THE EFFECTIVENESS OF VIDEO TAPING AND PLAYBACK EQUIPMENT FOR TEACHING READING IN THE SECONDARY SCHOOL

by

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A Dissertation Submitted to the Faculty of the

DEPARTMENT OF SECONDARY EDUCATION

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

The University of Arizona

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THE UNIVERSITY OF ARIZONA

GRADUATE COLLEGE

I hereby recommend that this dissertation prepared under my direction by RONALD ROSCOE STARCHER

entitled THE EFFECTIVENESS OF VIDEO TAPING AND PLAYBACK EQUIPMENT FOR TEACHING READING IN THE SECONDARY SCHOOL

be accepted as fulfilling the dissertation requirement of the degree of DOCTOR OF PHILOSOPHY

Paul M. Alley — Dissertation Director — Date 2/18/71

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ACKNOWLEDGMENT

The author gratefully acknowledges the assistance given him by the following individuals: Mr. Richard Dwight, President of Visual Concepts, Inc., for supplying considerable data and the technical resources of both himself and his company; Sister Mary Julian, C.M.F., Mother Provincial of the Sisters of the Immaculate Heart of Mary for providing him with the opportunity of using their educational facilities; Sister Miriam Claire, C.M.F., principal of Suffolk Hills School (formerly Immaculate Heart High School), Tucson, Arizona, for insuring the cooperation of the faculty and students of the school; Dr. Paul M. Allen, Professor of Education, for the kindness, assistance and direction which was given by him during the preparation of this dissertation and Drs. Barnes, Butler, Gavlak, and Grant for their very able assistance in completing this investigation and reporting the results.

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ABSTRACT

Purpose

Every school official should feel obligated to provide the students of his school with opportunities to develop their skills in educationally-sound endeavors, and to provide competent instruction in subjects which make post high school lives more fruitful. Yet extensive research presently available shows that up to 25 percent of America's public school children are unable to read at even a minimum level of efficiency.

This study focused on: (1) changes in reading skills when secondary school students were exposed to a pre-recorded video developmental reading program, (2) student attitudes associated with instruction by means of video equipment (television), and (3) changes in student behavior as a result of exposure to conditions designed to reinforce a learned skill (reading).

Procedures

This investigation was conducted as an exploratory field study using a standard Design 1 research design (one-group pretest-posttest design with minimal control) modified to incorporate a repeat to check reproducibility and to permit the administration of an attitude inventory and a library usage tally.

The experimental population consisted of 361 secondary school students from three schools.

Three instruments were used: (1) The Nelson-Denny Reading Test of Vocabulary, Comprehension and Rate for High School and College, Forms A and B. Form A of this test was used to pre-test 265 ninth-grade students. These students were then exposed to a commercially available video developmental reading program consisting of 36 video tapes, each 30 minutes in length. These students were post-tested by Form B. (2) The Nebraska Attitude Inventory was modified to obtain information about three affective domains (reading, television, and reading instruction by television) and was administered to 107 students; (3) A daily tally was kept of books checked out of a school library during the entire year prior to and during which the video reading course was in effect. These data provided a means of comparing the average number of books read per student.

Conclusions

1. Based on raw test data converted to the national norms of the Nelson-Denny Reading Test, the mean scores of the experimental population improved by 41 percentile rank scores in reading rate, 7.5 percentile rank scores in comprehension, and 6.5 percentile rank scores in reading vocabulary. In terms of reading speed, this represented an increase of 405 words per minute.

2. The attitude of students in the experimental population was found to be: positive (57.0 percent agree and 43.0 percent disagree) toward the subject of reading; positive (60.7 percent agree and 39.3 percent disagree) toward the subject of television; nearly neutral (51.6 percent agree and 48.4 percent disagree) toward the subject of instruction by means of television.

3. Students in the experimental population did not make greater use of the school library during or following exposure to the video developmental reading program. Considering only the months during which the program was in effect, the average number of books checked out of the school library was 1.58 books per month per student. During the equivalent time of the year prior to the reading program this figure was 1.86.

Recommendations

1. Studies similar to this should be conducted on the same subject with larger experimental populations (perhaps nationwide) and with more sophisticated research designs (more rigorous controls).

2. Follow-up studies should be made, perhaps on the identical experimental population, to determine if the large increase in reading speed found in this study is valid and to determine how long it is retained.

3. Other commercially prepared reading programs (both video and non-video) should be evaluated.

4. Further refinement of the instrument used to measure the attitudes of the experimental population is urged.

CHAPTER I

THE PROBLEM

Introduction

According to the 1960 report of the United States Census, the average reading ability of Americans over twenty-five years of age is approximately that of a typical tenth grade pupil.

In 1964, Francis Keppel, United States Commissioner of Education, stated, "Every examination of the problems of our schools, of poverty, every question raised by troubled parents about our schools, every learning disorder seems to show some association with reading difficulty."[1]

Many authorities in the field of reading diagnosis and treatment report that the percentages of seriously retarded readers (one year in the lower grades and two or more at the higher levels based on national grade norms) range from about 10-25. Every survey completed at any grade level beyond the first grade reveals numerous cases of retarded

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1. Francis Keppel, "Research: Education's Neglected Hope," Journal of Reading, Vol. 8 (October, 1964), p. 3.

readers. A problem in education that affects 10-25 percent of all students in the United States must be considered of major importance.[2]

Reading is a learned skill which requires considerable training and practice.[3] As with many other skills, reading can be learned without formal instruction. But, much of this learning may be inefficient and even detrimental to highly skilled performance.

In most school systems of the United States reading instruction is concentrated in the early primary grades only. As the pupil advances through the grades, the amount of reading instruction he receives decreases while the amount of required reading increases. Upon entering junior high school the student is expected to be able to read at a high level of efficiency. At this level only the most inept readers are given instruction. This is normally considered remedial reading and is provided by reading-specialists on a referral basis.[4] It is a rare occurrence when senior high schools provide any extensive reading instruction to pupils.

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2. D. D. Durrell, Improvement of Basic Reading Abilities (New York: Harcourt, Brace and World, 1940), p. 2.

3. Anne McKillop, "Why Many Children and Youth Are Retarded in Reading," Reading in the Secondary Schools (New York: The Odyssey Press, 1961), p. 13.

4. George D. Spache, Toward Better Reading (Champaign, Illinois: Gerrard Publishing Company, 1963), pp. 45-53.

The inescapable result of this ommission is that many poor readers are unable to meet the increased reading demands of high school. Consequently, they drop out of school. Ruth Penty[5] conducted an extensive four-year study of students enrolled in Battle Creek, Michigan, High School. This in-depth study of 593 poor readers and 593 good readers revealed that more than three times as many poor readers as good readers dropped out of high school before graduation. Interview data emphasized that difficulty in reading played a very important role in the early departure of boys and girls from school. It was learned that 49.9 percent of the poor readers but only 14.5 percent of the good readers dropped out of school before graduation.

It has been estimated that the reading ability of a typical ninth grade high school student is as follows: Reading rate = 200-300 words per minute;[6] Comprehension = 120-250 words per minute;[7] Vocabulary = 60,000 words.[8]

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5. Ruth C. Penty, Reading Ability and High School Drop-Outs (New York: Bureau of Publications, Teachers College, Columbia University, 1956), pp. 51, 73.

6. Nita Banton Smith, Read Faster (New York: Prentice-Hall, 1961), p. 3.

7. Visual Concepts, Inc., from the results of extensive testing of ninth grade students in secondary schools. Test data available in company files, 7601 Mentor Avenue, Mentor, Ohio.

8. Mary K. Smith, "Measurement of the Size of General English Vocabulary through the Elementary Grades and High School," Genetic Psychology Monographs, 1941, pp. 311-345.

For those students who desire to enter college with a reasonable chance of success the following minimum reading skill is recommended: Reading rate = 400-600 words per minute;[9] Comprehension = 300-500 words per minute;[10] Vocabulary = 150,000 words.[11]

Post-high school students who do not enter higher education are expected to read at a level substantially higher than the ninth-grade in order to meet the routine demands of life.

From the statistics listed above it can be seen that two opposing forces in regard to reading come into play: (1) The average student enters high school with a partially developed skill in reading. While in high school he receives little or no formal instruction in reading. (2) At the same time, the amount of required reading increases drastically. It has been estimated that 75 percent of all that is learned at the secondary level is acquired through reading.[12]

The student has four alternatives to the required reading dilemma: (1) He can improve his reading efficiency. (2) He can devote larger

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9. Nita Banton Smith, op. cit., p. 3.

10. Visual Concepts, Inc., op. cit., test data from files.

11. Mary K. Smith, op. cit., pp. 311-345.

12. L. C. Fay, "Reading in the High School," What Research Says to the Teacher (Department of Classroom Teachers, American Education Research Association of the National Education Association, 1956), Washington, D.C., p. 10.

amounts of his time to compensate for the increased amount of required reading. (3) He can accept the penalties of not completing the reading assignments. (4) Or he can give up and drop out of school.

Practice alone seldom results in a high degree of reading skill. Consequently, many post-high school students are poorly prepared to meet the communication demands of society.[13]

Penty concluded:

> Several other findings of this study emphasize the need for the giving of help to boys and girls in the improvement of reading skills throughout the secondary schools, if they are to remain in school in greater numbers until graduation. The past practice in most school systems of terminating special help in reading at the close of the sixth grade, is not meeting the needs of students who are expected to read increasingly difficult and varied materials without receiving help in the techniques of reading those materials. The prevalence of drop-out in the tenth grade points to the need for special help in reading between the sixth and the tenth grades. It is also undoubtedly desirable to continue the giving of reading help through the high school grades.[14] (Emphasis supplied.)

How can the fourteen million students in the senior high schools of the United States be given this needed and recommended reading instruction?[15] George Spache stated that the number of adequately trained personnel to give reading instruction is insufficient.[16] Hence, it would appear that a method must be developed which will enable the

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13. McKillop, op. cit., p. 13.

14. Penty, op. cit., p. 77.

15. Lindley J. Stiles, Lloyd E. McCleary, Roy C. Turnbaugh, Secondary Education in the United States (New York: Harcourt, Brace and World, 1962), Fig. 2-4, p. 26.

16. Spache, op. cit., p. 45.

presently available reading teachers to reach more students (at least until additional personnel can be trained).

One attempt to solve this problem has already been made. This method involves the use of Video Recording and Playback Equipment. This teaching "tool" permits the video-taping of classroom performance of master teachers, under ideal teaching conditions, using scientifically proved methods. The resultant tapes can then be played back as often as necessary on television screens.

Using such equipment and taped lessons, the number of students reached is limited only by the number of television sets available to students within a proper seating and viewing space. Several independent companies and a few public school districts have prepared reading courses using this method. This investigator has attempted to study the effectiveness of televised reading instruction under actual classroom conditions by evaluating one of the several commercially-produced reading programs that are available. The results are reported in this study.

Statement of the Problem

There are many reasons for the inability of certain people to read well. Albert Harris[17] suggests that among these reasons are:

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17. Albert J. Harris, How to Increase Reading Ability (New York: David McKay Company, 1969), pp. 20-21.

(1) lack of reading readiness, (2) mental retardation, (3) physical handicaps, (4) directional confusion, (5) special brain defects, (6) emotional handicaps, (7) accidental interference with learning and (8) poor teaching.

Three of these reasons--lack of reading readiness, accidental interference and poor teaching--combine to form a composite reason which might be termed "insufficient exposure to conditions which encourage a person to read well." People in this category are often called "Able Retarded Readers." The intent of this dissertation is to present the results of an action study designed as a systematic attempt to alleviate this "insufficient exposure" deficiency.

Thus, this is a first step in a proposed long-range program designed to improve the reading speed and comprehension of all students in one local private high school, and a continuing study made in two other schools. The experiment is unique in that the entire reading-program was presented by means of video and audio equipment. Hence, the results of this experiment will have considerable practical value from the standpoint of the student, the parent, the classroom teacher and the school administrator.

This investigator proposes to answer the following:

1. What gains are realized in reading speed and comprehension in offering a specialized reading-instruction program

to secondary school students by the use of video recording and playback equipment?

2. How acceptable (from an attitudinal standpoint) is reading instruction to secondary students when performed by such equipment?

3. What are some of the measurable consequences of teaching reading to secondary school students by the use of video equipment?

   a. Will students make greater use of the school library after exposure to a developmental reading program?

   b. Will the vocabulary of students increase after being exposed to a developmental reading program?

   c. How do students who participated in this reading program compare with those who do not, when compared with national norms of mean reading rates and comprehension?

Definition of Terms

Average Student: A hypothetical student who performs at the exact median (50th percentile) on the test in question.

Audio Presentation: An electronic presentation that can be heard by the human ear.

Commercially Prepared Video Reading Program: A reading course consisting of thirty-six, thirty minute, prerecorded video reading

tapes, prepared and distributed by Visual Concepts, Inc., of Mentor, Ohio. Its trade name is "Basic 36."

Electromagnetic Radiation: A continuous range of radiation spreading from gamma rays to audible sound waves.

Good Reader: A student who read in the highest quarter of his class at the time the last reading test was administered (assuming a normal heterogeneous group).

Grade Equivalent: The grade level for which a given score is the real or estimated average.

Grade Norm: The average score obtained by students of a given grade placement.

Hawthorne Effect: Any effect which causes a pre-selected experimental group to perform differently from expected levels, as a result of the knowledge that they are included in an experiment.

Poor Reader: A student who read in the lowest quarter of his class at the time the last reading test was administered (assuming a normal heterogeneous group).

Reading: The meaningful interpretation of verbal symbols.

Reading Efficiency Index: The product of reading rate times percentage of comprehension.

Readiness Test: A test that measures the extent to which an individual has achieved a degree of maturity or acquired certain skills or information required to begin some new learning activity.

Reading Age: An age-equivalent score assigned to the average score on a reading test for individuals at a given age.

Retarded Reader: A student who has a marked disparity between his mental capacity and his reading achievement (a disparity of more than one year in the lower grades, and two or more at the higher levels, based on national grade norms).

Video Presentation: An electronic presentation that can be seen by the human eye. Identical with television presentation.

Video Tape Recorder (VTR): A recorder which records sound and pictures on magnetic tape in such a manner that the tapes can be rewound, played back, and then shown on a television monitor at a later time, or many times.

Assumptions

The following assumptions have been made to facilitate the collection, interpretation and the presentation of meaningful information and data:

1. The commercially-prepared program of 36 lessons used in this experiment is a typical example of the several such programs that are available.
2. The pre-recorded reading course (Basic 36) prepared and distributed by Visual Concepts, Inc., of Mentor, Ohio, is technically and educationally sound.

