwin, J.C. California Achievement Tests, 1957 Edition with 1963 Norms. In O.K. Buros (Ed.). The Sixth Mental Measurements Yearbook. Hyland Park, New Jersey: The Grypton Press, 1965.

Neidt, C.D. California Achievement Tests, 1957 Edition. In O.K. Buros (Ed.). The Fifth Mental Measurements Yearbook. Hyland Park, New Jersey: The Grypton Press, 1959.

Parker, D.H. Learning Laboratory. Chicago: Science Research Associates, 1960.

Peerson, N. An Experiment with Evaluation in the Eradication of Adult Literacy by Use of Television Instruction over a State Educational Television Network. Washington: US Department of Health, Education and Welfare, 1961.

Scheier, E. Learning 100 Evaluation Manual. Huntington, New York: Educational Developmental Laboratories, 1969.

Scheier, E., & Senter, D.R. Evaluation of Learning 100: ABE Center, White Plains, New York. Information Bulletin 11, Huntington, New York: Educational Developmental Laboratories, October, 1969.

Scheier, E., & Senter, D.R. Evaluation of Learning 100: An Adult Education Project in Bedford-Stuyvesant, 1967-68. Information Bulletin 15, Huntington, New York: Educational Developmental Laboratories, February, 1959.

Statutes of Canada. Occupational Training Act. Ottawa: Queen's Printer, Chapter 94, 1967, p. 1205.

Wallach, H., & Averbach, E. On Memory Modalities. American Journal of Psychology, 1954, 68, 249-257.

Winer, B.J. Statistical Principles in Experimental Design. Toronto: McGraw-Hill Company of Canada, 1962.

APPENDIX A

DESCRIPTION OF EDL EQUIPMENT

DIRECTIONS FOR OPERATION OF THE AUD-X MARK 2

In following directions, please refer to the accompanying illustrations.

1. Plug Aud-X audio unit into an electrical outlet, using three-pronged plug or two-pronged adapter plug as appropriate to the outlet.

2. Unlock the turntable by releasing the LOCK/UNLOCK lever (A) of the audio unit.

3. Remove Aud-X projector from carrying case. At no time should projector be left standing in the bottom part of the carrying case while in use; doing so causes overheating.

4. Plug cord of projector into plug-in (B) at back of audio unit or into any electrical outlet, using three-pronged plug or a two-pronged adapter plug. It makes no difference whether the projector is plugged into the audio unit or a separate outlet.

5. Locate connecting cord (C) having the plugs at each end. Place the connecting cord between the projector and the audio unit by inserting one plug into the PHONO OUTLET (D) on back of the projector and the other plug into the PROJECTOR OUTLET (E) on the back of the audio unit.

6. Flip on the FAN SWITCH (F) on the back of the projector.

7. Flip on the LAMP SWITCH (G) on the back of the projector.

8. Flip the ON/OFF SWITCH (H) on back of the audio unit to the up position. This will light the green button (I) in the upper left hand corner of the front panel of the audio unit.

9. Select filmstrip from the album and make sure the film is rolled into the filmstrip cartridge (J) properly. Check this by turning the spool until the metal tab of the filmstrip is entirely under the plastic case; not extending beyond it at all. The metal tab must be in the proper position in the cartridge if the filmstrip is to frame properly.

10. Place the filmstrip cartridge (J) in top of the projector, making sure that the front lip of the cartridge containing the metal tab is under the metal spring (K) of the projector and that the cartridge is resting directly on the sprocket (L).

11. Advance film to frame showing TITLE by pushing the green button (I) on the front panel of the audio unit.

12. In order to bring picture into focus, adjust lens (M) on front of projector by rotating black rim.

13. Level instrument or adjust height by turning the feet (N), large screws, on each corner beneath the projector.

14. Continue to advance film by pushing the green button (I) on the front panel of the audio unit until the first START FRAME appears on the projection screen (O).

15. Remove record from album and place into position in audio unit by sliding it into the slot opening (P) in front of the audio unit. Slide record in until it clicks into position. (Record can be ejected at any time by pressing the EJECT BUTTON (Q) on the front panel of the audio unit.)

16. Connect earphones (R) by plugging into the HEADSET OUTLET (S) on the back panel of the audio unit. Either single headset or the jack box (T) may be plugged in. Multiple headsets may also be plugged into the jack box (T).

17. Push once the red START BUTTON (U) in the upper right corner of the front panel of the audio unit. The record and filmstrip will begin in synchronization.

18. Adjust the volume by turning the VOLUME CONTROL (V) on the back panel of the audio unit. If headsets contain a volume control, have students adjust them.

