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AN EVALUATION OF THE EFFECTS OF A STUDENT GUIDE AND AUTOMATED COURSE IN COMPARISON TO A TRADITIONAL APPROACH IN TEACHING THE COURSE "AUDIOVISUAL MATERIALS IN TEACHING"

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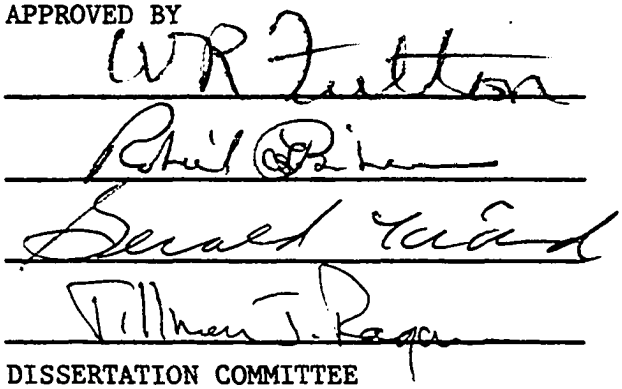
AN EVALUATION OF THE EFFECTS OF A STUDENT GUIDE AND AUTOMATED COURSE IN COMPARISON TO A TRADITIONAL APPROACH IN TEACHING THE COURSE "AUDIOVISUAL MATERIALS IN TEACHING"

APPROVED BY



DISSERTATION COMMITTEE

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CHAPTER I

INTRODUCTION

For centuries, education was provided on a basis where the teacher worked with a very small number of students and each student received special attention. Through the years, the one-to-one student-teacher ratio continued to be the primary method of instruction, but the arrival of the Twentieth Century and its concomitant increases in population, school enrollment, and expansion of knowledge forced educators to shift their teaching methods from working with individuals to providing education for the masses.[1] Shortly after World War II, these burdens on the schools were at an all time high and educators appeared to need a new means of providing needed instruction. With the increased emphasis upon educating the masses, there was a concurrent increase of interest in educational use of films, television, and other forms of media for mass instruction. Empirical foundations for mass instruction were advanced by the National Education Association, which conducted surveys in 1946 and again in 1954 and found that the number of

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[1] W. R. Fulton, "Administration and Evaluation of Educational Media Programs," University of Oklahoma. (Duplicated.)

sound-motion-picture projectors in the schools had increased by 140 percent when compared to the student enrollment during that period of time.[2] At the same time mass education was in demand, educators were recognizing the need for meeting individual problems of students. Only recently has technology, designed to meet the individual needs of students, appeared to have gained renewed emphasis. Schools have begun to take another look at meeting the needs of the individual students while still providing education for the masses. Although total personalization of instruction can plausibly be achieved, high costs seem to indicate that at the present time this is improbable.[3] There is, however, a method of instruction which is at least one step closer to individualization of education than the present methods of instruction for the average student. Individualization through independent and self-paced studies can be achieved by providing students with an instructional program that allows them to progress at their own rate. Once again, educational media supplies the alternative with advanced sophistication in technology which allows mass production of instructional materials at a low cost, and which, at the same time, may be used to provide each student with his own learning package allowing him to progress at his own rate.

Several institutions have been providing different levels of individualized instruction through some form of self-instructional, self-paced study method during the past two decades, and many institu-

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[2] James W. Brown and Kenneth D. Norberg, Administering Educational Media (New York: McGraw-Hill Book Company, 1965), p. 6.

[3] William B. Ragan, John H. Wilson, and Tillman J. Ragan, Teaching in the New Elementary School (New York: Holt, Rinehart and Winston, Inc., 1972), p. 261.

tions are currently experimenting with new programs.[4] The College of Education at the University of Oklahoma has been active in this new movement and is presently utilizing an automated educational media course consisting of filmstrips and audio-taped programs which are presented to the students in a self-paced laboratory. The title of the media course is "Audiovisual Materials in Teaching."

A study by Paschall compared the effectiveness of this particular automated course to a more conventional lecture approach of instruction, and the results of his study indicated that there were no significant differences in student achievement in one mode of instruction over the other.[5] The study indicated, rather, that basic media information could be taught equally well through a mediated presentation of an independent study basis when compared to a more conventional method of instruction.

A later study by Jordan discovered that the addition of group discussion sessions resulted in few significant gains in student achievement over students taking only the automated course. Jordan emphasized, however, that students' attitudes were more favorable toward the automated course when they had some instructional guidance from the professor.[6] This study also indicated that certain factual information can be acquired through the mediated program, but instructional guidance appeared to be a needed ingredient.

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[4]Jack V. Edling, "Individualized Instruction: The Way It Is--1970," Audio Visual Instruction, February, 1970, Vol. XV, No. 2, pp. 13-16.

[5]Jack W. Paschall, "The Comparative Effectiveness of Two Instructional Systems for Teaching the Course 'Audiovisual Materials in Teaching'" (unpublished Doctoral dissertation, University of Oklahoma, 1970).

[6]Dan Jordan, "The Effects of Intergrating Discussion Sessions with a Self-Instructional Course in Audiovisual Methods" (unpublished Doctoral dissertation, University of Oklahoma, 1972).

A recently developed "Student's Guide", which is to be used in conjunction with the automated media course, may be the needed ingredient to provide strength to the automated program, but the value of the "Guide" has still not been determined.[7] The "Guide" is divided into thirteen basic units and each unit is sub-divided into sections which include (1) an introduction to the unit, (2) a precise statement of the behavioral objectives, (3) the required assignments, (4) response items for unit review, (5) a self-test for self-evaluation on the content, (6) a list of references on the subject, and (7) additional assignments designed to enhance students' depth in the specific topics. The "Guide" may be one key to higher student achievement in the automated course when compared to the more conventional classroom method of instruction, and it may also provide some of the needed instructional guidance for individual students.

An investigation of the value of the new "Student's Guide" is needed to determine if such a "Guide" improves the quality of the automated course. An evaluation of the automated course and "Guide" should include data on individual traits of the students. Hilgard stated:

> It is surprising that studies of class size, discussion vs. lecture, and teaching aids such as motion pictures and TV point to so few differences in the effectiveness of teaching. It is not that these studies are poorly done, and even studies which show little differences in effectiveness leave us with freedom of choice with teaching methods. My guess is that they fail, however, to understand the subtle differences made by "kind of student" and "kind of teaching setting."[8]

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[7]W. R. Fulton, Jack W. Paschall, and Tillman J. Ragan, "Student's Guide to the Study of Educational Media: An Automated Course," University of Oklahoma, 1973. (Duplicated.)

[8]Gavriel Salomon and Richard E. Snow, "Aptitudes and Instructional Media," Audiovisual Communication Review, Vol. 16, No. 4 (Winter, 1968), p. 343, quoting Hilgard in Association for Higher Education College and University Bulletin, March 16, 1955.