3. The instrument (Nelson-Denny Reading Test, Forms A and B) used to measure reading rate, comprehension, and vocabulary prior to and at the conclusion of the course is a valid measuring device.[18]

4. The instrument (Modified Nebraska Attitude Inventory) used to obtain opinions of students regarding instruction by television and of the commercially prepared reading program is a valid measuring device. It is believed that the insertion of specific questions regarding reading, television and televised reading instruction did not destroy its validity.

5. There is no essential difference between beginning and mature reading. A number of authorities on reading state that the minor differences that do exist are in appreciation and purpose; and that the techniques employed for initial and developmental reading are very similar.[19]

6. Incidental influences, such as the "Hawthorne Effect," play only a minor role in the outcome of this reading program. The

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18. Oscar Krisen Buros, Reading Tests and Reviews (New Jersey: The Gryphon Press, 1968) 6(800), Review by D. B. Orr, pp. 315-317.

19. Jeanne S. Chall, Learning to Read: The Great Debate (New York: McGraw-Hill, 1967), p. 56.

reading course covers nearly a semester. Repeated exposure to an already commonplace object (a television screen) minimized the novelty, and the consequent "Hawthorne Effect."

Limitations of the Study

Some of the limitations of this study are:

1. The availability of precise data in the area of reading is extremely limited. For example, estimates of the vocabulary of a typical ninth-grade student vary from 5,000 to 65,000 words.[20] There seems to be little agreement among recognized authorities in the field of reading as to an acceptable method for determining such data.
2. The use of video recording and playback equipment as a teaching tool, in the area of reading at the secondary level, has been very limited. In fact, only a few studies have been made of reading instruction at the secondary level using video equipment.
3. The population involved, approximately 350 students, is a limited sample.
4. The investigator had no control over the design or preparation of the pre-recorded reading program. After auditioning

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20. Mary K. Smith, op. cit., pp. 311-345.

most of the video-tapes, several suggestions were made which, if adopted, should make the course more interesting to future students.

5. The video reading program at Immaculate Heart High School in Tucson, Arizona, was offered for the first time during the 1969-1970 school year. It was not totally successful, due primarily to equipment malfunctions. Technical problems with the video tape recorder resulted in considerable down-time. Only one group of students, an Honor's English class of sixteen students, actually viewed all thirty-six tapes and took the post-test. These students were not representative of the entire student population of the school, hence, their post-test scores were not used in this study.

6. The instruction of any subject via television depends, to a large extent, upon the quality of the video and audio presentations. Poor picture and sound quality are definite limitations for any televised program. These problems have largely been solved in commercial broadcasts; but the use of video equipment in the classroom is still in its infancy and is accordingly subject to equipment malfunctions. Few teachers are competent operators of such equipment. Such operational limitations will hopefully be solved in time.

No attempt was made during this study to investigate the specific variable of student attitude as affected by the quality of the video and audio presentations. This variable may have a bearing as to the attitude of students toward instruction by television.

7. The diverse locations of the test schools posed the limitation of distance. However, the authenticity of the information and data used in this study was verified by personal contact with officials of all of the schools involved.

Summary

Every school has an obligation to provide its pupils with opportunities to develop their skill in educationally sound endeavors and to provide competent instruction in subjects which will make their post-high school lives more fruitful. Research has shown that the average American adult is deficient in the area of reading. This would indicate that this particular area has been ignored in the formal education of many adults, or has been given insufficient attention. Only an extensive adult-reading program would solve this problem for the existing adults. But future adults can be helped while they are enrolled in elementary and secondary schools. When the increased complexity of our society is taken into account, it seems reasonable that serious

attempts be made now to upgrade the very important area of reading. With growing numbers of young people in our schools, with inflation and rising taxes, it would appear that the only logical way to provide adequate reading instruction to large numbers of students at a reasonable cost by existing teachers is through the use of teaching aids. However, the arbitrary installation of untested methods and teaching aids should not be permitted.

This study is directed toward evaluating the effectiveness of a potentially valuable and far-reaching teaching aid--video recording and playback equipment. In the hands of well-trained teachers its future is unlimited. The principal areas to be studied are: (1) changes in reading skills when students are exposed to a pre-recorded reading course, (2) student attitudes associated with this method of instruction, (3) changes in student behavior as a result of exposure to conditions designed to reinforce a learned skill.

Chapter II contains a review of related literature on video recording and playback equipment; the teaching of reading; and a possible marriage between the two for the benefit of the student.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter is divided into three sections: (1) the history and operation of video recording and playback equipment (television), (2) the theories, methods, innovations and experiments pertaining to the subject of reading instruction, and (3) a summary of investigations dealing with the relative success of video recording and playback equipment (television) as a teaching aid.

The information presented is concentrated on material which clarifies the reasons for the selection of video equipment as a potential teaching aid, and/or reading instruction as the recipient of this aid.

The History, Theory and Operation of Video Recording and Playback Equipment

History

The Danish physicist Valdemar Poulsen patented in the United States on November 13, 1900, his invention of magnetic sound-recording. In that invention lies the origin of audio and video tape recording. The word "television" was coined in the same year, 1900, by the French engineer, M. Perskyi. It means "seeing at a distance."

In 1927, an Englishman, John L. Baird, invented "phonovision," the first technique for recording and playing back a television signal. Baird's method consisted of transforming the image into equivalent electrical impulses and impressing them on the wax surface of a phonograph record.

Over the succeeding years, many individuals and industrial concerns attempted to improve the quality of the recorded image. But it was not until 1951 that video signals were successfully recorded on magnetic tape. On November 11th of that year, the Electronic Division of Bing Crosby Enterprises demonstrated a monochromatic (black and white) video tape recorder. On December 1, 1953, at its David Sarnoff Research Center in Princeton, New Jersey, the Radio Corporation of America gave its first public demonstration of tape recording and playback apparatus with pictures and sound in monochrome and full color. All of these early units were too large and too expensive for the mass market. However, by 1967, in the United States alone, at least thirty manufacturers were in the business of producing low-cost video tape-recording equipment.

At the present time (1971) there are three major price categories of video tape recording systems: half-inch monochrome systems priced under $2,500; one-inch monchrome systems priced from $4,000 to $50,000; and two-inch monochrome systems of commercial broadcast

quality costing $100,000 and up. One-inch color systems sell from around $25,000 to $35,000. Because of research and production "breakthroughs" prices are constantly decreasing, and quality is gradually improving.

Video recording and playback equipment (television and its associated component equipment) have been used as a major educational aid for less than twenty years. Educational television, as a mass media device, was initiated on May 25, 1953, when station KUHT at Houston, Texas, began operations.[1]

Lester Asheim, in 1962, after surveying the opinion of persons knowledgeable in the field of education, made the following predictions: "Not every school, rural and urban, will have television by 1971, but probably every major school, college and university will have at least one closed-circuit system, and there will not be many school children who will not have had some television in their educational experience."[2]

As the United States enters the decade of the 1970's it is amazing how accurate this prediction was. Today it is a rare child, indeed, who has not had some television in his educational experience.

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1. The Ford Foundation and The Fund for the Advancement of Education, Teaching by Television (New York: Georgian Press, 1961), 2nd. Ed., p. 3.

2. Lester Asheim, "A Survey of Informed Opinion on Television's Future in Education," Educational Television: The Next Ten Years (Stanford University: The Institute for Communication Research, 1962), p. 33.

In 1966, more than 100 educational television stations were in operation. There were many commercial stations selling or donating daytime hours for school programs; and there were hundreds of closed-circuit systems in schools and colleges. In addition, there were many cases of multiple institutions linked together by cable or microwave.[3] It has been estimated that by 1966, 15 million students were enrolled in ETV courses.[4]

The use of video equipment in the classroom has become so commonplace that school administrators, classroom teachers and other school personnel should become familiar with the theory of its operation. A short summary is given in Appendix A of the background theories of electromagnetic radiation and other technical intricacies of video recording and playback equipment.

Operation

Actual operation of a well-adjusted video system is not difficult. However, it is advisable for all persons using the equipment to have sufficient training and practice in the proper handling of the various controls. Careful study of Appendix A should give any interested

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3. Judith Murphy and Ronald Gross, Learning by Television, The Fund for the Advancement of Educational Television (New York: Georgian Press, 1966), p. 24.

4. Ibid., p. 32.

person an understanding of what makes the equipment work. All manufacturers of video equipment send with the equipment complete instructions needed for care and operation of their equipment. These instructions must be carefully studied and followed to achieve good results.

The following are practical comments and advice about the care, operation and routine maintenance of video equipment:

1. At the present time there is little or no compatibility (ability to play video tape recorded on one make of VTR on different makes of VTR produced by different companies). This is a major obstacle to good fidelity in reproduction of the pictures.

2. Quite often different brand name VTR units are not compatible with other VTR units produced by the same company. Even different brands of video tape will not operate equally well on different VTR units.

3. In selecting a specific brand of VTR, be certain it will be serviced to your satisfaction. It is very common to find it necessary to pack and ship it to New York or Los Angeles for service. The delays can be numerous and the "downtime" very troublesome and expensive.

4. Do not accept delivery of a VTR unit without having it "aligned" at the location where it will be used. Internal adjustments, such as "head speed" and "head penetration" cannot be made by the average person.

5. The video camera is a delicate piece of equipment. Handle it with extreme care and always keep the lens capped when not in use. Never point the lens at the sun or other bright light. Permanent damage costing several hundred dollars may result if this is done.

6. Keep the Video Tape Recorder covered when not in use. Nearly all VTR units are strongly affected by particles of

dust and dirt. Before every use (and sometimes even during a playback session) the playback head will have to be cleaned. A short "blast" of Freon from a small pressure can will often remove small dust or iron oxide particles from the head but very often a special cleaning solution will have to be used. Use extreme care when handling the recording and playback heads. Do not permit the cleaning solution to come in contact with the magentic tape or plastic parts of the VTR.

7. Prior to using the video equipment, it is advisable to turn on the equipment and allow it to operate for a half hour. This permits all of the components to reach a constant temperature and the stability of recording and playback will be much better.

8. All video tapes should be previewed before the actual showing. The heads should be carefully cleaned before the actual showing.

9. The "tracking" control of the VTR is a useful and much used knob. It is used often on most sets to stabilize the picture on the television monitor. When two or more monitors are being used (at the same time) from one VTR the use of this control is critical.

10. If at all possible, purchase the television camera, video tape recorder and television monitor from the same reliable manufacturer. Because this equipment is designed as a complete "package" the connections will all fit, and in addition, the quality of the video output will probably be much better.

11. The choice of half-inch, one-inch or two-inch equipment will have to be made by the buyer. Cost and potential usage are the major factors.

12. When using the equipment to record the performance of individuals (teacher evaluation for example) great care should be exercised in handling and showing the completed tape. It is desirable that the person being taped be allowed to have several practice sessions on camera before the actual taping session. Even then, it is best to show the tape to that individual first and get his permission before showing the tape to any other persons.

13. The "dubbing" of tapes (making copies from the original) is a difficult process because imperfections in the original are multiplied in the copies. When buying copies of tapes, check the quality of the reproductions on your own VTR before accepting the copies.

14. Contrary to common belief, most pieces of electronic equipment work better if used often (but carefully).

15. In case your VTR system fails to operate, the first thing to do is to check the power cord to see that the unit is receiving electrical power.

Literature Pertaining to Reading Theories, Methods, Innovations and Experiments

In this section a summary is given of the major theories, methods, and innovations employed in the field of reading since 1910. Each of these is briefly described and discussed, and the results of pertinent research investigations are listed. This information is presented for two reasons: (1) the focus of this study is on reading instruction and consequently some points of reference are necessary and (2) the commercially prepared program used as the variable in this experiment is based on one of the major reading theories (meaning-emphasis theory). Evidence is available to indicate that the program itself is theoretically sound, therefore, any lack of learning must be due to course imperfections rather than to the proved and tested theories of learning. A summary of the material covered is given at the end of this section.

This investigation is primarily directed toward reading instruction at the secondary school level. However, of the thousands of investigations conducted on the subject of reading, an overwhelming percentage of them have been conducted below the fifth grade level. Rather than limit the review of the literature to a few studies at the secondary level, the investigator made the assumption that there is no essential difference between beginning and mature reading.[5] This assumption made available an opportunity to use a much greater body of research data. The year, 1910, was chosen as a date for beginning this literature search because very few investigations in reading were made before that date. Since 1910, many theories have been advanced about how to teach children to read. Each theory came "equipped" with one or more methods to place it into practice. Proponents of a succession of "discoveries" or "re-discoveries" always claimed their method to be the "new," "natural," "true," or "logical" way for children to begin to read.

From the perspective of the 1970's it can be seen that all of these innovations may be classified rather easily in two major categories or theories:

1. Code-Emphasis Theory (sometimes called decoding-emphasis and analogous to the S-R theory of learning). The basic contention of this theory is that the initial stage in the reading

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5. Jeanne S. Chall, Learning to Read: The Great Debate (New York: McGraw-Hill, 1967), p. 56.

instruction should emphasize teaching children to master a code--the alphabetic code.[6]

2. The Meaning-Emphasis Theory (analogous to the Gestalt-field theory of learning). The basic contention is that children should and do learn to read best when meaning is emphasized from the start.[7]

The implementation of these two major theories is brought about by a number of methods and approaches. The best known of these are: (1) phonetic emphasis, (2) linguistic materials, (3) language-experience, (4) the Initial Teaching Alphabet, (5) programmed learning, (6) basal readers, and (7) individualized reading.

Phonic Emphasis

These programs start the beginning reader with letters and sounds in conjunction with early story and poem reading. This approach attempts to combine Code-Emphasis and Meaning-Emphasis theories but gives priority to the Code-Emphasis theory. The most widely known of the phonic emphasis programs is the Lippincott Basic Reading Program. This program consists of pre-primer, primer, workbooks and readers for each grade.

Linguistic Materials

Basically, linguistics is the scientific study of the nature of language. The linguistic approach to the teaching of reading involves

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6. Ibid., p. 75.

7. Ibid., p. 75.

learning the code of alphabetic principle. In the beginning, oral reading is stressed over silent reading. Several reading programs claim to be based on linguistic principles. Among these are the Linguistic Science Readers by Stratameyer and Smith, the Basic Reading Series by Rasmussen and Goldberg, and Read Along With Me by Robert and Virginia Allen.

Language-Experience

"A language-experience approach to instruction in beginning reading makes no distinction between the development of reading skills and the development of listening, speaking, spelling and writing skills."[8] In this method all of the subcategories of language are used as experiences related to the construction of printed materials. The classroom is operated as a language laboratory. Children frequently read their own writings to other students. This method falls into the code-emphasis category because it stresses early acquisition of the code.[9] The teacher plays the leading role in this approach to the teaching of reading.