19. Aud-X lessons contain built-in stops to give the students time to complete directed tasks. At these times a START FRAME will appear on the projection screen (O). When students have completed the assigned task, press the red START BUTTON (U) on the front panel of the audio unit to continue the lesson.

20. At the end of Side One of the record, a START FRAME will appear on the projection screen (O) and the record will automatically eject. The record must be turned over, reinserted, and the START BUTTON (U) pushed once to continue with Side Two of the record.

21. At the completion of Side Two of the record, the record will again eject automatically.

22. Rewinding of the film in the cartridge must be done manually. The metal rewind rod (L) must be engaged into the hole in the middle of the filmstrip cartridge (J). To do this rotate the rewind rod (L) until the two little sprockets or pins on the end will slip into position in the hole in the middle of the cartridge. Push the rewind rod in firmly.

23. Pull back the big spring (K) which covers the sprockets and the lip of the cartridge. Pulling back the spring will activate the rewind.

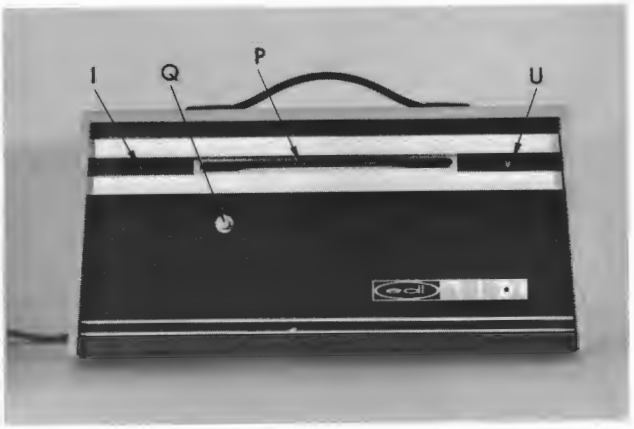
24. Replace record and filmstrip in proper place in albums.

25. Flip off the LAMP SWITCH (G) on the Aud-X projector and allow the fan to run for a couple of minutes to cool the instrument.

26. Flip off the FAN SWITCH (F) on the projector.

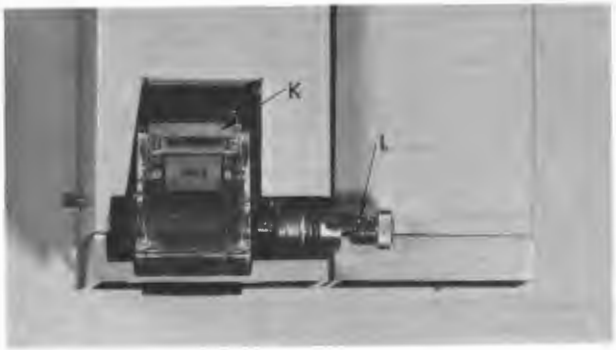
27. Flip the ON/OFF switch (H) on the back of the audio unit to the down position to turn off the instrument.