Statement of the Problem

The purpose of this study was to determine (1) whether or not the independent study media program, "Educational Media: An Automated Course," used in conjunction with the "Student's Guide" significantly affected the achievement of students taking the course "Audiovisual Materials in Teaching," (2) whether or not students' cumulative grade point averages related significantly to their achievement in the course, and (3) whether or not students' attitudes toward the course related significantly to their course achievement.

More specifically, the study compared the automated course and "Student's Guide" with a more conventional lecture-demonstration method of instruction. The students' grade point averages and attitudes toward the course were compared with their achievement to determine if there was a significant correlation.

Hypotheses

H_{o1} There is no significant difference in achievement of students using the automated course and "Student's Guide" in comparison to students being instructed by the more conventional lecture method.

H_{o2} There is no significant difference in achievement of students with similar grade point averages who take different instructional treatments.

H_{o3} There is no significant difference in achievement of students who have similar attitudes toward the course but receive different instructional treatments.

Additional Questions for Investigation

1. Do students taking the automated version of the course take advantage of their class flexibility and try to finish the course work before the end of the semester?

2. Are the attitudes of the students taking the independent study course favorable toward that type of instruction at the end of the course?

3. Does the "Student's Guide" provide sufficient direction and guidance for the students so that they need little or no assistance from the course instructor?

Limitations of the Study

1. This study was limited to students enrolled in the course "Audiovisual Materials in Teaching" at Oklahoma University during the spring semester of 1973.

2. When comparing the conventional lecture-demonstration class with the automated version, generalizations from this study can only be made if the comparison involves the automated course with conventional lecture-demonstration classes being taught by the same instructor who was involved in the study.

3. Students were not statistically randomized at the beginning of the course, but they were, instead, assigned to groups which met at a time convenient to their scheduling needs. Each student had equal opportunity to select either section of the class he wanted to attend. According to Kerlinger, "the principle of randomization, where every member of a population has an equal chance of being selected, in the long run, will provide groups which are usually counterbalanced in terms

of characteristics.[9] The students were permitted to select the time they wanted to attend class, but they had prior knowledge to the type of instruction involved. A statistical process was introduced to allow for this limitation.

4. The experimental group was sub-divided into two sections, for lack of laboratory facilities to accommodate more than twenty students at a time, but the two sections met during the same evening at consecutive times.

Definition of Terms

Conventional Instruction - Instruction which takes place in a specified classroom for a specified amount of time during each week of the academic semester and usually consists of some combination of lecture-demonstration techniques which are provided by a professor.

Automated Instruction - Instruction which takes place in the independent study lab with prepared audio-tapes and filmstrips used in conjunction with the "Student's Guide". The instruction is flexible and can be self-paced by the individual students so they may complete the course as quickly as possible.

Individualized Instruction - Specific instruction which can meet the needs of certain individuals according to their specific needs.

Self-paced Instruction - Instruction which can be paced by the individual student according to his own desires.

Personalized Instruction - Instruction which provides the exact and desired learning experiences needed for each and every individual student in the class.

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[9] Fred Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart, and Winston, Inc., 1964), pp. 56-57.

Students' Attitudes - The students' attitudes about the media course, as measured by a specially prepared attitude measure.

Procedure to be Followed

Population

A class of sixty students enrolled in the course "Audiovisual Materials in Teaching" at Oklahoma University during the spring semester of 1973 was divided into two specific groups. One group (Group A) was taught by the conventional lecture-demonstration method of instruction and the other group (Group B) received instruction through the automated independent study lab. Group A consisted of twenty students and they received their basic instruction through lecture-demonstrations and direct contact with the course instructor. Group B consisted of forty students and they received their basic instruction from the automated course while relying on considerable guidance from their "Student's Guide". A graduate assistant was also available to assist Group B with logistical problems.

Instruments for Collecting Data

Pre-test - The pre-test was comprehensive and consisted of 156 items which were validated for this particular course in previous doctoral research studies.

Attitude Scale - An attitude measure consisting of 24 items was developed by the author and was submitted to the students during the last regular class period of the course.

Post-test - This test was given during the last class period of the semester and consisted of the same 156 items that were used on the pre-test.

Grade Point Average - A cumulative grade point average was collected for each student to be used for comparison with his achievement.

Analysis of Data

Upon completion of the post-test, data for each student was compiled to determine if one particular method of instruction resulted in higher student achievement, and if particular student characteristics significantly correlated with the students' achievement in either of the two treatments.

The independent variable for the study was the use of two different instructional treatements. The dependent variable consisted of the students' scores on the achievement test.

Organization of the Study

The report of this study is divided into five chapters. The first chapter includes an introduction, a statement of the problem, and an hypotheses. Chapter Two contains a review of related literature. Chapter Three consists of methods and procedures used in the study for providing treatments and collecting data. Chapter Four provides a detailed analysis of the statistical data collected in the experiment. A summary of the study with conclusions and recommendations from the study is included in Chapter Five.

CHAPTER II

A REVIEW OF RELATED LITERATURE

This chapter was divided into four sections which include (1) background information on self-instruction, (2) studies involved with self-instruction in courses other than Educational Media, (3) self-instructional programs in Educational Media, and (4) a summary of the facts and findings relevant to this particular study.

Background

A multitude of programs dealing with automated self-paced instruction have been developed and tested to various degrees during the past fifteen years. The enormous variety of studies and their results have provided educators with numerous techniques of automation which could be used in preparing self-paced instruction.

Blyth stated that design, selection and use of self-instructional systems should include (1) lessons packaged in small units, (2) a low duplication cost, (3) easy access to materials, (4) easily operated teaching devices, (5) automatic scoring features, and (6) use of audio in addition to visual presentation.[1]

These logistical problems of providing self-instruction are just

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[1]John W. Blyth, "Teaching Machines and Human Beings," in Teaching Machines and Programmed Learning, ed. by A. A. Lumsdaine and Robert Glaser (Washington, D.C.: Department of Audiovisual Instruction, 1960), pp. 401-15.

one phase of the necessary planning when choosing the proper type of program.

Glaser commented that individualized programs should include (1) re-designed time limits for subject matter, (2) well-defined sequences of behavioral objectives as a study guide for individual students, (3) adequate evaluation of a student's progress through a curriculum sequence, (4) instructional materials appropriate for self-directed learning, (5) professional personnel for evaluation and guidance, and (6) use of student profiles, automation and other special techniques to design individualized instruction.[2]

The guidelines suggested by these two educators provide a basis for determining some important traits of a self-instructional program.

Self-Instruction Through Automation

Considerable research related to self-paced instruction has been conducted, which includes various segments of the guidelines mentioned in the previous section. This section of the review of literature is concerned with those studies which appear to be related to the experiment of this paper by including at least two similar variables.