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8. Roach Van Allen, "How a Language-Experience Program Works" in Elaine C. Vilsuk (ed.), A Decade of Innovations: Approaches to Beginning Reading, Vol. 12, Part 3, (Newark, Delaware: Proceedings of the Twelfth Annual Convention, International Reading Association, 1968), p. 1.

9. Chall, op. cit., p. 42.

The Initial Teaching Alphabet (ITA)

This method, devised by Sir James Pitman, requires that students learn forty-four characters in place of the English alphabet. These characters correspond more closely to the actual sounds of the language. This method is used only in the beginning stage of reading. After the student can read in ITA with some fluency, he transfers to the conventional alphabet and spelling. There are several systems which use the ITA idea of a single sound concept.

Programmed Learning

Instruction in reading by the programmed learning route should be considered as a composite approach rather than a single mehtod. This is due to the fact that any approach to beginning reading--sight, sentence meaning, phonic or linguistic--can be programmed. Normally, programmed reading as applied to reading instruction is also concerned with self-paced and self-directed learning. Three programmed beginning reading courses are The Basal Progressive Choice Reading Program by Woolman, Programmed Reading by Buchanan, and Grolier's First Steps in Reading for Meaning. All of these rely on the phonic-linguistic approach (decoding-emphasis theory).

Basal Reading Series

In general, the basal readers published since 1950 for grades one, two and three use a sight or word method to teach reading.

Children are taught to recognize words as wholes. Only minor attention is directed to the alphabet, phonic or structural aspects of the word. The basal-reading programs, from their beginning, emphasized practice in the understanding and enjoyment of stories. "Reading instruction in almost all schools starts from a similar basis: basal readers from a graded series are used by 98 percent of first grade teachers and by 92 to 94 percent of second and third grade teachers..."[10]

The Scott-Foresman Reading Program is an example of a basal reading series.

Individualized Reading (IR)

This innovation is concerned with patterns of classroom organization, pacing, motivation and subject-matter-content of reading materials. Basically, this program may be called a conventional basal reading program with provisions for individualized reading (method-emphasis theory). Teachers use a large variety of reading materials in this approach. Because such programs vary considerably it is not necessary here to describe Individualized Reading in great detail.

There are a number of innovations and reading approaches not described in the preceding section, but Chall[11] states that three major

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10. Allan H. Barton and David E. Wilder, "Research and Practice in the Teaching of Reading: A Progress Report" in M. B. Miles (ed.) Innovations in Education (New York: Bureau of Publications, Teacher College, Columbia University, 1964), pp. 361-398.

11. Chall, op. cit., p. 48.

lines of innovation can be detected in all of these new programs (including those described):

A. Innovations to bring about earlier acquisition of the alphabetic principle.

B. Innovations to bring about greater individualization of instruction.

C. Innovations to bring about more vital, realistic and imaginative content altogether.

The commercial video reading-program used in this study is based upon the meaning-emphasis theory of reading. This automatically means that it is also based on the Gestalt-field theory of learning. "Thus, a Gestalt-field psychologist sees perception as a unitary process, in which sensation hinges on meaning and meaning on sensation, and sensing and finding meaning occur simultaneously."[12] This video reading course is designed as a developmental program and is not intended to be a program of initial reading instruction. However, it utilizes the same premises of the meaning-emphasis approach in that it concentrates on "the recognition of words as wholes and on the understanding and enjoyment of stories." The program also borrows ideas from some of the other approaches to reading. For example, it uses some of the techniques of individualized reading, i.e., pacing,

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12. Morris L. Bigge, Learning Theories for Teachers (New York: Harper and Row, 1964), p. 74.

organization, motivation and subject-matter content together with the constant reinforcement of the programmed learning approach.

Reading Research

Research in reading has generally been carried out by investigators from different disciplines. More than 3,000 investigations have been conducted in the area.[13] These investigations fall into three categories: (1) laboratory experiments performed by experimental psychologists, (2) classroom experiments and correlational studies conducted by educational psychologists and others interested in educational research, and (3) clinical studies carried out by neurologists, psychologists and psychiatrists. Each of these groups has tended to publish its findings only in journals read by those of similar background and interest.

Perhaps the most thorough study of first grade reading was conducted under the auspices of the United States Office of Education. This survey was summarized in The Reading Teacher, May, 1966, and consisted of twenty-seven independent studies, extending over almost all of the United States. The studies were coordinated in terms of research design, measuring instruments and information gathered to make

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13. Roger Farr, Reading: What Can Be Measured (Newark, Delaware: International Reading Association Research Fund, 1969), p. 2.

possible various comparisons between studies. A variety of approaches were studied "...including those employing basal readers, phonetic emphasis, linguistic materials, language-experience approaches, the Initial Teaching Alphabet, and diacritical marking."[14]

Guy Bond, the coordinator of all twenty-seven studies, made the following statements in a progress report.

> We have found no one approach so distinctly better in all the situations and respects than the others that it should be considered the one best method nor to be used exclusively.[15]

> There are, however, many indications that no matter what the underlying method is, word-study skills need to be emphasized and taught systematically. This is best shown by the superiority of the approaches which augmented the basal reader with a phonetic emphasis as compared with basal readers as usually taught.[16]

> The combined data analysis tends to show that a linguistic approach develops word-recognition skills effectively, but demonstrates no superiority over other systems in developing comprehension abilities.[17]

Chall[18] makes the following generalizations from the results of a number of experimental studies regarding a comparison between approaches employing code-emphasis and meaning-emphasis.

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14. Guy L. Bond and Robert Dykstra, "The Role of the Coordinating Center in the Cooperative Research Program," The Reading Teacher (May, 1966), Vol. 18-19, p. 2.

15. Ibid., p. 8.

16. Ibid., p. 9.

17. Ibid., p. 9.

18. Chall, op. cit., p. 137.

1. A code-emphasis tends to produce better overall reading achievement than a meaning emphasis by the beginning of fourth grade.

2. Growth in reading skills seems to take different courses under the two emphases.

   a. Under a code emphasis, the child shows, from the very beginning, greater accuracy in word recognition and oral reading; this may or may not give him an immediate advantage on reading-for-meaning tests (standardized silent reading tests of vocabulary and comprehension). However, by the end of the first or sometime during the second grade, the early advantage in word recognition produces better vocabulary and comprehension scores on silent reading tests. These advantages persist through about the third grade.

   b. Under a meaning emphasis, the child has an early advantage (in the middle of grade 1) on reading-for-meaning tests (standardized silent reading tests of vocabulary and comprehension). However, he has an early disadvantage in accuracy or oral word recognition (pronunciation) and connected oral reading tests (when rate is not included in the score), which ultimately dissipates the early advantages on the standardized silent reading tests. . . .In the beginning the child reads faster under a meaning emphasis, but he may lose this advantage by about the third or fourth grade.

The Use of Video Recording and Playback Equipment (Television) for Teaching Secondary School Students

The question today is no longer whether television can play an important role in education, but what kind of a role it can play. This stage of development has not been reached overnight. The process has been long and expensive. To achieve its present status has taken the expenditure of massive funds from private foundations and from the

federal government. The Ford Foundation alone has made grants in the neighborhood of one hundred million dollars to all phases of educational television: for educational television stations and programming through the Fund for Adult Education and later to schools and colleges through the Fund for the Advancement of Education. The federal government's support has added approximately another one hundred million dollars in equipment to the country's ETV facilities.[19]

> There can no longer be any doubt that students learn efficiently from instructional television. This fact has been demonstrated now in hundreds of schools, by thousands of students in every part of the United States and in several foreign countries. The list of subjects which schools and colleges have been able to teach effectively by television includes: arithmetic, algebra, geometry, calculus, accounting, consumer mathematics, physics, chemistry, biology, physiology, general science, engineering, psychology, sociology, anthropology, government, history, economics, electronics, humanities, art, music, philosophy, literature, spelling, social studies, health and safety, driver education, Spanish, French, German, Russian, English, typewriting, and slide rule. Over all this list, the conclusion of testers, school administrators, teachers and students alike has been that the average student is likely to learn about as much from a television class as from ordinary classroom methods. In some cases he will learn more, and in some less, but over-all the conclusion has been 'no significant difference'.[20] (Emphasis supplied)

The following table sums up 393 cases in schools and colleges in which instructional television was compared with other classroom teaching by Wilbur Schraum.[21] Only investigations which were considered

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19. Murphy and Gross, op. cit., pp. 11-12.

20. Wilbur Schraum, "What We Know about Learning from Instructional Television," Educational Television: The Next Ten Years (Stanford University: The Institute for Communicative Research, 1962), p. 53.

21. Ibid., p. 55.

Table 1

Comparisons of Instructional Television and Other Classroom Teaching

School Level	Sig.*	Math.	Science	Soc. Stud.	Human. Hist. Lit.	Lang. Skill	Health Safety	Total	Sig.
Grades 3-6	+TV	14	8	12	0	14	2	50	+TV
	n.s.	21	14	11	0	36	4	86	n.s.
	-TV	3	1	1	0	10	1	16	-TV
Grades 7-9	+TV	4	9	0	2	0	3	18	+TV
	n.s.	11	8	1	7	0	1	28	n.s.
	-TV	2	3	0	0	0	0	5	-TV
Grades 10-12	+TV	0	3	3	4	1	1	12	+TV
	n.s.	10	7	17	17	6	0	57	n.s.
	-TV	5	3	0	9	4	0	21	-TV
College	+TV	0	1	1	0	0	1	3	+TV
	n.s.	4	26	24	11	12	7	84	n.s.
	-TV	0	1	4	3	1	4	13	-TV
Total	+TV	18	21	16	6	15	7	83	+TV
	n.s.	46	55	53	35	54	12	255	n.s.
	-TV	10	8	5	12	15	5	55	-TV

*+TV = superior at .05 level or better
n.s. = not significant
-TV = inferior at .05 level or better

to be of adequate design, control and statistics were included. It can be seen from this table that the areas of science and social studies have had considerable attention and success from instructional television. Approximately 86 percent of the 393 investigations indicated

that a satisfactory amount of learning took place as compared with regular classroom instruction.

The literature revealed few studies that had been undertaken and reported in the specific area of reading instruction by television. Very often the studies were concentrated in other areas, and reading was included only because it was considered a normal part of the communicative arts.

One such study, the very large "Hagerstown Project,"[22] taught reading in grades one through six by the use of television. This was not done on a regular basis, but the reading lessons were telecast for voluntary use by classroom teachers. The summary report of the project stated that in both urban and rural schools reading achievement by students in classes that regularly watched this reading instruction did show small gains. The level reached was close to the national norm.[23]

Surveys regarding how students react toward instructional television produced the following data reported in Table 2.

One of the most complete reports on television research as a teaching aid was performed by Presley Holmes,[24] who developed a

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22. Washington County Closed Circuit Television Report, (Hagerstown, Md.: The Board of Washington County, Md., 1963), pp. 54-55.

23. Ibid., p. 55.

24. Presley D. Holmes, Television Research in the Teaching-Learning Process (Detroit, Michigan: Wayne State University, Division of Broadcasting, 1959), pp. 74-79.

Table 2

Student Attitudes toward Instructional Television*

	Florida Elem.	N. Carolina Elem.	Nebraska High Sch.	Cincinnati High Sch.	Kansas C. High Sch.	Florida High Sch.
N	670	533	254	277	300	2014
Per-cent						
More	72	77	35	30	57	31
Same	22	13	35	37	31	40
Less	6	10	30	33	12	29

*Question asked: "Do you think students learn more, the same, or less from a TV class?", Schraum, op. cit., p. 57.

classification system to analyze and correlate television research. He organized, identified, and clarified seventy-five investigations which studied students in grades one through twelve and at the university level. A summary of his conclusions follows (certain conclusions which do not apply to this study are omitted):[25]

1. The overwhelming majority (almost 90 percent) of gross comparisons between television and conventional communication conditions show no substantial differences in achievement or information gain.

2. Students, who received content by means of television, evidenced learning in every type examined: (1) cognitive structure (achievement and critical thinking), (2) motivation (like or dislike), (3) group belongingness (socialization, authoritarianism), and (4) psychomotor skills.

3. The content of the studies indicating differences in information gain show television favoring the sciences, and conventional favoring English, speech and communication. An

25. Ibid.

equivalent or greater gain in information can be effected in a shorter period of time when the content is presented by means of television compared to conventional conditions.

4. When immediate post-tests are administered, students generally exhibit the same or greater information gain under television presentation as they do under conventional conditions.

5. No significant differences were evidenced between males and females due to receiving information under television or conventional conditions.

6. Greater achievement is shown on information tests by students who receive "simple" television presentations, as compared to "highly visualized" rather than the "simple" television presentations. Students prefer separate periods of television presentations and conventional discussion conditions rather than splitting a single period for a short television presentation and a short discussion.

7. In gross comparisons between television and conventional conditions, the majority of students prefer conventional conditions. Most studies indicate that student opinions of television became more favorable after exposure than they were before exposure. There is little relationship between student information gain and their attitudes toward the communication conditions. In the opinion of students, small classes are more important than the communication conditions, i.e., they prefer small one-way television receiving rooms to large lecture halls. Experienced instructors are more important than the communication conditions. The students' attitudes toward television are more accurately described as attitudes toward other elements involved in the teaching-learning process, e.g., the instructor, the situation, and the content.

8. Face-to-face interaction produces more positive changes in group structure, attitudes, and socialization than does one-way television. Television students develop psychomotor skills just as well as do conventionally taught students, providing that they have equal access to any equipment which is to be manipulated.

9. There is no consistent evidence on retention tests which points to a superiority of conventional conditions over television.

10. The intelligence of the student is a greater predictor of information gain than are the communication conditions. There is no relationship between students' failure to complete a course and the communication conditions, i.e., television does not cause a greater "drop-out" rate. (Emphasis supplied.)

Summary

The literature has been reviewed in three major areas: (1) the history, theory and operation of video recording and playback equipment (television), (2) the theories, methods, innovations and experiments of reading instruction, and (3) a summary of educational television research.

In general, it is apparent that literature about television (video equipment) is plentiful. The information tends to fall into two categories: (1) highly technical and (2) highly promotional. Neither of these aspects of television gives the prospective educational buyer or user much assistance as to practical use of the equipment and taped lessons in the classroom. An attempt was made to provide such information in the first part of this chapter and in Appendix A.

Literature about reading instruction was found to be voluminous, often contradictory; and the published research findings were sometimes inconclusive. There is no one best way to teach reading. Each approach to the teaching of reading appears to have its strength and weaknesses. One definite fact about reading is that its instruction is

concentrated in the lower grades. If a student does not read well when he completes elementary school, the probability is high that he also will not be reading well when he departs from high school--whether he leaves as a drop-out or as a graduate.