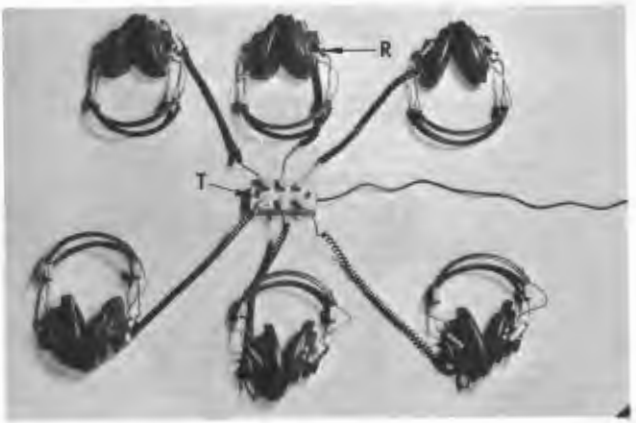

EDUCATIONAL DEVELOPMENTAL LABORATORIES
AUD-X Mk 2
FAN
LAMP
PHONO
D
F
G


I
Q
P
U

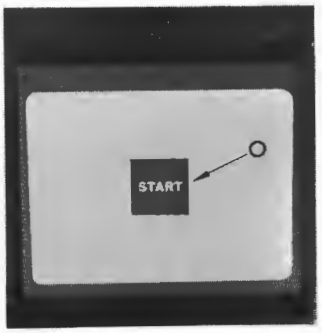

M
N


J


K
L


R
T


B
H
A
E
S
V

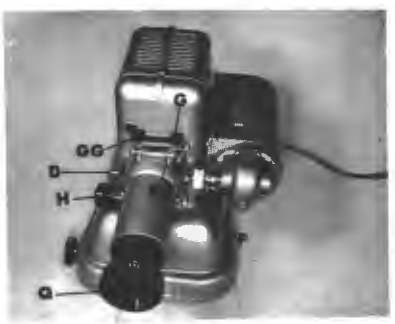

START
O


C

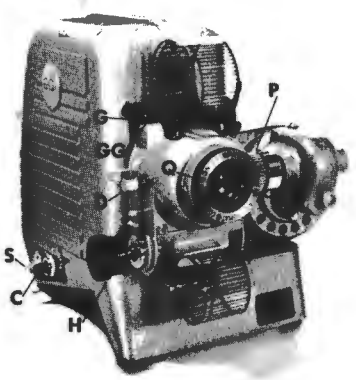
Operation of the Controlled Reader and Controlled Reader Jr.

(Before operating, remove packing from between condenser lenses and insert projection lamp.)

1. Plug in projector. Set speed dial A below 15 (off position). The numbers on the speed dial indicate lines per minute.
2. Turn on projector. On Controlled Reader, use switches S at rear of projector; on Controlled Reader Jr., use switch S at side of projector.
3. Insert film into projector between G and GG, keeping toward the screen the side on which yellow paint has been applied.
4. Knob H can be pressed in and held, in order to repeat a line. It may be turned clockwise to reverse film.
5. Move knob D up to obtain guided slot and to adjust framing.
6. Sharp focus may be obtained by rotating barrel Q.
7. To start scanning action, set speed dial A at 15-20 lines per minute. After the scanning slot shows the title of the story, the new words will follow. To review each word, stop scanning action by pressing "stop" button C. Each successive word is introduced by releasing and pressing button C. After the last word appears, release button C and tell students to get ready to read.
8. As the selection begins, turn up speed dial A to the rate appropriate for the group. COMPUTE READING RATE AS FOLLOWS:
   The speed dial is calibrated in *lines per minute;* the filmstrips indicate *words per line* in their code numbers (i.e., the strip 6(5)15 has 5 words per line). To determine rate in words per minute, multiply *lines per minute* times *words per line.*
   Example: If the filmstrip has 5 words per line and the speed dial is set at 30, the reading rate would be 150 words per minute (5 x 30 = 150).
9. Free-Reading Slot
   To expose a full line of print, lower knob D. To return to the scanning slot, raise knob D.
10. Manual Scanning Control
    Manual control over the scanning slot can be obtained by disengaging the motor coupling (pull P out and turn to lock in *out* position). The scanning slot then can be guided at will by turning the knurled coupling manually.



Controlled Reader



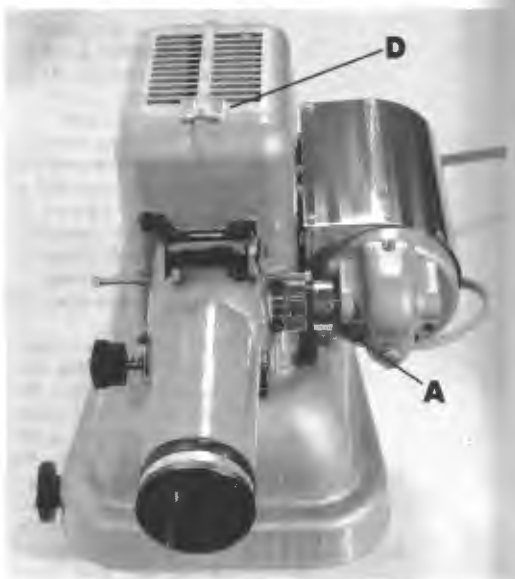
Controlled Reader Jr.

Note: For Processing Training, the conventional motor unit must be removed from the Controlled Reader and the High Speed (6X) Processing Motor installed.

Directions for Installation of Processing Motor on Controlled Reader

Remove Controlled Reader Motor as follows:

1. Disengage knurled coupling A by pulling apart and revolving slightly.
2. Pull out plug B.
3. Turn knob C counter-clockwise and remove.
4. Slide motor cover back and up.



Install Processing Motor as follows:

1. Slide motor cover down and forward, making sure clip D on top engages.
2. Engage knurled coupling A by revolving parts until pin slips into place.
3. Insert plug B.
4. Insert knob C and turn clockwise.