Variables considered in this study were (1) automated self-instruction vs. conventional instruction, (2) students' attitudes toward the course, (3) students' grade point averages, (4) time for completion of work, (5) use of a "Student's Guide", and (6) amount of course guidance needed from the instructor.

Medical schools have been quite active in research on self-

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[2]John Bolvin and Robert Glaser, "Developmental Aspects of Individually Prescribed Instruction," Audiovisual Instruction, October, 1968, Vol. 13, No. 8, pp. 828-831.

instruction. Hanna conducted an experiment with nursing students who were divided into two groups with one group being instructed through the use of programmed texts while the other group was instructed by the conventional classroom method. The results indicated that there was greater achievement gain in pre- to post-test gain of students using the programmed materials. There was no significant correlation between the students' grade point averages and their achievement, and the attitudes of students using the programmed version were equally divided between positive and negative.[3]

Hess designed a nursing course which compared the performance of nursing students, one group being taught by self-directed study and the other group being taught by a traditional lecture. The students were paired according to their grade point averages and then equally divided into the two groups. At the beginning of the semester, the students received a detailed course outline listing objectives, learning experiences, expected behavior, and course requirements. The experimental group had no organized meetings, but each member of the group had the freedom to see instructors or other personnel at any time. The results indicated that a very small, but insignificant, difference did occur, with the experimental group mastering the material slightly better.[4]

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[3]Marilyn J. Hanna, Virginia S. Jackson, and Jeanne Creagh, "Teaching of an Introduction to Asepsis by Programmed Instruction," in Toward More Effective Teaching in WCHEN Schools; The Report of a Course in New Training Techniques for Nurse Faculty, ed. by Eleanor Elliott (Albuquerque, New Mexico: University of New Mexico, October, 1964), ERIC #026450.

[4]Gertrude Hess, "A Comparison of Two Groups of Nursing Students in Self-Directed Study and Traditional Study," in Toward More Effective Teaching in WCHEN Schools; The Report of a Course in New Training Techniques for Nurse Faculty, ed. by Eleanor Elliott (Los Angeles, California: University of California, October, 1964), ERIC #026450.

Coe developed a self-directed course designed to teach nursing students the history of nursing. Twenty-eight students were matched on the basis of predicted grade point average, age, and home address. They were divided into two equal groups; one group used the independent study materials and the other attended regular lectures. There was no significant difference in performances of the two groups.[5]

Considerable research has also been done in the field of Industrial Arts. Hill conducted a study designed to assist students in learning basic principles of electricity. The basic method of instruction was a linear type of program, which was presented on a series of tape-slide sequences. The students were also provided with a workbook which included questions and problems. Measurements were made on pre-post achievement, general mental ability, time used, and amount of instructor assistance used. The results showed little correlation between the students' general mental ability and their achievement, and, in addition, little instructor assistance was needed for the course.[6]

Shemick conducted a study to determine if slide-tape lessons could teach college students metal spinning on the spinning lathe. The purpose was to eliminate time-consuming repetition of instruction on how to operate the machine. A class of twenty students was divided into two groups of ten members each. One group was provided with teacher

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[5]Charlotte R. Coe, "Two Methods of Teaching the History of Nursing," in Toward More Effective Teaching in WCHEN Schools; The Report of a Course in New Training Techniques for Nurse Faculty, ed. by Eleanor Elliott (Laramie, Wyoming: University of Wyoming, October, 1964), ERIC #026450.

[6]Edwin K. Hill, The Development and Testing of An Experimental Polysensory Self-Instructional System Designed to Help Students Acquire Basic Electrical Occupational Competence (Pullman, Washington: Washington State University, June, 1968), ERIC #021141.

demonstrations and written explanations of the process and the other group was given the slide-tape series. The randomly assigned students were timed and measured on number of assists they needed. The quality of their work was rated by three separate judges. The results showed that the students in the slide-tape group needed a significantly greater amount of time than the students being taught by teacher demonstrations. The students using the programmed instruction seemed unsure of what they should be doing. Consideration was also given to the fact that since the process involved motion, the slide-tape series may not have been the correct media for use in the programmed lesson.[7]

George was concerned with testing the comparative effectiveness of a programmed version versus a lecture-demonstration method of teaching Ohm's Law and Power in D. C. Circuits to sixty college students. The students were divided into two groups of thirty each which met for a controlled time of three hours each week. They were tested at the end of the course by a criterion referenced test to determine if either group had scored significantly higher. The results showed no significant difference between methods of instruction when the group means were compared. It was recommended the programmed method be continued because students achieved just as well through programmed instruction when compared to the traditional lecture. The program also released the teacher from time normally spent in preparation and presentation.[8]

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[7]John M. Shemick, "Teaching a Skill by Machine," Industrial Arts and Vocational Education, October, 1965, LIV, 30-31.

[8]Harold Francis George, "An Experimental Study of the Effectiveness of Self-Instruction versus the Lecture-Demonstration Method of Teaching Selected Phases of Electricity" (unpublished Doctoral dissertation, Southern Illinois University, 1966).

Greene also taught a basic electricity course through the use of a self-paced slide-tape presentation with workbooks. The students were given a pre- and post-test that showed a significant gain in learning. He also found that students' attitudes were very favorable toward the automated class.[9]

VanderMeer investigated the extent to which instructional films by themselves could teach a body of factual information. He divided ninth grade students into three comparable groups and taught them in a course of General Science. One group watched films and received no other instruction while the second group watched the films and used a guide. The third group was taught by an instructor using a standard textbook and conventional teaching techniques. The results showed that there were no significant differences in achievement of the three groups. It was emphasized that the group using the film and guide achieved subject competence at least as effectively and possibly slightly more effectively than the other two groups.[10]

Arnwine also compared the effects of self-paced instruction to a traditional lecture-lab approach in teaching Biology. Individual stations were set up on conventional lab tables and information was presented on audio tapes with films, slides, and drawings. Behavioral objectives and exercises were given to students for each unit of study. Both groups of students were given the same amount of time, tests, and

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[9]Mark A. Greene, A Self-Instructional System in Electricity (Portland, Oregon: Northwest Regional Educational Lab, April, 1970), ERIC #059600.

[10]Abram W. VanderMeer, Relative Effectiveness of Instruction by: Films Exclusively, Films Plus Study Guides, and Standard Lecture Methods (University Park, Pennsylvania: Pennsylvania State University, ERIC #053567.

teaching concepts. The self-instructional group appeared to score significantly higher in the course.[11]

Porter presented a spelling course to elementary students by the standard method and also, in an experimental setting, used teaching machines. The teaching machines required the students to identify the spelling words in a meaningful sentence context, match the words to correct definitions, match words on the basis of letter structures, and write missing letters in words which were used in sentence context. Instruction of the experimental group was performed completely by machine. Additional variables included in the study were an intelligence measure, sex, time, number of errors, transfer of learning measures, student reaction to the machine, and change in performance through the year.