Information about instructional television provides strong support for its use as a teaching aid. In study after study it was proved that students learned as much or more from television as from regular classroom instruction. This learning takes place despite the fact that television instruction very often incorporates the same weaknesses that are present in many classrooms everywhere.

In conclusion, there is nothing in the history, theory, operation or research findings that preclude the use of video equipment (television) as an exceptionally fine teaching aid. Proper use of good television lessons violates none of the recognized learning theories or approaches to the instruction of reading.

CHAPTER III

DESIGN OF THE STUDY

This chapter includes a description of: (1) the population, (2) the instruments used to collect the data, (3) the research design, (4) the application of the research design, (5) a description of the independent variable (X), and (6) the procedures used for collecting, summarizing and analyzing the data. A summary is provided.

Population

Students from three secondary schools, located in Cincinnati, Ohio, Lakewood, Ohio, and Tucson, Arizona, were selected for this study. All three schools have two things in common: (1) they have provided their students with the same pre-recorded, televised, commercially prepared, developmental reading program, and (2) they are all private parochial schools.

Immaculate Heart High School (now Suffolk Hills School) is located at 625 East Magee Road, Tucson, Arizona. The school is owned and operated by the Sisters of the Immaculate Heart of Mary. At the time of this study the enrollment consisted of ninety-six girls in grades nine through twelve. Sixty-seven of these students were day students and the other twenty-nine were resident students. The faculty consisted of eight Sisters, one Priest and four Lay teachers.

St. Edward High School is located at 13500 Detroit Avenue in Lakewood, Ohio. The Brothers of the Congregation of the Holy Cross own and operate the school. The enrollment at the time of the study consisted of 1,730 boys in grades nine through twelve. The students were all day students. Thirty-eight Brothers and forty-three Lay teachers were on the staff.

Seton High School is located at Glenway and Beech Avenues in Cincinnati, Ohio. The school had an enrollment of 1,510 girls at the time of this study. The school is owned and operated by the Sisters of Charity. The faculty consisted of thirty-eight Sisters, two Priests and thirty-four Lay teachers.

Private parochial secondary schools were selected as test schools because the investigator was, at the time this study was conducted, the principal of Immaculate Heart High School and thus had access to information from other similar schools. Very few public school districts have utilized the services of commercial firms to supply developmental reading courses by means of video equipment. These three schools use such equipment.

St. Edwards High School and Seton High School were selected principally because they provided geographical distribution. Letters were written to the principals of the two schools to obtain general information about the schools, their students and their reading programs.

A total of 361 students took a direct part in the study. Indirectly, 8,000 students who served as the national norm group for the ninth and tenth grades of the Nelson-Denny Reading Test had a part in the study. Test data from these students were used for the purpose of graphic comparison.

Library usage data were supplied by students from the Arizona school. Student attitude information about reading, television and reading instruction by television was obtained from one Ohio school and the Arizona school. Reading skill data were applied by students from both Ohio schools.

Table 3

Number of Secondary School Students Enrolled, Number Involved in the Study, and Percent Involvement in the Study--by School

School	Number Enrolled	Number Involved	Percent Involved
Immaculate Heart High School	96	96	100.0
St. Edward High School	1730	155	11.3
Seton High School	1510	110	7.3
Total	3336	361	-----

The group used for graphic comparisons for this study consisted of 4,000 ninth grade and 4,000 tenth grade students. These students served as the national norm populations for the Nelson-Denny Reading

Test, Forms A and B. A stratified-random sampling procedure was used. Stratification of the norm population was made on the basis of secondary school enrollment by region (eight strata) and community size within each region (four strata). The Statistical Abstract of the United States, 1956, was used as the source of the pertinent descriptive data. The sample of 4,000 from each grade level was structured according to the percent of students by region and according to the percent in the four size categories.[1]

Instruments

Three instruments were used to obtain data for this study. They were:

1. The Nelson-Denny Reading Test of Vocabulary, Comprehension and Rate, Form A. Copyrighted 1960, by the Houghton Mifflin Company of Boston. This instrument is a widely used, commerically available, reading test consisting of 100 items to measure vocabulary and thirty-six items to measure reading comprehension. These two categories are combined to produce a measure of reading rate.

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1. Examiner's Manual, The Nelson-Denny Reading Test of Vocabulary, Comprehension, and Rate (Cambridge: Houghton Mifflin Company, 1964), pp. 28-29.

D. B. Orr,[2] in a review presented in the 1968 Buros' Reading Tests and Reviews, stated that the reliabilities for reading rate, vocabulary and total score is .92--.93 and for comprehension is .81 (using the equivalent-form method). He also reported the validity coefficient which represents the correlation between an item score and a total score to be .38--.45. Very complete technical data for the Nelson-Denny Reading Test are presented in the Examiner's Manual.[3]

This instrument was used to pre-test the experimental and control groups to obtain information about initial reading rate, comprehension and vocabulary.

2. The Nelson-Denny Reading Test of Vocabulary, Comprehension and Rate, Form B, Copyrighted 1960, by the Houghton Mifflin Company of Boston. Technical information for this test is identical with that for Form A presented above.

   This instrument was used to post-test both the experimental and control groups to obtain information about changes in reading rate, comprehension and vocabulary.

3. The Nebraska Attitude Inventory modified to obtain additional data pertaining to the attitude of students toward reading,

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2. Oscar K. Buros, Reading Tests and Reviews (New Jersey: The Gryphon Press, 1968), pp. 315-317. (Review by D. B. Orr).

3. Examiner's Manual, op. cit., pp. 25-27.

television and televised reading instruction. The original instrument consisted of sixty-five items grouped into five categories and was developed by Alan Seagran using the Likert Model.[4] The Kuder-Richardson 21 formula was employed to estimate the reliability-homogeneity of each scale. The range was found to be .610--.811 for the five categories.[5] The new items were structured to agree in technique with the original sixty-five items. They were designed to be monotonic (the more favorable a person's attitude the more likely it is that he will agree with an item), similar in length, and with vocabulary and syntax structured to the level of the subject's understanding. (See Appendix B for the attitude scale in its modified form).

The Nebraska Attitude Inventory consists of five categories: (1) attitude toward school--15 questions, (2) attitude toward the relationship between students and teachers--13 questions, (3) attitude toward peers--8 questions, (4) attitude toward self--6 questions, (5) attitude toward teachers--14 questions.

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4. Alan T. Seagren, The Impact of Student Teachers Upon the Attitude and Achievement of High School Students (Kansas City: The Mid-Continent Regional Educational Laboratory, 1967), pp. 23-30.

5. Seagren, op. cit., p. 31.

The modified Nebraska Attitude Inventory consists of three additional categories. The additional items are dispersed throughout the entire inventory: (1) attitude toward television--7 questions, (2) attitude toward reading--9 questions, (3) attitude toward reading instruction by television--7 questions.

The answer sheet used was of the forced-choice type with students carefully instructed to agree or disagree with each item. An IBM 1030 type answer sheet was used so that the answers could be machine scored. The instructions were attached to the attitude inventory, and when the inventory was administered the instructions were read to the students. Sixty minutes were allowed for completing the inventory, but most students finished in less than forty-five minutes.

Research Design

The research design used in this study is described by Deobold Van Dalen[6] as a one-group pretest-posttest design with minimal control (Design 1) with slight modification. The independent variable (X) studied was the presentation of a developmental reading program by means of video equipment to an experimental group of secondary school

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6. Deobold B. Van Dalen and William J. Meyer, Understanding Educational Research (New York: McGraw-Hill, 1966), pp. 253-256.

students. Possible changes in reading rates, comprehension and vocabulary were to be determined. In order to measure some of the side-effects of the independent variable, the design was modified by an expansion to include: (1) the administration of an attitude inventory to the experimental group and (2) the collection of school library book checkout figures before and during the study.

The paradigm for a standard Design 1 is:[7]

	Pre-test	Treatment	Post-test
Experimental Group	T_{1_e}	X	T_{2_e}
Experimental Group	$T_{2_e} - T_{1_e}$ = (difference between pre-test and post-test mean scores)		

The standard design was expanded to include the following:

	Pre-test	Treatment	Post-test
Experimental Group	---	Attitude Inventory	---
Experimental Group	---	Library Usage Tally	---

When employing Design 1 the investigator takes the following steps:[8] (1) administers T_1 to measure the dependent variables of a single group and obtains the mean for the group; (2) exposes the experimental group to the independent variable, (X), for a period of time; (3) administers T_2 to measure the dependent variables and compares T_1 and T_2 means to ascertain what difference, if any, the exposure

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7. Ibid., p. 254.

8. Ibid., p. 254.

to X has made; (4) utilizes a technique to present any difference which is determined.

To include procedures for the expanded design, the investigator: (5) administered an instrument designed to obtain data regarding the attitude of the members of the experimental group toward certain aspects of X; (6) collected library usage data by keeping daily tally figures of the number of books checked out of a school library before and during application of X.

Van Dalen[9] gives the following criteria for the use of Design 1; this design should be used only for preliminary research (1) when the independent variable is likely to produce a drastic effect, for this lessens the influence of extraneous variables; (2) when the interval between T_1 and T_2 is of brief duration, for there is less opportunity for history and maturation to operate; and (3) when the dependent variable is relatively stable, that is, when it is not apt to change unless a deliberate effort is made to bring about a change. This study meets all of these criteria.

Application of the Research Design

Substituting the actual groups into the paradigm for Design 1 yields:

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9. Ibid., p. 255.

Experimental Groups	Pre-test	Treatment	Post-test
GROUP A--155 ninth grade students from St. Edward High School GROUP B--110 ninth grade students from Seton High School	Nelson-Denny Reading Test Form A	Commercially prepared video developmental reading course (X)	Nelson-Denny Reading Test Form B

In this study the research design was actually used twice. After the first application, a duplicate run was made with a different student population to see if the results were reproducible.

Expanded Design 1

Experimental Group	Pre-test	Treatment	Post-test
96 secondary school students from Immaculate Heart High School and 26 ninth grade students from St. Edwards High School	None	Modified Nebraska Attitude Inventory	None
96 secondary school students from Immaculate Heart High School	None	Tally of books checked out of the school library before and during exposure to X	None

Description of the Independent Variable X

Background

Early in 1969, officials of Immaculate Heart High School became increasingly aware that a serious reading problem existed among the students of the school. Several methods of correcting this deficiency

were explored. The most promising solution to the problem appeared to be the addition of a developmental reading course to the English curriculum. It was agreed that this could best be accomplished by acquiring the services of persons outside the school. Here again several avenues were explored and inquiries made.

It was learned that a firm by the name of Visual Concepts, Inc., specialized in developmental reading programs and that their course was widely used among private parochial schools. This firm was contacted, and a demonstration was given before a joint teacher-student meeting. Information was presented by company representatives about their prerecorded video developmental reading program (called the Basic-36 and based on the Gestalt-field learning theory) which had evolved after several years of development.

This program seemed to meet the needs of the students of the school, and an agreement was made with the company to supply the reading course and its associated video recording and playback equipment for the 1969-70 school year.

It was decided that simultaneously with the introduction of this addition to the school curriculum, an evaluation procedure would be undertaken to study not only the immediate effects of the reading program but to study the effectiveness of video equipment as a potential teaching tool. Furthermore, the results from this evaluation would be compared with the results from the same reading course in other schools.

The basic agreement provided that for a fee of sixteen dollars per student a complete developmental reading program (via pre-recorded video tape) and sufficient video recording and playback equipment would be supplied.

The video equipment which was thus furnished to Immaculate Heart High School consisted of: (1) Shibaden Video Tape Recorder, Model SV-700 UA, with Microphone, (2) Shibaden Monitor, Model TU-23UL, (3) General Electric Monitor, Model CEM723BCA1, (4) Shibaden Video Camera, Model TP-100, (5) Shibaden Distribution Network, Model DB101, (6) all necessary leads and extensions. (A photograph is included in Appendix C.)[10]

The developmental reading course (thirty-six, thirty-minute lessons recorded on half-inch video tape) can be described as follows:

Course Objectives--"Basic-36"

1. To make reading an effective tool for study skills.
2. To increase reading efficiency at least 250 percent by: (a) eliminating regressions, (b) destroying "inner speech," (c) using eye span more completely.
3. To develop an over-all (Gestalt) approach to reading by: (a) following the author's ideas and (b) responding quickly and accurately to concepts, relationships and major ideas.

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10. St. Edward High School and Seton High School used similar but not identical equipment.

4. To make reading more profitable, enjoyable and less time-consuming.
5. To make every teacher able to aid in Reading Development and Study Skills (reading is every teacher's responsibility).

Lesson Plans

1. The first half of the course is devoted to developing preview, read, recall skills (a) through reaction drills--the hand is used as a pacer, (b) drawing eyes down the page eliminating regressions, (c) establishing new seeing patterns thus breaking away from slow habits and (d) through mass observation drills, developing greater perceptual awareness in all areas.
2. The second half of the course is devoted to developing study skills: (a) study procedure (Robinson's "Survey Q3R") effectively using PREVIEW-READ-RECALL, (b) depth reading (Mortimer J. Adler's Hard Reading Made Easy), (c) memory training as a reading skill (using mnemonics and other memory techniques), and (d) concentration training as a reading skill.

Reading Kit

Each student in the reading program received:

1. Nelson-Denny Reading Tests (Forms A and B)

2. Student Folders for:
   a. Test results
   b. Class results
   c. Homework results
   d. Rate chart for timed readings

3. Student Workbook contains:
   a. Outline of course
   b. Pertinent questions to draw student response
   c. Rate chart and test score chart
   d. Homework drills
   e. Recall sheets for novel, non-fiction, biography and autobiography
   f. Study reading guides

4. L. P. Record...Drills
   a. Side 1
      (1) Flood light effect drill
      (2) Count drill
      (3) Timed thread reading (preview book)
      (4) Recall (who, what, when, where, how, and why)
      (5) Timed comprehensive reading
      (6) Recall

5. Selected Paperback Books and Tests
   a. Albert Einstein and tests: beginning chapter 1, 2, 3, and 4...ending chapters 5 to the end
   b. Animal Farm and test...value of preview
   c. The Pearl and test...effectiveness of thread reading
   d. Sink the Bismark...paragraph practice and observation drill
   e. Cheaper by the Dozen and test...recall practice
   f. Hiroshima and test...in-depth reading

Procedure Used for Collecting, Summarizing, and Analyzing the Data

The procedure used for collecting the data for this study follows the outline presented in the section titled "The Research Design."

1. Two experimental groups were selected.

   Group A--consisted of 155 ninth grade students from St. Edward High School.

   Group B--consisted of 110 ninth grade students from Seton High School.

2. Both experimental groups were pre-tested on the dependent variable (reading rate, comprehension, and vocabulary) by means of the Nelson-Denny Reading Test, Form A.