Operation of the Tach-X

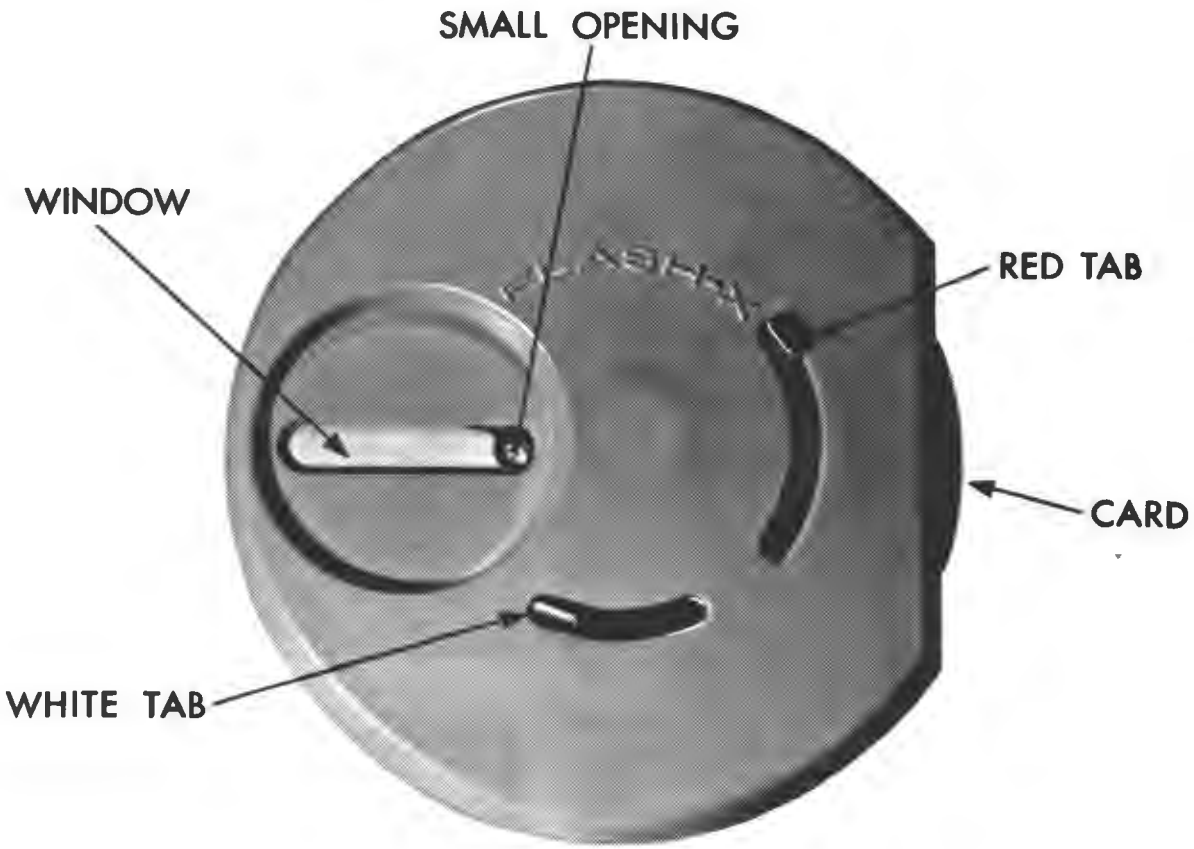
1. Plug in projector. Turn on switches at rear of projector. Insert film between plates G and GG, keeping lacquered side toward screen. Push film down, retaining slight downward pressure, and rotate film advance knob H counterclockwise until film is engaged and print is visible on the screen. Place roll of film on film spool N.
2. Focus projector: Press X, allowing cams to rotate until red cam follower bar lines up with red line. (This is check position 3.) Rotate lens B to secure sharp focus. Using elevating knob E, raise or lower projected image.
3. Frame in desired sequence--A, B, C, or D--by raising or lowering framing level L until appropriate letter is centered in clear area of projected image.
4. To set speed, lift small knurled section of cam assembly and rotate it until letter indicating desired speed is above line on lower cam. Drop locking pin into appropriate hole. Speed range: A--1/100 second, B--1/10, C--1/4, D--1/2, E--1, and F--1 1/2.
5. To get ready for first exposure, press switch X to advance to ready position. The image will be blurred. Now advance film by turning knob H one click stop. Give students "Ready" signal.
6. Make exposure by pressing X. Lens will snap image into focus, then out. The cams will stop rotating when position 2 is reached. Students make their response, either orally or in writing.
7. Check. Press X, allowing cams to rotate to position 3, bringing image into focus. Students check their work. Continue training by repeating steps 5, 6, and 7.

READY

WRITE

CHECK

Operation of the Flash-X



1. Slide a card into the Flash-X with arrow pointing towards window.
2. Turn the card until number "1" shows in the middle of the small opening.
3. Look at the window, and flip the red tap up or down to make a flash.
4. Write down or say what you saw.
5. Check. Open the window by moving the white tab to the left or right, or flip the red tab quickly a number of times.
6. Turn the card so that number "2" shows in the small opening. Now you are ready for the next flash.