Results showed that achievement of the experimental group was significantly better than the control group. There appeared to be no significant relationship between intelligence and achievement of students in the experimental group, but there was a significant relationship in the control groups. Sex and attitude did not relate significantly to achievement in either group. There was no relationship between the number of errors per lesson and achievement, but there was a relationship between the number of elicited responses per lesson and achievement.[12]

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[11] James E. Arnwine and Bill Juby, An Objective Evaluation of the Success of an Audio-Tutorial Course in General Biology (Independence, Kansas: Independence Community Junior College, 1969), ERIC #037207.

[12] Douglas Porter, "Some Effects of Year Long Teaching Machine Instruction," in Automated Teaching: The State of the Art, ed. by Eugene Galanter (New York: John Wiley & Sons, 1959), pp. 85-90.

West conducted a study to determine the effects of programmed versus conventional instruction on proficiency in office typing. The subjects were low ability students in beginning typing classes. Results indicated that students taking the conventional instruction could type faster, but students taking the self-paced course produced fewer errors. Overall, the self-paced course produced work of higher quality, but students had negative attitudes toward the programmed treatment and several students were frequently absent from class.[13]

An experiment by Dworkin determined if sound filmstrip lessons were good substitutes for the classroom teacher. He provided four sound filmstrips on the topic of atomic bonding to a group of sixty graduate engineering students. Another matched group of students were taught by the regular classroom lecture. The sound filmstrip lessons contained about one hundred fifty frames and ran for about fifty minutes. The teacher who produced the self-instructional materials also taught the class. There was no significant difference in learning between the two methods of teaching. Seventy-five percent of the students indicated that they were willing to accept the sound filmstrip method of instruction. The study also confirmed research which indicated that elaborate production methods, including color, were not necessary for effective learning.[14]

Richason conducted an experiment in which the achievement of students taking an audiovisual-tutorial method of instruction were

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[13]Leonard J. West, Effects of Programmed vs. Conventional Instruction on Proficiency at Office Typing Techniques (New York: City University of New York, September, 1971), ERIC #055420.

[14]Solomon Dworkin and Alan Holden, "An Experimental Evaluation of Sound Filmstrips vs. Classroom Lectures," Journal of the Society of Motion Picture and Television Engineers, June, 1959, pp. 383-85.

compared to students taking the same course in a more conventional manner during previous semesters. Students in the former group were permitted to progress at their own rate through the use of specially prepared materials that were available in a laboratory which was open five days a week. The research was conducted for three years and the final results showed that students could cover the same material in forty percent less time than usually taken in a normal teaching situation. Over this three year period, scores increased 28.75 percent. Students' attitudes toward the automated course were very favorable.[15]

Banister reviewed several case studies concerning the use of automated instruction in California Community Colleges and discovered that many students preferred the automated course of instruction. He also stated that more experimentation needed to be done in comparing a traditional approach of instruction with an automated approach.[16]

Automated Educational Media Courses

The previous section included studies which involved a broad array of styles, techniques of instruction, and types of subject matter. This section is devoted strictly to the use of automated self-paced instruction in educational media courses.

Gabriel investigated the effects of three different self-instructional approaches to teaching equipment operation in an educational media laboratory. The subjects were seniors and graduate students enrolled in an Audiovisual Aids course at Washington State University.

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[15]Benjamin F. Richason, Geography Via the Audiovisual Tutorial Method (Chicago: McKnight & McKnight Publishing Company, 1969).

[16]Richard Banister, Case Studies in Multi-Media Instruction (Los Angeles, California: University of California, October, 1970), ERIC #044098.

The three instructional approaches were (1) each-one-teach-one self-instructional approach, (2) a sequenced self-instructional approach, and (3) a scrambled self-instructional approach. The course content was the same for all students. They were tested on 16mm motion picture projectors and tape recorders after they had studied machine operation. The transparencies they produced in the class were judged on production criteria established for tansparencies. The results indicated that a man-machine system could adequately teach. Implications from the study indicated that other types of subject matter areas in the teaching curricula could be taught successfully by the self-instructional method.[17]

Colwell conducted an experiment to determine whether or not there would be any significant differences in student achievement when comparing lecture-demonstration and self-instruction as measured by written tests and performance tests on operating audiovisual equipment. Sixty-five junior and senior students were randomly divided into conventional lecture-demonstration and a self-instructional groups. A three-week portion of the regular audiovisual course was programmed for self-instruction. The group using the self-instructional materials was further divided into two groups. One of the groups used the self-instructional program with the assistance of an instructor and the other group worked only with the self-instructional program. The group in the conventional class was the control group. Findings of the study showed that (1) students could master the operation of audiovisual equipment on a self-instructional basis, (2) sex makes no difference in comparing one method of instruction to the other, (3) assistance of an instructor made

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[17]Lloyd M. Gabriel, "A Comparison of Self-Instructional Systems in an Educational Media Laboratory" (unpublished Doctoral dissertation, Washington State University, 1966).

no significant difference, (4) students were favorable toward the self-instructional type of instruction, and (5) the amount of time needed in instruction could be greatly reduced.[18]

Allred compared the effectiveness of three different instructional techniques in teaching the operation of audiovisual equipment operation to the University of Oklahoma, College of Education juniors and seniors. He used (1) a programmed text method, (2) a filmstrip-record method, and (3) an each-one-teach-one method of instruction. He found that students learned better from the programmed text method, but there was not a statistical significance in the difference. Both of the self-instructional methods were significantly better than the each-one-teach-one method of instruction. He concluded that three distinct advantages were exhibited in the use of the self-instructional methods. They were (1) the students could work at their own pace, (2) they needed less time to learn the material, and (3) the assistance of an instructor was not needed.[19]

These first three studies on educational media were concerned with teaching the skills in operation of audiovisual equipment. Very little research information has been published about self-instructional techniques used in teaching a complete course in Audiovisual Education with the exception of the following two studies, which are closely related to the topic in this study.

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[18]Dell McDonald Colwell, "The Effectiveness of Self-Instructional Techniques in Teaching Selected Phases of an Introductory Course in Audiovisual Education" (unpublished Doctoral dissertation, University of South Dakota, 1963).

[19]J. D. Allred, "A Study of the Comparative Effectiveness of Three Methods of Teaching the Operation of Selected Audiovisual Equipment" (unpublished Doctoral dissertation, University of Oklahoma, 1967).