3. The two experimental groups were exposed to the independent variable (X) (a video developmental reading course consisting of thirty-six pre-recorded video tapes each thirty minutes in length).

4. Following exposure to X, the two groups were post-tested by means of Form B of the Nelson-Denny Reading Test.

5. Mean scores of the pre-test and post-test for each group were calculated. Then the differences between the pre-test and post-test mean scores (D_e) were determined.

6. Tables or graphs were then constructed to show the (D_e) (converted to percentiles of the national norm populations

for the Nelson-Denny Reading test) in comprehension, vocabulary and reading rates for students from each school.

7. Additional tables and graphs were constructed to show the (D_e) (in raw scores on the Nelson-Denny Reading Test) for comprehension, vocabulary and reading rates with a pictorial comparison between the equivalent and typical (50th percentile) students of the national norm population of the Nelson-Denny Reading Test.

8. At the approximate mid-point in time of the application of X the modified Nebraska Attitude Inventory was administered to 96 students at Immaculate Heart High School and 26 students at St. Edwards High School. The students recorded their answers (either agree or disagree) on IBM 1030 answer sheets. These answer sheets were scored by means of an IBM Optical Scanner and IBM data cards were punched for each student.

9. A program was written for the UNIVAC 9200 and the pre-punched IBM cards were processed. A print-out was obtained for the student responses to each of the 90 items of the modified Nebraska Attitude Inventory. In addition, the total agree and disagree responses were obtained for each of the eight categories of the Inventory.

10. Only the responses to items pertaining to three categories are included in this study: attitude toward television, attitude toward reading, and attitude toward televised reading-instruction. These results are presented in Chapter IV. The results of all 90 items and totals for all eight categories are presented in Appendix D.

11. A daily tally was taken of the number of books (fiction, non-fiction and biographical) checked out of the Immaculate Heart High School library during the entire 1969-70 school year. Similar data were obtained from library records for the previous school year (1968-69); and for the first two months of the 1970-71 school year. Taking into account the student enrollment and the number of days each month that school was in session, the average number of books per student per month (prior to, during and after the application of X) were calculated. These results are presented in Chapter IV.

Summary

Chapter III contains information pertaining to: the design of the study, the conditions under which the investigation was conducted, how the experimental results were obtained, and the procedures used to summarize and analyze these results. This study was of an exploratory nature and was conducted in the "field."

The data obtained from this investigation fall into three categories: (1) data concerning reading skills (comprehension, vocabulary and reading rate) as affected by exposure to a commercially available, televised, developmental reading program; (2) data pertaining to the attitudes of secondary school students toward television, reading, and televised reading instruction; (3) data related to changes in library usage as affected by changes in reading skills. The findings of this investigation are presented in Chapter IV.

CHAPTER IV

FINDINGS

The findings of this study are divided into three parts. First, the summarized and tabulated results which were obtained from the implementation of the research design are used to answer this question:

1. What gains are realized in reading speed and comprehension in offering a specialized reading-instruction program to secondary school students by means of video recording and playback equipment?

Second, the results, by item and by category, of the attitude inventory are presented and are used to answer this question:

2. How acceptable (from an attitudinal standpoint) is reading instruction to secondary students when performed by such equipment?

Third, the results of a school library book checkout tally and other selected experimental results are presented and used to answer the following questions:

3a. Will students make greater use of the school library after exposure to a developmental reading program?

3b. Will the vocabulary of students increase after being exposed to a developmental reading program?

3c. How do students who participated in this reading program compare with those who do not, when compared with national norms of mean reading rates and comprehension?

Results from the Administration of the Research Design

The variable studied (X) was a video developmental reading program. The research design used was a one-group, pretest-posttest design with minimal control (with one repeat to check reproducibility). Two-hundred and sixty-five students, from two secondary schools, were pretested by the Nelson-Denny Reading Test, Form A. These students were exposed to a video reading program consisting of 36 video tapes, each video tape 30 minutes in length. After the final tape these same students were post-tested by Form B of the same test. The raw scores were converted into percentiles of the national norm population of the Nelson-Denny Reading Test. These test data are reported in Appendix E. The summarized reading rate and comprehension data are given in Table 4 and shown graphically in Table 5.

1. What gains are realized in reading speed and comprehension by offering a specialized reading-instruction program to secondary school students through means of video recording and playback equipment?

Based on raw test score data converted to the ninth grade national norms of the Nelson-Denny Reading Test, it would appear that this video

Table 4

Reading Rate and Comprehension Scores of Two Experimental Groups before and after Exposure to a Video Developmental Reading Program

Description	Reading Rate (Percentile) Before	After	Reading Rate (Words per minute) Before	After	Comprehension (Percentile and raw score) Before	After
Group A (N = 155) St. Edward High School	61	97	228	609	69 (31)	76 (33)
Net Change	+36		+381		+7 (+2)	
Group B (N = 110) Seton High School	53	99	207	637	66 (30)	74 (32)
Net Change	+46		+430		+8 (+2)	
Average Change for both Groups	+41		+405		+7.5 (+2)	

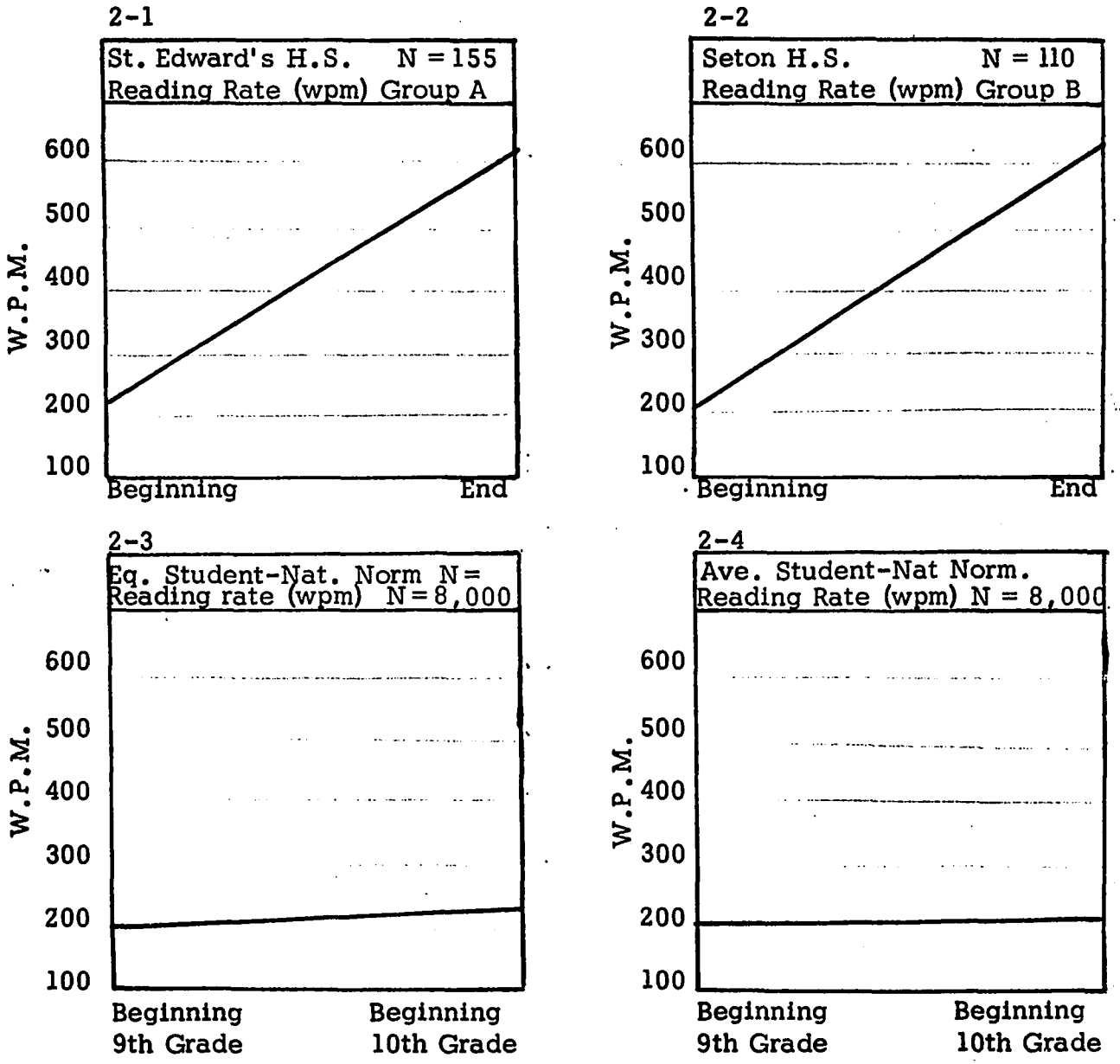

Figure 1

Comparison of the Reading Rate in Words Per Minute of Two Experimental Groups Exposed to a Video Developmental Reading Program

developmental reading program contributed an improvement to the average student of the experimental population of 7.5 percent rank scores in comprehension and 41 percentile rank scores in reading rate (see Table 4). With respect to reading speed this represents an increase of 405 words per minute (see Table 4). Graphs 2-1 and 2-2 of Figure 1 present a graphic comparison of the increases in reading rate of the two ninth-grade groups of the experimental population. In an attempt to provide a point of reference, Graph 2-3 shows the expected increase in reading rate of ninth-grade students of the national norm population of the Nelson-Denny Reading Test with initial reading rates of 210 words per minute by the time they reach the tenth-grade (with no formal reading instruction).[1] Graph 2-4 shows the expected increase, under the same conditions, of students who read at the 50th percentile while in the ninth-grade.

2. How acceptable to secondary students (from an attitudinal standpoint) is reading instruction performed by such equipment?

In the three attitude categories investigated: attitude toward reading; attitude toward television; and attitude toward instruction by television, the following results were obtained.

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1. Examiner's Manual. The Nelson-Denny Reading Test of Vocabulary, Comprehension and Rate, Houghton Mifflin Company, The Riverside Press, Cambridge, 1964, pp. 11-12.

a. At a ratio of 1.32 : 1.00 (57.0 percent agree and 43.0 percent disagree) students in the experimental groups displayed a positive attitude toward reading (see Table 5).

b. At a ratio of 1.56 : 1.00 (60.7 percent agree and 39.3 percent disagree) students in the experimental groups displayed a positive reaction toward television (see Table 6).

c. At a ratio of 1.06 : 1.00 (51.6 percent agree and 48.4 percent disagree) students in the experimental groups displayed a slightly positive reaction to reading instruction by television (see Table 8). This suggested near neutrality.

3a. Will students make greater use of the school library after exposure to a developmental reading program?

Based on library book checkout figures obtained in this study (see Table 8) the average number of books per pupil per day checked out during the time the reading program was in effect was 0.079. During the identical time period of the year prior to the presentation of the reading program this figure was 0.093. Converted into practical units this means that during the year prior to the developmental reading program the average student checked out 1.86 books per month. During the year in which the reading course was offered, the average student in the school checked out 1.58 books per month. These facts bear out the negative response that the students made to the attitude inventory question (Item Number 88), "I check more books out of the school

Table 5

Attitude Scale Items for the Category Attitude toward Reading

No.	Item	St. Edwards High School Agree	St. Edwards High School Disagree	Immaculate Heart High School Agree	Immaculate Heart High School Disagree
17	I like to read.	17	9	56	25
21	If I could read better my homework would be easier.	15	11	47	34
23	Almost all my friends enjoy reading books.	6	20	44	37
26	I wish I could improve my ability to read.	22	4	58	23
48	I want to learn to read very rapidly.	23	3	60	21
74	Most high school students need instruction in reading.	22	4	54	27
83	Since taking this reading course I read more.	17	9	20	61
88	I check more books out of the school library than I did last year.	6	20	21	60
90	Not counting the books I have to read, I have read more than three books since school started this year.	15	11	46	35
	Category Totals	143	91	406	323

Table 6

Attitude Scale Items for the Category Attitude toward Television

No.	Item	St. Edwards High School Agree	St. Edwards High School Disagree	Immaculate Heart High School Agree	Immaculate Heart High School Disagree
4	I think television is interesting.	23	3	74	7
8	Television is a good method to hold my attention.	17	9	56	25
13	I can remember things that I see on television.	24	2	66	15
37	I like to be taught by television.	13	13	24	57
42	I would like to be taught other subjects by television	12	14	23	58
55	Television teaching is boring.	7	19	47	34
61	I prefer to be taught reading by a live teacher rather than by TV	15	11	55	26
	Category Totals	111	71	345	222

Table 7

Attitude Scale Items for the Category Attitude toward Reading Instruction by Television

No.	Item	St. Edwards High School Agree	St. Edwards High School Disagree	Immaculate Heart High School Agree	Immaculate Heart High School Disagree
30	Since I have started the school reading program my reading speed has improved.	25	1	46	35
33	Television picture quality of this video course has been good.	22	4	35	46
45	The television teacher isn't as good as my regular English teacher	14	12	42	39
51	The first reading lessons on television were better than the recent ones.	6	20	45	36
58	I think this reading program helps the smart kids more than the average kids.	8	18	33	48
66	I think the materials used (records, books, instruction booklet) in the reading course are good.	20	6	51	30
70	I think the reading selections (Sink the Bismark, for example) are interesting.	21	5	29	52
	Category Totals	96	67	281	286

Table 8

Comparison of Secondary School Library Usage Before, During, and After the Total Student Body Was Exposed to a Video Developmental Reading Program (X)*

	Before X 1968/69 School Year N = 124			During X 1969/70 School Year N=96			After X 1970/71 School Year N = 79		
	No. checked out of library	No. checked out per day	No. of books per student per day	No. checked out of library	No. checked out per day	No. of books per student per day	No. checked out of library	No. checked out per day	No. of books per student per day
September	116	7.23	.058	101	5.31	.066	47	2.93	.037
October	152	6.60	.053	104	4.52	.047	83	3.60	.045
				Reading Course Began					
November	150	7.89	.056	85	4.48	.045	--	----	----
December	183	12.20	.098	65	4.43	.046	--	----	----
January	172	8.60	.069	36	1.80	.019	--	----	----
February	279	14.61	.118	115	6.05	.063	--	----	----
March	252	12.03	.096	152	7.24	.075	--	----	----
April	242	12.10	.098	180	9.00	.093	--	----	----
May	283	12.82	.103	194	8.82	.092	--	----	----
				Reading Course Ended					
Year Totals	1829	-----	----	1032	----	----	130	----	----
Year Average	----	10.45	.084	----	5.89	.061	---	3.30	.042
Total during period X was in effect	1561	-----	----	827	----	----	---	----	----
Average during period X was in effect	----	11.48	.093	----	7.59	.079	---	----	----

*Source: Immaculate Heart High School, 625 East Magee Road, Tucson, Arizona.

library than I did last year." The ratio was approximately 2.96 : 1.00 (25.2 percent agree and 74.8 percent disagree) in a negative direction.