Paschall conducted a study to determine if students who received self-instruction in the course "Audiovisual Materials in Teaching" performed as well as students taking a more traditional lecture method of instruction in the same course. The study used senior and graduate level students who were divided into two classes which met at different times. Each class was sub-divided into two groups to provide both experimental and control students in each class. Paschall developed the software materials to be used in teaching the self-instructional course and provided them in an experimental laboratory. The results of the study indicated that students could learn the course content from the self-instructional program just as well as students taking the traditional instruction. A questionnaire used at the end of the study found that the majority of the students in the self-instructional program had a very favorable attitude toward that type of instruction.[20]

Jordan conducted a study with the same self-instructional materials similar to those used in the Paschall study. He entered the treatment variable of instructor-led and student-led discussion sessions to the self-instructional course. His study found that students attending the discussion sessions did not perform significantly better than the students taking only the self-instructional treatment. It was pointed out that student-instructor contact appeared to be vitally important in maintaining favorable attitudes of the students toward the self-instructional treatment.[21]

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[20]Paschall, "Effectiveness of Two Instructional Systems," pp. 57-60.

[21]Jordan, "Integrating Discussion Sessions," pp. 74-80.

Summary

The first section of this chapter includes some of the common traits which are usually associated with self-paced instruction. The traits include (1) small units of information, (2) low duplication cost, (3) easy access to the instructional materials, (4) easily operated teaching devices, and (5) use of combined audio and visual modes of presentation. Many self-paced programs also include (1) re-designed time limits for subject matter, (2) well-defined behavioral objectives, (3) adequate student evaluation, (4) sufficient instructional materials, and (5) professional personnel for guidance. The extent to which each of these traits were included in past research has varied considerably from one study to another.

The studies included in the second section of this chapter varied considerably from one research project to another. Some studies included less than twenty subjects while other studies have involved as many as several hundred subjects. Educational levels of the subjects varied from elementary students through college graduate students. The length of the teaching sessions used in the research studies varied from a few short lessons to a full-semester course, and, in some cases, studies continued for more than one semester. The types of courses taught by the self-instructional methods were highly concentrated around teaching skills during the earlier studies. Later studies, however, included more research concerned with learning content information.

Certain conclusions were formed from this section of the literature review. Few studies indicated a significant difference in students' achievement when comparing self-instruction to more conventional forms of instruction. This means that self-instruction provides

an equally good form of instruction, but there is not extensive evidence of self-instruction being better than more traditional forms of instruction.

Students' attitudes were usually favorable toward the self-paced instruction because it allowed them more freedom to pace their work. Few studies were concerned with the degree of success a student had in the instruction when compared with their attitudes about the course.

The few studies which involved study guides in the self-paced instruction indicated that there may be a slight improvement in student achievement, but the results were not statistically significant.

The third section of this chapter indicates that self-instruction has been at least as successful as other forms of instruction in teaching machine operations. Studies involving content information in Educational Media may be taught equally well by the automated version of instruction, but there is little evidence indicating that self-instruction is actually a superior form of instruction to more conventional forms of instruction.

The purpose of this study is to determine if the self-paced version of an Educational Media course could produce significantly better student achievement with the use of the "Student's Guide", when compared to students' achievement in a conventional lecture section of the same course.

Students' cumulative grade point averages and attitudes toward the course were examined to determine if there was a definite relationship with achievement in the Media course.

CHAPTER III

METHODOLOGY

This study was designed to determine if the use of a "Student's Guide" and automated course in Educational Media could significantly affect students' achievement when compared to a more conventional lecture-demonstration method of teaching the course. Additional factors such as the students' attitudes toward the course, their cumulative grade point averages, time involved in completing the course, and use of the "Student's Guide" were also included in the investigation to determine whether or not they correlated highly with achievement.

Certain procedures which were necessary for conducting this experiment were (1) selection of a population, (2) provision of treatments, (3) collection of data, (4) development of a design, and (5) determination of the proper statistics for analysis. The remainder of this chapter is devoted to explaining those procedures.

Population

The subjects involved in this study were sixty college senior and graduate students enrolled in the course "Audiovisual Materials in Teaching" during the Spring Semester of 1973 at the University of Oklahoma. The course was a basic introductory course for teachers and resource center personnel, and it provided a general introduction to the acquisition, production, and utilization of a variety of media available for education.

The class met on campus one evening a week for two and one-half hours. At the first class meeting, the students were asked to participate in an experimental study which would divide the class into two separate groups. The two groups were to meet in two separate rooms within the building at consecutive times. Enrollment procedures had confused the schedule and some students were expecting to meet the class at a different time. By splitting the groups, the time problem was eliminated and everyone was able to attend the class at a time convenient for them.

The control group for the experiment met in a regular lecture classroom every Tuesday evening of the semester. They were presented with a general introduction to the course during the first meeting, and additional lecture-demonstrations were used as the main source of instruction throughout the rest of the semester. The students were able to interact with the instructor and other students in the class, and the textbook, A-V Instruction: Materials and Methods by Brown,[1] was used as the main source of reference. Each student was also expected to learn how to operate specific audiovisual equipment in a specially built equipment laboratory. The students were given special class time to learn how to operate the equipment, and were evaluated by a graduate assistant in the laboratory.

The experimental group in the study consisted of forty students who met in an experimental language laboratory. The room had a specially built listening laboratory which was able to provide tape recorders and filmstrip viewers to be used by individual students operating

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[1] James W. Brown, Richard B. Lewis and Fred F. Harcleroad, A-V Instruction: Materials and Methods (New York: McGraw-Hill Book Company, 1964).

independently from one another. The laboratory contained only twenty stations, resulting in a subsequent division of the experimental group into two smaller sections of twenty students each. The first section of experimental students met at 4:15 p.m. and the second section met at 7:00 p.m. To eliminate confusion, the experimental students attended the introductory session of the course with the control group. During the second meeting of class, all of the control and experimental students took a comprehensive pre-test. When they had completed the test, they were divided into their separate groups and given a tour of the College of Education Media Center. During the third meeting of the class, the experimental group was introduced to the self-instructional laboratory and how they would proceed through the course.

The experimental group was informed that there would be no direct contact between the course instructor and the class as a whole. If they needed any assistance, they were to call upon the graduate assistant who was available to help them with logistical problems, or they were to meet with the course instructor on an individual basis. The main source of instruction used for the experimental group was a series of filmstrip and audio-tape lessons which were developed from materials used in a former research study conducted in the Media Center.[2] There were twenty copies of each unit, which was a sufficient number to provide each student with his own copy. Another major part of the instruction was provided through the "Student's Guide to the Study of Educational Media: An Automated Course."[3]

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[2]Paschall, "Effectiveness of Two Instructional Systems."

[3]Fulton, Paschall, Ragan, "Student's Guide."

The "Student's Guide" was devised to help the students learn the information presented in the filmstrip-tape units. It contained an introduction to the course and separate chapter for each of the thirteen units. Each unit was divided into seven sections, as shown in Appendix A.

The first section of each chapter consisted of an introduction which presented a brief overview of the content in the chapter. The introduction provided the student with general background information and prepared him for the second section, which included a listing of specific behavioral objectives to be achieved by the student.

The behavioral objectives section included specifically stated goals that were to be achieved by the student. The objectives were to provide the student with guidance and direction through the unit by defining the way he should perform.

The third section of the "Guide" listed required assignments for the unit. The three assignments for each unit were (1) view the filmstrip and listen to the audio-tape for that unit, (2) respond to the response items provided in the chapter, and (3) take the self-test at the end of the unit.

The response items for each unit were constructed to be part of the instructional process. They were to be filled in while viewing the automated unit. The response items were designed to emphasize significant points to be learned. The use of the response items provided an easier and faster method for students to keep notes.

The fifth section of each unit consisted of self-test items. The self-test items provided the students with a method of evaluating how well they learned the material. The self-tests allowed the students to evaluate their knowledge of the material, and it provided another

source for later review. The self-tests were graded immediately after completion and students were given results at that time.

A list of references was provided for each unit so that students could find additional information on the topics covered in the unit.

The last section of each unit included optional learning activities which were normally provided for enrichment activities. Certain optional activities were required of the students taking the experimental version in this study. The experimental group also used the same textbook as the control group for additional reference.

After the students had been oriented to the laboratory, they progressed through the course at their own desired rate. The laboratory was open from 8 a.m. to 12 p.m. and 1 p.m. to 5 p.m. every week day. The Media Center was also open from 5 p.m. to 10 p.m. on Tuesday evenings to provide time for the students who preferred to meet during the regularly scheduled class time. Roll was not taken during the semester and students were allowed to pace their instruction as they desired. Three students did not finish the course by the end of the semester and they were excluded from the statistical analysis.

Instrumentation and Collection of Data

Pre-test - The pre-test was given to all sixty students during the second class meeting of the semester. There were 160 multiple-choice questions on the comprehensive examination, and they were selected from a pool of more than 250 questions that had been proven valid and reliable in the two former research studies by Paschall[4] and Jordan.[5] Four typing errors were discovered in the test and were eliminated in

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[4]Paschall, "Effectiveness of Two Instructional Systems," pp. 31-33.

[5]Jordan, "Integrating Discussion Sessions," pp. 33-34.

grading the examination. Students used IBM answer sheets for marking their answers, and the completed answer sheets were scored by the Computer Center at the University of Oklahoma.

Post-test - The final examination for the course, shown in Appendix B, contained the same 156 items that were used in the pre-test, and employed the use of IBM answer sheets that were scored by the Computer Center. The test included questions from topics which were covered in both the experimental and the control groups in the course.

Attitude Measure - A search of the literature indicated that no known attitude measure existed which was considered adequate for measuring the students' attitudes about the Educational Media course used in this study. This instrument would have to contain statements which were general enough to measure the attitudes of both control and experimental students, but it would also need to include items which would differentiate between control and experimental students' attitudes toward the specific method of instruction they received.

Some items for the instrument were selected from Hand's "Scale to Study Attitudes Toward College Courses," but the items were revised to apply more specifically to the Educational Media course.[6] Additional items which measured students' attitudes toward the methodology were developed by the author. The first draft of the attitude measure contained 35 questions, but after careful screening and with recommendations from two Education professors, the instrument was reduced to 26 items. The instrument was then given to 28 students in an Educational Psychology class and they were asked to determine if the statements appeared to be

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[6]Marvin E. Shaw and Jack M. Wright, Scales for the Measurement of Attitudes (New York: McGraw-Hill Book Company, 1967), pp. 24-25.

positively or negatively oriented (Appendix C). The Likert Method[7] of using a five-point continuous scale was used in measuring the tone of each statement. The number "one" represented the most negative statement, the number "three" represented a neutral statement, and the number "five" represented the most positive statement. Two more items were eliminated from the instrument after the students' evaluations had been scored. The final step used in constructing the instrument was the determination of which items appeared to be good statements about the methodology of the class. Six graduate students in Education were asked to sort the attitude measure statements into two separate groups, one dealing with content and one dealing with methodology. The statements that were concerned with methodology were used as a separate measure to determine whether or not students preferred one method of instruction over the other.

The final form of the instrument also used the five point Likert Scale, which provided a cumulative score for each student (Appendix D).

Grade Point Average - The cumulative grade point averages were collected from the students' personal data files in the College of Education and the Graduate College. Each student's grade point average was computed on all college credit course work completed by the student.

Additional data were collected from the experimental students which were not directly involved with the hypotheses of the study. Self-tests, which were included in the "Student's Guide", were scored for each student, and the number of errors made by each student was tabulated.

Time schedules were tabulated for each student to determine both

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[7] J. Guilford, Psychometric Methods (New York: McGraw-Hill Book Company, 1954), pp. 459-60.

how quickly he finished the course work and how he ranked with the rest of the class in completing the course work.

Assignment grades were calculated on the 35 assignments submitted by each student. The grading involved the subjective evaluation by the graduate assistant who was available for assisting the experimental group.

Research Design and Statistical Procedure

In experimental work, investigators frequently use a design involving the comparison between an experimental group and control group. There is usually a problem in an experimental situation in Education where the two groups cannot be manipulated in a completely random fashion. Campbell and Stanley refer to that design as the Nonequivalent Control Group Design.[8] This study involved that type of design and is shown in Figure 1.

The student participants were not randomly assigned to the two experimental groups. Instead, they were allowed to choose the group with which they wished to participate. Most made their selection on the basis of class meeting time since some of them had scheduling conflicts. A few students did choose the experimental treatment for their instruction. Obviously, this method of selection may easily lead to a biased sample. A biased sample may, in turn, contaminate the results of the overall experiment. For this reason, it was necessary to control some extraneous variable which may significantly alter the results of the achievement gain scores. The experimenter was particularly careful to control some

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[8]Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally & Company, 1963), p. 47.