3b. Will the vocabulary of secondary students increase after being exposed to a developmental reading program?

Based on data presented in Table 10, the average student in the two experimental groups increased his vocabulary as a result of the developmental reading program by 6.5 percentile rank points. This represents an increase in raw score on the Nelson-Denny Reading Test of approximately 6.5 points. The Nelson-Denny Reading Test does not yield results which indicate how many total words this increase represents.

3c. How do students who participate in this reading program compare with those who do not when compared with national norms of reading rates and comprehension?

Direct comparisons between experimental populations and national norm populations cannot be made statistically. Furthermore, it is hazardous to attempt to make use of the equivalent or average student on the national norm population for direct comparisons.

Accepting these limitations a graphic comparison has been made in an attempt to answer the above question (see Table 4 and Figure 1). The mean raw score in comprehension for students taking this video

Table 9

Comparison of the Mean Reading Vocabulary Percentile Scores of Two Experimental Groups Exposed to a Video Developmental Reading Program

Month	Vocabulary (Percentile and raw scores) Before		After
Group A:	78		87
St. Edward High School (n = 155)	(22)		(30.5)
Net change		+ 9 (7.5)	
Group B:	74		78
Seton High School (n = 110)	(21)		(26.5)
Net change		+4 (5.5)	
Average change for both groups		+6.5 (6.5)	

developmental reading program increased from approximately 30.5 to 32.5. Students in the national norm population for the Nelson-Denny Reading Test who have an initial raw score of 31 while in the ninth grade normally increase this score to 35 by the time they reach the tenth grade (without any formal reading instruction).[2]

With respect to mean reading rate the average student in the two experimental groups increased his reading rate by 405 words per minute, or by 41 percentile rank scores of the national norm population of the Nelson-Denny Reading Test. The ninth grade students who had a comparable initial reading rate of the national norm population of the Nelson-Denny Reading Test would increase their reading speed by approximately 40 words per minute, or by approximately eight percentile rank scores, without any formal reading instruction during the ninth grade.[3]

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2. Examiner's Manual, The Nelson-Denny Reading Test of Vocabulary, Comprehension and Rate, Houghton Mifflin Company, The Riverside Press, Cambridge, 1964, pp. 11-12.

3. Ibid., pp. 11-12.

CHAPTER V

SUMMARY, CONCLUSIONS AND SUGGESTIONS FOR FURTHER STUDIES

Summary and Conclusions

This study began as an attempt to improve the reading skills of a group of students in a small, private, secondary school in Tucson, Arizona. It was felt advisable to compare the results of such a program with the results from the other schools. This study has now been completed; the results, conclusions and suggestions for further study are presented in this chapter.

A survey of pertinent literature revealed two facts: (1) major emphasis on reading instruction is concentrated in the lower elementary grades and (2) instruction by means of television has proved to be effective at different levels in a large number of subject areas. This study was designed to explore the possibility of correcting an existing reading skill inadequacy of secondary students by the use of a video developmental reading program. The video method provided the means of supplementing the talents of the available English teachers. On an expanded scale this technique could be used as a mass media approach to the instruction of reading.

This study focused on: (1) changes in reading skills when ninth grade students were exposed to a pre-recorded video developmental reading program, (2) student attitudes associated with this method of instruction, and (3) changes in student behavior as a result of exposure to conditions designed to reinforce a learned skill.

The principal evaluation instrument used in this study was the Nelson-Denny Reading Test of Vocabulary, Comprehension and Rate, Forms A and B. Form A of this test was administered as a pre-test to 265 students in two selected secondary schools. After exposure to the video developmental reading program, Form B of this same test was used to post-test these same students. Both of the schools involved were private parochial secondary schools, located in Ohio and had enrollments of above 1500 students.

An attitude inventory, the Nebraska Attitude Inventory, was modified to include items regarding reading, television and video instruction. A standard IBM 1030 answer sheet was used. The student responses were automatically punched onto IBM cards by the IBM O tical Scoring Reader and the 534 Card Punch equipment. A program was written for the Univac 9200 to obtain summarized data relevant to student responses to specific items and to specific categories of items. This attitude inventory was administered to 107 students (81 from Immaculate Heart High School and 26 from St. Edward High School). The attitude inventory

was administered immediately following the eighteenth video reading tape.

A third source of data, a daily tally of library books checked out of the Immaculate Heart High School library, was used. These data were obtained for the entire year of the experiment, and similar figures were obtained from library records for the year prior to the developmental reading program. This permitted a month by month comparison of the number of books checked out of the school library. This information was used to determine changes in library usage.

The results of this investigation are presented in three sections. The first section is devoted to changes in reading skills (rate, comprehension, and vocabulary) of the experimental population as a result of exposure to the video developmental reading program. The second section is related to student opinion in the areas of reading, television, and video instruction. The third section is concerned with changes in student behavior as a result of the exposure to the video reading program.

Changes in Reading Skills

1. The average student who took part in this study increased his reading speed by 405 words per minute as indicated by pre-test and post-test scores of the Nelson-Denny Reading Test. He received approximately 25 hours of reading instruction.

2. The average student in the experimental population increased his reading speed by 41 percentile rank points as compared with the national norm population of the Nelson-Denny Reading Test.
3. The average student who received reading instruction in study increased his reading comprehension by 7.5 percentile rank scores as compared with the national norm population of the Nelson-Denny Reading Test.
4. The average student who took part in this study increased his reading vocabulary by 6.5 percentile rank scores as compared with the national norm population of the Nelson-Denny Reading Test.
5. Reading skill is a function of rate, comprehension and vocabulary. The average student who took part in this study increased his reading rate from 218 words per minute to 623 words per minute while showing increases in comprehension and vocabulary. As rate increases, the total time required for reading a specific article decreases by geometric proportion Therefore, one immediate benefit of this improved skill is the saving of large amounts of time needed to do required reading. For example, the following reading rates and reading

times apply to the reading of Huckleberry Finn.[1]

Reading Rate	Reading Time
600 words per minute	3 hours 8 minutes
300 words per minute	6 hours 16 minutes
150 words per minute	12 hours 30 minutes
75 words per minute	25 hours 0 minutes

Student Opinions Concerning Reading, Television and Instruction by Television

1. Of the students who took the modified attitude inventory, 57.0 percent felt that their reading skills needed improving. Forty-three percent felt that their reading skills were satisfactory. In general, the students felt that they needed to improve their reading skills.
2. Of the students who took the modified attitude inventory, 60.7 percent had a positive reaction toward the general subject of instruction by television; 39.3 percent displayed a negative reaction. This indicated that many students were receptive to the use of television as a means of receiving information and/or instruction.
3. Of the students who took the modified attitude inventory, 51.6 percent reacted in a positive manner toward receiving reading instruction via television; 48.4 percent responded

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1. James A. Grob, "Reading Rate and Study-Time Demands on Secondary Students," Journal of Reading, Jan. 1970, Vol. 13 #4, p. 285.

negatively. The students were, as a group, nearly neutral toward this method of instruction. The attitude inventory was administered at the approximate midpoint of the video developmental reading program.

4. Considering the marked improvement in reading speed (405 words per minute for the average student in the experimental population) and the nearly neutral feelings toward televised reading instruction it is concluded that this method shows great promise as a teaching "tool."

Changes in Student Behavior Regarding School Library Usage

1. Item Number 88 of the modified Nebraska Attitude Inventory (see Appendix B) reads, "I check more books out of the school library than I did last year;" 25.2 percent of the students in the experimental group agreed and 74.8 percent disagreed with the item. Library book checkout figures substantiated this negative response. During the year prior to the video reading program, the average number of books checked out of the Immaculate Heart High School library per month per student was 1.86. During the year that the reading program was in effect, this number was 1.58. This indicates that an improvement in reading skills does not necessarily mean that a

student, of his own free will, will make greater use of books from the school library.

2. The number of books checked out of a school library may well be a function of the assigned reading by the teachers rather than of changes in student reading skills.

Suggestions for Further Study

There is a considerable body of research data available which supports the contention that television (video recording and playback equipment) can be used effectively to teach many subjects at different levels. This study substantiates these findings in the area of developmental reading at the secondary school level. Due to conditions under which this investigation was conducted (an exploratory field study), several factors became apparent which merit further investigation.

1. It is recommended that future studies be made on this same subject at the same level, but with more sophisticated research designs (rigid control populations) and with much larger experimental populations -- perhaps on a nationwide basis.
2. It is recommended that follow-up studies be conducted either on the identical experimental population (or another suitable population) to determine if the large increase in reading speed

(405 words per minute) found in this study is retained by the typical student.

3. It is recommended that other commercially prepared developmental reading programs be thoroughly evaluated (both video and non-video).
4. It is recommended that future studies of this nature be expanded to include such factors as the effect of video and audio quality on the amount of learning that takes place.
5. It is recommended that future studies be designed and conducted to find ways in which an improvement in reading skills will result in greater use of that skill.
6. Further refinements of the instrument used to measure the attitudes of the experimental population are urged.

APPENDIX A

OPERATION, EFFECTIVENESS OF, AND ADMINISTERING OF VIDEO RECORDING AND PLAYBACK EQUIPMENT

Theory

Information presented in this section is intended for school administrators, classroom teachers and other interested persons who desire an overview of the operation, effectiveness of, and administration of video recording and playback equipment. No attempt has been made to cover the background theories of electromagnetic radiation; nor the technical intricacies of video recording and playback.

Video recording and playback is not a new phenomenon, nor is it an especially difficult technique. It involves application of the long known facts about magnetism, electricity, sound and light. It was determined many years ago that these four terms identify different aspects, or parts, of the same thing--electromagnetic radiation. In simple terms, they are forms of energy and have many similar properties.

Relatively speaking, it is more difficult to record and replay pictures than sound. This is due primarily to the fact that light is inherently more complicated (for one thing--it has much greater velocity) than sound. The human sense organs for receiving light are more complicated than are the sense organs for receiving sound.

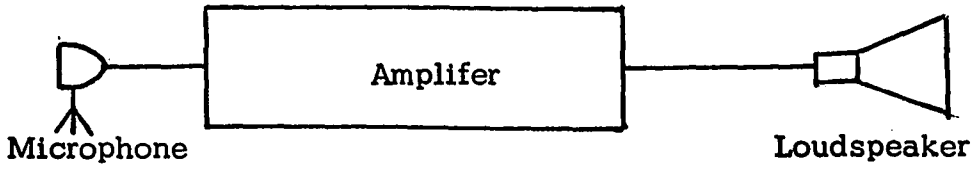
As described earlier in Chapter II, human beings have had the technical ability to record and playback video (pictures) and audio (sound) for almost a half century. Since this discovery, most of the time and effort expended in development of audio and video presentations has been devoted to improvement of the quality of the presentation while continuously reducing the size and cost of the equipment used.

At the present time, audio and video playback equipment has been developed greatly in quality of production. Simultaneously, the equipment size and cost have been reduced to realistic levels. Because of this, we need to concern ourselves here only with the theories of audio and video recording and playback that are essential to an understanding of "how the equipment works." However, this involves knowledge other than "what control knob should be moved to correct or adjust some minor operational problem."

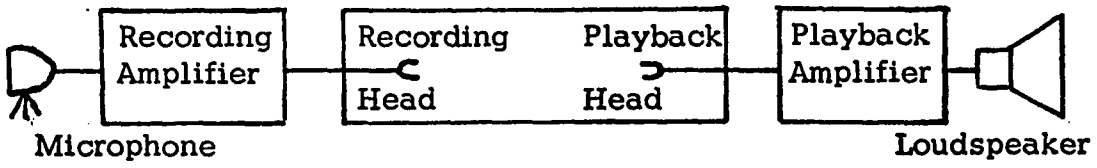
Because audio (sound) is a simpler subject than video (pictures) it seems logical to begin with the fundamentals of sound recording and playback. A basic component in an audio recorder is a magent. A magnet has several interesting (and useful) properties: (1) it has a "north" pole and a "south" pole, (2) it attracts certain metallic substances, (3) it will transfer its magnetic properties to other metallic substances, and (4) when two magnets are brought in close proximity, "like" poles repel and "unlike" poles attract.

The "recording" and "playback" heads of a common tape recorder are nothing more than magnets. The tape is a plastic strip coated on one side with particles of a substance which can be magnetized, iron oxide. During the recording cycle the metallic particles on the tape are magnetized by the recording head in a pattern which is determined by the signals received from a microphone. During the playback cycle, the magnetized particles cause the playback to be "excited" and the magnetic impulses that have been implanted on the tape are "picked off," reconverted to sound, and reproduced by the loudspeaker.

A sound reproducing system is a "chain" which starts with sound and ends with sound. In its basic nonrecording form it can be shown in a diagram thusly:



In diagram form a sound system with provisions for recording and playback looks like the following:



The diagram can be explained as follows:

1. Audible sound is picked up by the microphone and converted into electrical signals which are sent to the recording amplifier.

2. The recording amplifier increases the strength of the electrical signals, and sends them on to the recording head.

3. The recording head converts the electrical signals into magnetic impulses, by magnetizing particles of iron oxide as the tape passes across the head.

4. The tape is rewound.

5. During the playback cycle the tape, which contains the magentized impulses, is drawn in front of the playback head and the magentized impulses are reconverted to electrical signals. These signals are sent to the playback amplifier.

6. The playback amplifier increases the strength of the electrical signals and sends them on to the loudspeaker.

7. The loudspeaker converts the electrical signals into audible sounds and projects them into space.

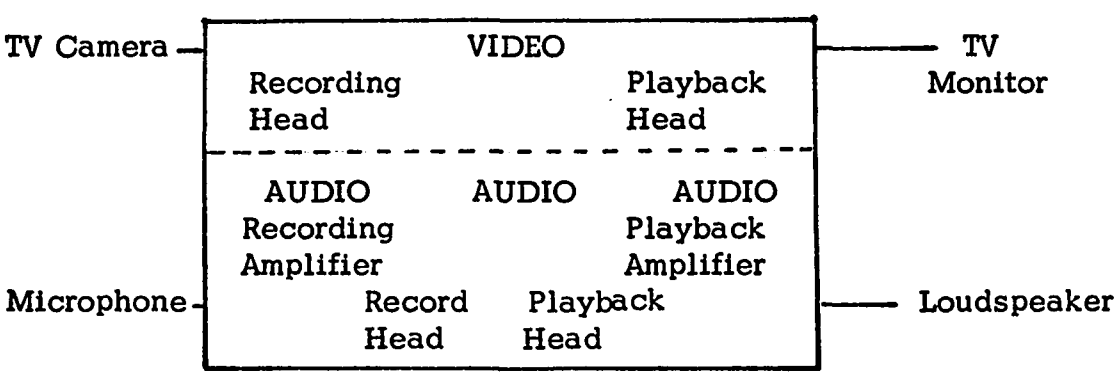
Not shown in the above diagram is the tape transport system. This system serves to draw the tape across the recording head during the recording cycle. After the tape has been rewound, it also serves to pull the tape across the playback head during the playback cycle at exactly the same speed. The tape transport system thus plays a major part in the quality of sound that is produced.