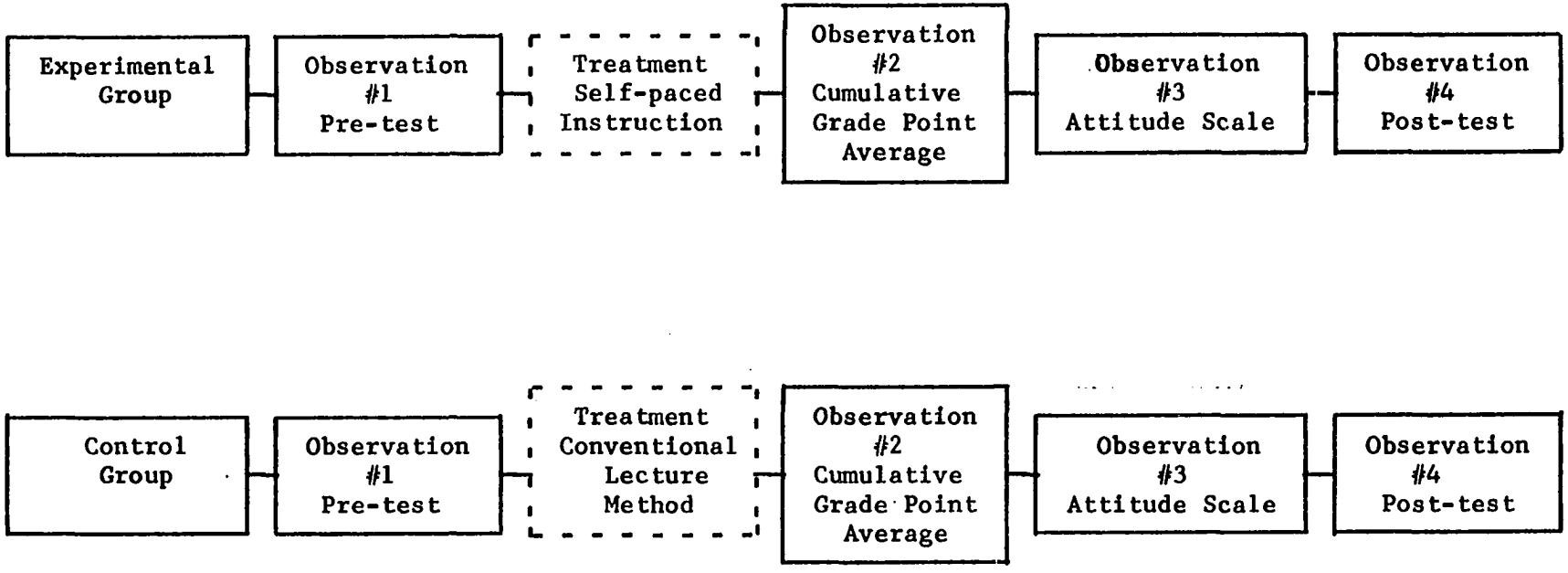

Figure 1. Basic Research Design

variable which was highly related to the achievement scores. Specifically, the pre-test scores were controlled by statistical methods--an analysis of covariance statistical test using the students' pre-test scores as a covariable. By comparing the achievement gain scores of the two groups of participants with an analysis of covariance (ANCOVA), the achievement gain scores could be estimated. The statistical calculations of the ANCOVA adjusted the individual achievement gain scores according to the amount of the differences in the students' pre-test scores.

The second and third hypotheses concerned additional factors which were suspected to relate significantly to the students' success in the media course. A correlation was computed between the variables of cumulative grade point averages and achievement gain, and also between attitudes and achievement gain. The statistical analysis provided a method of observing the differences in achievement which were associated with cumulative grade point averages and attitudes.

Additional observations were conducted on the experimental group to determine how the students' performances related to their achievement in the course (Figure 2).

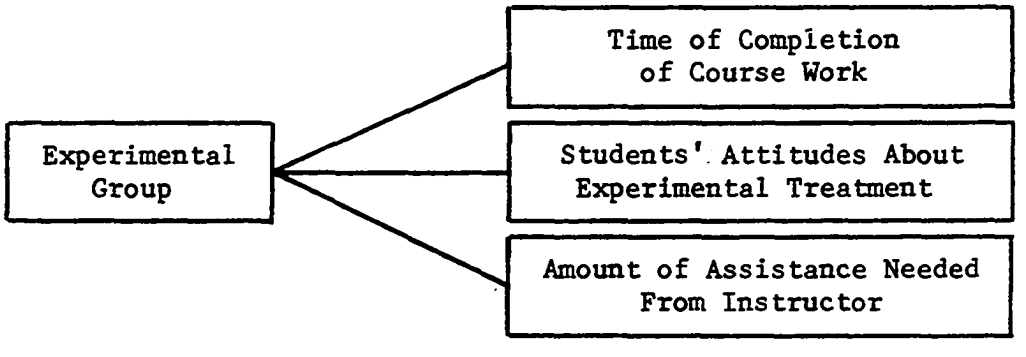

Figure 2. Additional Observations on Experimental Group

These observations were conducted throughout the semester while the students progressed through the course.

CHAPTER IV

ANALYSIS OF THE DATA

The data collected in this investigation were intended to provide a means of comparing two treatments in the course "Audiovisual Materials in Teaching." The two treatments were a conventional-lecture method and an automated version with its specially prepared "Guide" book. The tabulated raw data are included in Appendix E.

The initial discussion of this chapter considers the analysis of the main hypotheses of the study. The remainder of the chapter is devoted to comparisons of data collected only on the experimental-treatment group.

Analysis of Hypothesis Number One

When measured at the .05 level of significance, there is no statistically significant difference between the pre- and post-test achievement gain scores computed for the experimental group (those students who were taught by the automated self-instructional method) and the pre- and post-test achievement gain scores computed for the control group (those students who were taught by the conventional-lecture method).

Pre-test scores on content knowledge were collected from all members of both groups during the initial class sessions. Achievement test scores were obtained from both groups at the end of the course sessions. The pre- and post-tests contained the same 156 items. Table 1 indicates that the mean score of the control group was very similar to

the mean score of the experimental group on the pre-test, but the mean score of the experimental group was considerably higher on the post-test.

TABLE 1

DESCRIPTIVE STATISTICS OF THE PRE-TEST, POST-TEST AND CHANGE MEASURES OF ACHIEVEMENT

	Experimental Group N = 38		Control Group N = 19	
Measure	Mean	Standard Deviation	Mean	Standard Deviation
Pre-test	85.31	12.97	87.21	15.69
Post-test	124.92	12.18	105.11	12.08
Change	39.61	13.74	17.90	12.78

The data from the pre-test and post-test scores were analyzed by an analysis of covariance, using the pre-test scores as a covariate. The computation of this analysis was accomplished by using a pre-written statistical program published by the University of California (UCLA) Medical School. The particular program used in the calculations was BMD 04V taken from a biomedical school (BMD) publication.[1] The results of the statistical calculations are presented in Tables 2 and 3.

Table 2 contains the analysis of variance (ANOVA) results computed between the post-test achievement scores of the experimental and control groups before the differences in effects of the pre-test achievement scores had been removed. The groups were compared at the .05 level of significance.

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[1]W. J. Dixon, ed., BMD Biomedical Computer Programs (Berkeley, California: University of California Press, 1970), pp. 218-232.