The basic theories of sound recording and playback are included in the preceding discussion. Tape recorders (audio) are normally very durable devices and are widely used in classrooms. Operational problems with audio tape recorders usually involve the following: (1) lack of electrical power to the unit, (2) failure of electrical or mechanical components, (3) dirty recording or playback heads, (4) poor quality

tape or defects in the tape transport system. The quality of the sound output of a tape recorder results from the quality of its component parts, and the care with which they are assembled and operated. The general rule of thumb is "the more such equipment costs, the higher the quality of sound output."

A video recording and playback system is basically a high quality audio-tape recorder with additional provision for recording and replay of pictures. The same type of tape transport system is used. The same theory applies of converting electrical signals into magnetic impulses and at a later time reconversion of these magnetic impulses back into electrical signals. The major differences (in the video channel) are in the substitution of a television camera for the microphone; substitution of a television monitor (screen and built-in speaker) for the loudspeaker; and a more complex recording and playback head arrangement for implanting and pick-up of the magnetic impulses which represent light.

The following is a typical video system diagram:



From this diagram it can readily be seen that one reason for the additional complexity of a video system (as compared with an audio system) is that the video system also contains an audio system. Both sound and pictures are recorded on the video tape.

The diagram can be explained as follows:

1. Pictures are continuously taken by a television camera and converted into electrical signals. These signals are amplified and sent to the video tape recorder (VTR).
2. The recording head of the VTR converts the electrical signals into magnetic impulses by magnetizing particles of iron oxide coated on one side of the video tape.
3. The video tape is rewound.
4. During the playback cycle the tape is drawn in front of the playback head and the magnetized impulses are "picked off" when the playback head is "excited" by the magnetized particles. There particles of iron oxide remain magnetized. Thus, the tape can be played many times without apparent loss of quality.
5. The magnetized impulses are converted into electrical signals. These signals are sent on to the control circuit of a television monitor (which contains a viewing screen).

6. The television monitor converts the electrical signals into video presentations which can be seen on the screen. The images seen on the screen are identical with those photographed by the television camera.

APPENDIX B

STUDENT ATTITUDE SCALE--MODIFIED NEBRASKA ATTITUDE INVENTORY

Directions to Students

A study is being made to help improve the understanding of student achievement under various teaching conditions. Your answers to the items in this attitude survey will contribute to this understanding.

It is important that you consider your entire school experience in marking your answers, not just isolated experiences or your relationships with individual students or teachers.

Notice the order of the numbers on the answer sheet. They go across rather than down. Please be sure that this number of your answer matchs the number of the item on the scale.

EXAMPLE:

1. I generally do an acceptable job of studying.

	a	b	
1.	_____	_____	(Use only the spaces under a or b)
	Agree	Disagree	

If you agree with the above statement, blacken the space under the a.
If you disagree, blacken the space under the b.

REMEMBER...Consider your entire school experience in answering these items.

Please answer every item. Your first reaction is generally the best (your true feeling); therefore, do not spend a lot of time on any one item. Completely blacken the space between the lines for each answer. Please use a pencil. DO NOT USE A BALLPOINT PEN.

Answers on this scale will not be used to make individual evaluations. Rather, they will be used for group comparisons. Please express yourself frankly.

Thank you for your cooperation.

Student Attitude Scale

1. I generally do an acceptable job of studying.
2. I think school work is important.
3. Teachers are concerned about whether or not a student has friends.
4. I think television is interesting.
5. Students are given enough freedom in selecting their school subjects.
6. Students in my school make a special effort to make new students feel welcome.
7. I can depend on a teacher to help me even if I should get into serious trouble.
8. Television is a good method to hold my attention.
9. I feel that I have a teacher who is definitely interested in me as an individual.
10. I understand the reasons behind school rules and regulations.
11. I feel that my teachers care about what students think about their subjects, their classroom work, and their assignments.
12. I do as well as my classmates in school.
13. I can remember things that I see on television.
14. My grades tend to encourage me in my school work.
15. The school has the information I want and need to know about colleges or other schools which offer post-high school education.
16. Teachers have talked with me about the things I do best.
17. I like to read.
18. I feel at ease when talking individually to my teachers.
19. Students in my school do not make fun and criticize other students who are different.
20. When I am in a "rut" at school, I know how to get out of it.
21. If I could read better my homework would be easier.
22. At least one high school teacher has done something important especially for me as an individual.
23. Almost all my friends enjoy reading books.
24. Teachers show respect and consideration for students under their supervision.
25. I feel free to discuss a personal problem with one of my teachers.
26. I wish I could improve my ability to read.
27. It is easy for me to make friends.
28. The grading system is an incentive to do my best work.
29. Teachers are aware of the opinions of students.
30. Since I have started the school reading program my reading skill has improved.
31. Time spent in school is worthwhile.
32. To be accepted by a group of friends is one of the best things that can happen to a person.

33. Television picture quality of this video course has been good.
34. Teachers speak to me outside of class.
35. I feel that I have become sufficiently involved in school activities.
36. I can talk about my real feelings about things with one of my teachers.
37. I like to be taught by television.
38. Most high school students are interested in helping other students succeed.
39. I plan to go to college after finishing high school.
40. I usually feel comfortable and at ease when I am in my classes.
41. I seldom think about quitting school.
42. I would like to be taught other subjects by television.
43. I put school work before other things.
44. Teachers let me know when I have done a good job.
45. The television teacher isn't as good of a teacher as my regular English teacher.
46. I have several close friends at school who would stick by me even if I were in serious trouble.
47. My teachers have helped me to make new friends.
48. I want to learn to read very rapidly.
49. My teachers understand the problems of high school students.
50. My friends think that getting good grades in school is important.
51. The first reading lessons on television were better than the recent ones.
52. Students respect teachers in my school.
53. My teachers try to become personally acquainted with all the students in their classes.
54. I spend enough time studying.
55. Television teaching is boring.
56. I have a friend whom I can trust to keep my secrets.
57. My teachers miss me when I am absent from class.
58. I think this reading program helps the smart kids more than the average kids.
59. My school subjects interest me.
60. Making friends at school is easy.
61. I prefer to be taught reading by a live teacher rather than by TV.
62. Teachers make an effort to make new students feel welcome at school.
63. My teachers think that I will be successful in my adult life.
64. My teachers try to give students a chance to be successful in class.
65. I look forward to seeing my friends at school.
66. I think the materials used (records, books, instruction booklet) in the reading course are good.

67. I like my subjects.
68. Teachers are more likely to recognize students when they have done a good job than to criticize them for their shortcomings.
69. I feel that there is a teacher or somebody that I can really talk with in school.
70. I think the reading selections (Sink the Bismark--for example) are interesting.
71. School work is easy for me.
72. My teachers have helped me feel more confident about my ability.
73. I work to learn in school.
74. Most high school students need instruction in reading.
75. I enjoy doing school work.
76. I want to keep my grades about the same as those of the rest of the members of my group.
77. School work is exciting and interesting to me.
78. The reading course proves that our school is trying to help me get a good education.
79. My teachers help me with any problems or questions I have.
80. My teachers are willing to spend extra time and effort to help me with my school work before or after regular school hours.
81. I enjoy coming to school.
82. I hate to miss school.
83. Since taking this reading course I read more.
84. I would be going to school whether or not I had to.
85. I think my teachers enjoy teaching.
86. My education is helping me to set and achieve my future goals.
87. It is easy for me to get along with teachers and other students.
88. I check more books out of the library than I did last year.
89. I find it easy to talk with my teachers about my problems.
90. Not counting the books I have to read, I have read more than three books since school started this year.

APPENDIX C

VIDEO RECORDING AND PLAYBACK EQUIPMENT USED AT IMMACULATE HEART HIGH SCHOOL, TUCSON, ARIZONA

Figure C-1. Video Recording and Playback Equipment Used at Immaculate Heart High School, Tucson, Ariz.

APPENDIX D

MODIFIED NEBRASKA ATTITUDE INVENTORY ITEM RESPONSES

Table D-1

Modified Nebraska Attitude Inventory--Item Responses

Question Number	St. Edward High School		Immaculate Heart High School	
	Agree	Disagree	Agree	Disagree
1	21	5	66	15
2	25	1	74	7
3	7	19	54	27
4	23	3	74	7
5	11	15	65	16
6	7	19	63	18
7	19	7	59	22
8	17	9	56	25
9	14	12	46	35
10	20	6	68	13
11	19	7	59	22
12	16	10	51	30
13	24	2	66	15
14	23	3	61	20
15	18	8	70	11
16	5	21	29	52
17	17	9	56	25
18	12	14	48	35
19	4	22	26	55
20	18	8	52	29
21	15	11	47	34
22	18	8	55	26
23	6	20	44	37
24	18	8	63	18
25	9	17	34	47
26	22	4	58	23
27	22	4	53	28
28	20	6	55	26
29	18	8	58	23
30	25	1	46	35

Table D-1--Continued

Question Number	St. Edward High School Agree	Disagree	Immaculate Heart High School Agree	Disagree
31	23	3	76	5
32	20	6	59	22
33	22	4	35	46
34	16	10	56	25
35	13	13	40	41
36	10	16	40	41
37	13	13	24	57
38	5	21	39	42
39	26	0	58	23
40	20	6	67	14
41	22	4	54	27
42	12	14	23	58
43	15	11	36	45
44	20	6	53	28
45	14	12	42	39
46	22	4	59	22
47	9	17	14	67
48	23	3	60	21
49	17	9	55	26
50	24	2	72	9
51	6	20	45	36
52	16	10	48	33
53	13	13	49	32
54	15	11	42	39
55	7	19	47	34
56	18	8	71	10
57	6	20	28	53
58	8	18	33	48
59	17	9	66	15
60	19	7	56	25
61	15	11	55	26
62	19	7	72	9
63	20	6	47	34
64	21	5	68	13
65	21	5	65	16
66	20	6	51	30
67	16	10	63	18
68	11	15	53	28
69	19	7	55	26

Table D-1--Continued

Question No.	St. Edward High School Agree	St. Edward High School Disagree	Immaculate Heart High School Agree	Immaculate Heart High School Disagree
70	21	5	29	52
71	13	13	36	45
72	13	13	46	35
73	20	6	69	12
74	22	4	54	27
75	8	18	46	35
76	11	15	34	47
77	10	16	41	40
78	22	4	67	14
79	21	5	62	19
80	21	5	53	28
81	13	13	64	17
82	13	13	44	37
83	17	9	20	61
84	21	5	67	14
85	19	7	67	14
86	23	3	77	4
87	22	4	63	18
88	6	20	21	60
89	9	17	23	58
90	15	11	46	35

Table D-2

Modified Nebraska Attitude Inventory--Category Totals

	St. Edward High School		Immaculate Heart High School	
	Agree	Disagree	Agree	Disagree
Attitude toward School	251	113	871	263
Attitude toward the relationship between students and teachers	196	142	625	428
Attitude toward peers	142	66	479	169
Attitude toward self	97	59	306	180
Attitude toward teachers	214	150	750	379
Attitude toward television	133	75	380	268
Attitude toward reading instruction by television	94	62	246	240
Attitude toward reading	143	91	406	323

APPENDIX E

COMPARISON OF SCORES--GROUPS A AND B

Table E-1

Comparison of Scores (Beginning and Ending Converted to Percentiles of Group A)
(Basic 36, St. Edward High School, Lakewood, Ohio, Dec-Feb, 1969)

	Nelson-Denny Test							
	Voc. B	%ile E	Comp. B	%ile E	Rate B	%ile E	Rate B	WPM E
Agozzino, J	77	95	65	74	79	99	275	666
Ahern, Joe	99	99	97	99	84	99	327	558
Androsky, A	82	92	80	93	73	99	250	736
Arnold, J.	98	98	71	90	85	99	309	558
Atkian, Ron	99	99	--	99	--	99	---	806
Balbo, Tom	85	94	87	74	53	99	207	666
Beargie, Chas	57	84	76	90	33	99	161	518
Beebe, Doug	99	99	99	99	91	99	338	580
Bichl, Jim	80	96	65	82	91	99	338	1196
Bittel, Robt.	93	95	65	90	99	99	513	782
Blech, R.	98	99	--	93	--	99	---	666
Brieck, R.	96	92	--	63	--	95	---	354
Brignac, N.	29	56	59	74	18	99	129	480
Brown, Mark	47	82	38	56	37	99	174	638
Bucur, G.	82	90	46	78	57	52	216	190
Butler, Jack	41	79	84	74	88	99	318	976
Caja, John	96	96	95	99	73	99	250	806
Calabrese, A.	30	79	80	31	44	99	185	638
Carey, Kevin	--	79	--	56	--	99	---	580
Chrusciel, R.	96	96	99	97	78	99	267	826
Clark, Dennis	73	94	80	69	68	99	238	470
Colburn, D.	89	86	18	38	--	99	---	922
Conroy, M.	93	98	90	74	85	99	309	580
Cook, D.	89	96	87	97	49	99	195	900
Corrigan, J.	96	98	84	99	63	86	226	290

Table E-1, Comparison of Scores --Group A

	Nelson-Denny Test							
	Voc. B	%ile E	Comp. B	%ile E	Rate B	%ile E	Rate B	WPM E
Cummings, B.	90	82	76	82	68	99	238	900
Dancak, D.	87	86	59	82	68	91	238	390
DelVecchio, P.	69	88	59	56	13	95	115	354
DelVecchio, V.	99	99	53	99	73	80	250	258
DePompei, E.	82	95	84	44	73	99	226	1122
DiLeone, R.	89	69	87	82	84	99	298	900
Dingman, C.	85	90	53	78	37	99	174	618
Dodd, D.	90	82	71	56	84	97	298	390
Duber, J.R.	95	92	90	69	63	99	226	638
Dugan, James	77	88	71	93	73	99	250	580
Dugan, Jim	65	88	71	69	53	99	207	1230
Edgehouse, D.	73	90	71	69	98	99	446	654
Fahey, Tom	--	98	--	99	--	99	---	514
Fillar, Jim	85	93	76	90	21	99	140	666
Firment, D.	77	82	93	97	53	99	207	826
Flanagan, M.	65	92	31	56	49	98	195	428
Flesch, K.	57	79	80	82	77	99	262	736
Furst, Dan	41	86	59	38	63	98	226	452
Gallagher, D.	24	79	80	63	44	97	185	407
Gallagher, M.	47	82	38	38	37	99	174	758
Gallagher, N.	89	98	76	86	44	85	185	181
Gemperline, P.	82	99	90	93	44	99	185	806
Girlin, J.	85	86	31	82	--	63	---	212
Giblin, R.	95	99	98	95	77	99	262	700
Grapentine, L.	85	--	46	50	13	99	115	573
Gudhauskas, M.	94	97	98	74	79	99	274	558
Hagan, G.	90	82	93	95	53	99	207	714
Hanson, D.	81	91	82	79	45	95	238	452
Hart, Paul	91	99	90	--	79	--	275	---
Hatgas, M.	85	93	90	44	73	99	250	782
Havran, J.	95	99	84	99	44	99	185	850
Hearns, E.	35	40	80	31	26	99	150	538
Henehan, R.	99	98	98	--	77	--	262	---
Herdmann, T.	47	86	59	90	57	99	216	826
Herringer, Joe	95	96	93	63	90	93	327	330

Table E-1, Comparison of Scores--Group A

	Nelson-Denny Test							
	Voc. B	%ile E	Comp. B	%ile E	Rate B	%ile E	Rate B	WPM E
Higgins, J.	99	98	98	99	57	99	216	712
Hinkelman, B.	96	96	99	99	77	99	262	580
Hodgkiss, J.	89	88	90	99	44	97	185	390
Host, G.	94	98	87	82	99	99	563	976
Iflapi, Dan	--	56	59	63	73	99	250	688
Ilg, Kenneth	87	95	31	56	44	99	185	580
Januska, J.	91	79	18	82	53	97	207	406
Karaffa, J.	93	99	85	87	60	99	275	654
Kaufman, C.	80	76	46	69	44	99	185	638
Kauker, D.	69	90	59	82	73	99	250	558
Keane, T.	57	69	59	56	44	99	185	580
Keating, M.	57	95	80	74	77	99	262	538
Kenney, J.	35	66	--	63	--	97	---	390
Kiecan, T.	95	92	98	78	44	98	185	458
King, Keith	98	84	90	74	90	99	327	1122
Klostermeyer, R.	90	--	46	78	90	99	327	666
Konopka, E.	35	40	24	53	53	81	207	258
Kropp, A.	61	73	59	90	33	98	161	452
Kuehne, J.	90	95	65	50	33	98	161	452
Lamb, J.	82	76	76	78	68	97	238	390
Laskey, M.	90	93	98	90	63	92	226	330
Loan, J.	90	73	84	90	18	98	128	452
Ludwig, L.	69	86	84	97	96	99	407	826
Luppens, S.	94	95	8	82	75	99	256	976
Lydon, M.	90	93	65	78	37	99	174	580
Lydon, R.	87	95	53	95	61	99	250	976
McAllister, J.	99	86	59	74	49	95	195	354
McAvoy, D.	96	98	80	86	37	88	174	303
McCarthy, D.	94	95	80	95	77	99	262	688
McConnell, M.	72	87	56	91	24	56	161	234
McGuire, M.	85	88	65	93	49	99	195	538
McMananmon, J	65	66	53	56	81	99	287	712
McNally, J.	69	94	87	78	44	99	185	598
McNamara, J.	30	--	30	--	68	--	238	---
MacCollum, D.	54	95	70	82	84	99	327	666

Table E-1, Comparison of Scores--Group A

	Nelson-Denny Test							
	Voc. B	%ile E	Comp. B	%ile E	Rate B	%ile E	Rate B	WPM E
Maloney, J.	47	63	80	--	65	--	195	---
Mangione, M.	31	73	69	50	21	99	140	558
Marshall, B.	35	82	76	44	44	99	185	876
Mauerer, T.	65	88	76	98	57	72	216	330
Miecznikowski, T.	87	76	53	86	77	99	262	618
Monica, W.	85	92	59	90	79	98	275	428
Montgomery, K	82	82	80	90	67	97	238	406
Mooney, T.	65	79	31	38	33	99	161	580
Muran, S.	69	73	18	44	37	97	174	405
Murphy, T.	90	96	65	97	57	99	216	558
Murray, W.	69	73	76	82	68	99	238	470
Nagorka, F.	99	99	99	99	73	99	250	654
Nano, M.	14	88	70	98	68	99	238	736
Neff, R.	91	99	84	63	73	99	250	618
Novak, T.	99	95	76	74	44	99	185	806
Novicky, W.	85	93	38	56	63	99	226	654
O,Connell, T.	82	79	59	50	53	99	207	580
O,Donnell, M.	47	96	38	44	44	99	185	490
O'Linn, B.	--	71	56	97	19	99	185	598
O'Neill, C.	87	99	84	78	58	99	238	558
Palmer, D.	71	99	97	90	90	99	327	1076
Parchem, D.	95	88	71	99	13	98	115	452
Paskert, M.	89	82	18	74	4	97	74	390
Patton, M.	73	69	84	56	33	74	161	234
Patton, Mike	94	99	87	78	33	99	161	558
Paul, Ken	90	88	84	97	55	99	210	580
Pawlowski, J.	90	92	59	63	99	99	468	826
Pritchard, D.	80	82	23	90	--	99	---	976
Pritchett, L.	87	82	87	90	53	99	207	998
Raffey, T.	87	84	53	86	57	98	216	452
Redmond, B.	--	93	--	63	--	74	---	234
Salveter, L.	18	76	53	74	21	97	140	390
Sara, Bob	85	86	46	31	33	99	161	580
Scalley, K.	87	--	71	74	73	99	250	758
Sessin, T.	38	79	65	56	97	99	417	922

Table E-1, Comparison of Scores--Group A

	Nelson-Denny Test							
	Voc. B	%ile E	Comp. B	%ile E	Rate B	%ile E	Rate B	WPM E
Sherman, D.	99	99	93	97	68	99	238	618
Skeens, T.	94	95	80	56	37	99	174	712
Skeens, Tom	80	84	38	69	18	85	128	282
Sopko, J.	80	93	71	74	33	99	161	490
Sponseller, G.	82	94	93	97	63	99	226	580
Stephen, C.	65	84	65	56	65	99	195	580
Switala, J.	65	84	46	44	44	99	185	538
Szelpal, N.	85	66	9	--	84	--	298	---
Tantone, P.	85	90	53	56	37	97	174	390
Thompson, J.	99	79	54	74	49	99	198	782
Travers, An.	82	95	84	90	57	99	216	1022
Urban, R.	85	73	80	44	53	99	207	688
Vargo, J.	73	79	59	82	73	99	250	514
Versagi, F.	65	86	71	90	57	98	216	452
Viccarone, J.	85	88	76	63	57	97	216	390
Weisbarth, T.	85	94	93	82	26	98	150	452
Weisman, L.	87	92	84	93	88	99	318	1022
Whelan, M.	99	99	87	86	57	95	216	354
Whelan, P.	73	92	65	95	53	97	207	390
Wick, B.	57	79	53	74	77	99	262	538
Winterich, R.	87	76	90	82	72	98	260	452
Wittman, M.	73	82	80	63	18	99	128	666
Woods, G.	73	52	13	56	53	99	207	666
Wynalek, G.	93	95	90	56	90	99	327	850
Zeber, P.	85	69	65	90	68	99	238	1076
Mean	78	87	69	76	61	97	228	609

Table E-2

Comparison of Scores (Beginning and Ending Converted to Percentiles) of Group B
(Basic 36, Seton High School, Cincinnati, Ohio, September-November 1970)

	Nelson-Denny Test							
	Voc. B	%ile E	Comp. B	%ile E	Rate B	%ile E	Rate B	WPM E
Altherr, B.	65	91	76	44	44	99	185	618
Aver, Karen	77	60	59	86	49	80	195	258
Bachmann, J.	52	76	59	50	44	99	185	490
Backscheider,L	99	99	59	50	63	99	226	688
Backscheider,B	98	98	87	86	37	97	174	403
Baer, D.	99	99	99	99	90	99	327	1230
Bedinghaus,A	98	99	99	99	83	99	250	580
Benken, C.	77	73	76	74	63	98	226	850
Berne, T.	48	23	56	63	49	86	195	282
Bill, Janet	77	60	76	98	57	99	216	1048
Blessing, S.	61	44	53	78	37	98	174	452
Braun, J.	57	36	38	63	33	97	161	391
Bridges, P.	52	73	38	69	65	93	216	666
Brinkmann,T.	94	99	93	98	68	99	238	708
Brodbeck, D.	57	82	38	44	57	99	216	598
Bruns, Mary J.	80	99	71	93	33	98	161	425
Bryson, R.	82	76	99	82	44	99	185	511
Carvitti, P.	47	36	53	44	37	74	174	234
Coakley, C.	57	52	46	56	21	99	140	618
Conrad, L.	61	98	59	99	44	99	185	488
Copeland, K.	61	82	31	86	68	99	238	654
Dittmann, B.	99	99	99	99	84	99	298	666
Dossman, J.	94	82	76	90	57	99	216	470
Driggers, M.	52	--	18	--	20	--	150	---
Drury, Sh.	96	92	93	90	81	99	287	1022
Dwyer, M.	99	99	87	90	68	99	238	615
Egner, C.	98	94	90	63	53	98	207	452
Feeley, P.	99	99	95	93	37	99	174	758
Ferguson, J.	41	56	24	50	4	99	74	452
Friedman, L.	99	97	42	76	77	99	262	580

Table E-2, Comparison of Scores--Group B

	Nelson-Denny Test							
	Voc. B	%ile E	Comp. B	%ile E	Rate B	%ile E	Rate B	WPM E
Frondorf, T.	90	73	53	82	85	99	309	758
Gauin, S.	73	69	90	50	88	99	318	580
Geiermann,G.	89	92	65	38	93	84	359	282
Gelter, P.	73	82	55	63	33	96	161	376
Gibbons, M.	97	96	87	86	44	96	185	368
Goosmann, B.	9	82	76	74	57	99	216	452
Grady, S.	87	73	71	97	44	99	185	598
Grosquade,M.	87	94	90	95	63	99	226	950
Grove, JoAnn	82	--	53	--	10	--	104	---
Hayden, K.	29	60	59	97	68	25	238	258
Healey, L.	93	86	71	91	92	99	349	976
Heider, Debi	77	56	59	69	44	99	185	458
Heil, Laura	89	60	76	78	79	99	275	511
Hensler, A.	89	93	95	93	57	99	216	976
Holthaus, P.	29	32	38	74	18	99	128	758
Huesman, J.	47	79	59	50	37	99	348	354
Jaehnen, C.	65	--	71	--	13	--	115	---
Jasper, J.	93	93	87	95	44	97	185	390
Jordan, Sue	41	82	53	78	53	99	207	736
Kallmeyer, M.	65	73	18	82	26	99	150	598
Kathmann, J.	96	98	93	99	21	99	140	490
Kiaemer, T.	91	86	80	50	79	99	275	1230
Klaurtter, S.	20	36	80	31	21	94	140	354
Kluener, J.	52	60	65	78	57	99	216	580
Kunze, C.	65	56	38	69	79	99	275	490
Langenbrunner, M.	35	--	59	--	53	--	207	---
Laebes, C.	69	56	65	38	53	99	207	736
Lay, Julie	99	97	84	74	77	99	262	638
Lengerich, V.	82	84	84	98	68	97	238	390
Lillis, J.	99	99	99	99	84	99	298	736

Table E-2, Comparison of Scores--Group B

	Nelson-Denny Test							
	Voc.	%ile	Comp.	%ile	Rate	%ile	Rate	WPM
	B	E	B	E	B	E	B	E
Lindemann, M.	96	95	84	99	37	99	174	688
Loesing, D.	95	95	97	99	77	99	262	514
Ludwig, T.	82	79	71	86	57	99	216	922
McGowan, K.	99	99	98	99	15	99	207	580
Maas, M. L.	95	52	76	74	13	99	115	666
Macke, J.	85	96	65	78	77	99	262	876
Mancini, M.	37	50	55	69	24	99	87	750
Meyer, M.	57	66	59	95	57	99	216	654
Minning, D.	87	66	53	90	57	99	216	558
Molleran, M.	94	84	76	74	57	99	216	618
Neumann, P.	99	99	99	99	99	99	524	1246
Noppert, P.	57	90	38	82	26	99	150	1048
Nuss, J.	73	44	18	63	18	99	128	470
O'Brien, K.	95	86	84	97	--	99	---	758
Papania, V.	85	79	65	86	18	97	128	406
Pastura, D.	8	73	31	69	25	99	128	521
Pierri, D.	99	99	90	99	88	99	318	806
Pitchford, V.	93	90	87	93	57	99	216	654
Poston, K.	24	66	18	69	33	89	161	306
Quatman, M.	73	76	71	63	44	99	185	688
Recker, B.	80	88	65	82	63	97	226	390
Reilly, K.	57	63	46	50	8	99	94	618
Remke, T.	94	99	76	86	57	99	216	391
Rinck, K.	95	97	98	78	73	99	250	333
Roell, M.	36	69	38	40	42	99	174	806
Rogers, K.	80	69	65	69	13	99	115	666
Rowekamp, N.	96	88	87	56	57	99	216	758
Salem, M.	85	56	80	78	73	99	250	1230
Scheve, C.	65	79	59	93	18	99	128	758
Scholl, S.	61	48	31	56	49	99	195	1230
Schroeder, M.	99	63	98	44	57	99	216	826
Shook, D.	80	69	65	38	33	99	161	391
Stein, M.	73	95	46	74	26	98	150	428
Schmid, V.	69	60	53	56	37	95	174	354
Schwager, C.	85	79	65	86	18	97	128	406

Table E-1, Comparison of Scores--Group B

	Nelson-Denny Test							
	Voc.	%ile	Comp.	%ile	Rate	%ile	Rate	WPM
	B	E	B	E	B	E	B	E
Shoemaker, P.	98	96	93	98	81	99	287	1230
Stahl, K.	80	86	76	78	57	83	216	282
Stengel, C.	52	56	13	18	26	--	150	---
Strohofer, J.	95	98	90	63	44	99	185	598
Szydlowski,D	57	92	84	95	49	99	195	736
Tenoever, E.	82	--	53	--	79	--	275	---
Theetge, B.	2	94	31	24	44	99	185	1022
Totton, C.	90	96	71	93	44	99	185	---
Van Styn, Sara	95	92	31	82	77	99	268	998
Veth, J.	90	99	71	99	57	95	216	356
Wagner, S.	47	69	18	44	73	99	250	590
Weddington, A.	98	76	93	69	33	99	161	333
Weidner, J.	77	98	59	56	37	99	174	1022
Weikel, J.	80	79	89	86	73	99	250	806
Welbourne, C.	80	90	84	69	37	99	174	1122
Mean	74	78	66	74	53	99	207	637

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