TABLE 2

AN ANALYSIS OF VARIANCE OF THE EXPERIMENTAL AND CONTROL GROUPS POST-TEST ACHIEVEMENT SCORES

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F Value	P.
Between	4,973.76	1	4,973.76	33.71	P< .05
Within	8,114.55	55	147.54		
Total	13,088.31	56			

There appeared to be a marked difference in the achievement of the two groups when the post-test scores were compared. The results of the ANOVA assumed equality of both groups and the entering behaviors were not accounted for in the statistical calculations. The second part of the analysis used the pre-test scores as a covariate. The results, which are shown in Table 3, computed the achievement gain scores of the students by subtracting out their pre-test scores. When the pre-test scores were subtracted, the two groups were equated for comparison in course achievement. They were compared at the .05 level of significance.

TABLE 3

ANALYSIS OF COVARIANCE OF THE POST-TEST ACHIEVEMENT SCORES USING PRE-TEST ACHIEVEMENT SCORES AS A COVARIATE

Source of Variation	Sum of Squares	Degrees of Freedom	Adjusted Mean Squares	Adjusted F Value	P.
Between	4,250.15	1	4,250.15	28.97	P< .05
Within	7,922.28	54	146.71		
Total	12,172.43	55			

The critical value of the F ratio at the .05 level of significance with 1 and 55 degrees of freedom was 4.20. An F value of 28.97 was computed from the achievement scores which indicated a highly significant difference in the achievement of the two groups at the .001 level.

A practical method of comparing the differences in achievement of the two groups is to rank the students according to their post-test scores, as shown in Table 4.

TABLE 4

STUDENTS RANK ON POST-TEST

Range of Scores	Percentage Correct	Number of Control Students	Number of Experimental Students
156-140	100-90%	0	4
139-125	89-80%	1	19
124-109	79-70%	7	12
108- 94	69-60%	8	3
93- 78	59-50%	3	0

More than half of the experimental students achieved at the 80% level or higher, but only one of the control group students attained that level. In contrast, the experimental group had no students in the 50-59% level and only three students in the 60-69% level, but more than half of the control group students were at those levels. The results indicated that the students' scores were influenced by two different types of instruction, so the null hypothesis was rejected.

Analysis of Hypothesis Number Two

Hypothesis number two stated that there was no statistically significant difference between the correlation of the achievement gain scores and cumulative grade point averages tabulated for the experimental group (automated instruction) and the correlation of the achievement gain scores and cumulative grade point averages tabulated for the control group (conventional instruction). The level of significance was set at .05.

The hypothesis was first tested by computing a Pearson Product-Moment Correlation (r) between the students' gain scores and cumulative grade point averages. The correlations were then converted to "Z" scores, and the independent correlations for the two groups were used to test the significance of the difference computed between the two correlation coefficients by using the statistical formula shown in Figure 3.[2]

$$Z = \frac{Zr_1 - Zr_2}{\frac{1}{N_1-3} + \frac{1}{N_2-3}}$$

Figure 3. Z-Test of Independently Correlated Samples

Any "Z" value over 1.96 was considered to be significant for this study. A significant "Z" value indicated if cumulative grade point averages and achievement gain scores were more significantly related for one group than the other. The correlations were converted to "Z"

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[2]Gene V. Glass and Julian C. Stanley, Statistical Methods in Education and Psychology (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970), p. 311.

scores by using the Fisher Z Transformation Table.[3] The results of the Z-test of independently correlated samples are shown in Table 5.

TABLE 5

A COMPARISON OF THE CORRELATIONS BETWEEN ACHIEVEMENT GAIN SCORES AND CUMULATIVE GRADE POINT AVERAGES FOR EXPERIMENTAL AND CONTROL GROUPS

Group	Correlation Between Achievement Gain and GPA	Z Transformation of Correlation	Results of Z-Test	Level of Significance
Experimental	.0842	.0842	.0347	.488*
Control	.0735	.0735		

* Not significant at the .05 level.

A comparison of the students' gain scores with their cumulative grade point averages indicated no significant correlation for either group. The Z-test indicated that the scores of one group were not more significantly correlated than the scores of the other group. The final analysis of hypothesis number two indicated that cumulative grade point averages were not highly associated with the students' achievement gains in the course.

Analysis of Hypothesis Number Three

Hypothesis number three stated that there was no statistically significant difference between the correlation of the achievement gain scores and attitude scores tabulated for the experimental group

[3] Ibid., p. 534.

(automated instruction) and the correlation of the achievement gain scores and attitude scores tabulated for the control group (conventional instruction).

The statistical analysis of hypothesis three was tested by using the Z-test of independently correlated samples and the results of the Z-test were included in Table 6.

TABLE 6

A COMPARISON OF THE CORRELATIONS BETWEEN ACHIEVEMENT GAIN SCORES AND ATTITUDES FOR EXPERIMENTAL AND CONTROL GROUPS

Group	Correlation Between Achievement and Attitude Scores	Z Transformation of Correlation	Results of Z-Test	Significance Level
Experimental	-.1322	-.1330	-1.2807	.1003*
Control	.2488	.2535		

*Not significant at the .05 level.

The correlations of gain scores and attitude scores for each group were not highly significant, but there appeared to be a definite trend for the two groups. The experimental group calculations indicated a negative correlation between their attitude and achievement gain while the same calculations for the control group indicated a slightly stronger trend toward a positive correlation. The results of the Z-test indicated no significant difference in the two correlations when measured at the .05 level. The testing of hypothesis number three indicated that a good attitude toward the course may not be necessary for learning to occur.

Secondary Findings

Additional data were collected on the experimental students which provided for a better evaluation of the automated course and "Student's Guide". The remainder of this chapter was devoted to those findings and a subjective evaluation of the findings provided further insite into answering the following questions.

1. Did students in the automated version of the course take advantage of their class flexibility and try to finish the course work before the end of the semester?

A record was maintained for each student in the automated class to determine how soon he finished the course work. The record provided information on when each student finished both the self-tests and optional assignments. A timetable, which is provided in Table 7, shows the rate of work completion by the students. There were a total of 38 students included in the experimental group.

TABLE 7

TIMETABLE FOR WORK COMPLETION

Dates of Completion	Self-tests	Total Completed	Assignments	Total Completed
February 13	0	0	0	0
27	4	4	0	0
March 13	5	9	0	0
April 3	13	18	1	1
10	0	18	2	3
17	16	34	5	8
24	0	34	14	19
May 1	4	38	22	36*

*Two students had not finished by the end of the semester.

The records indicated that four of the students had completed the basic procedures of viewing the filmstrip-tape lessons and taking the self-tests within the first two weeks of class. The majority of the students finished the basic instructional units three weeks before the end of the semester. Four students maintained a rigid schedule of attending class one time a week for 2½ hours and finished at the end of the semester.

A majority of the students completed their self-instructional units early, but did not complete the added optional assignments until the final class meeting. Approximately 20% of the students had completed the course work two weeks before the end of the semester.

An additional record was maintained on the students' attendance in the laboratory by having them sign an announcement sheet. The sheet was provided each week to indicate corrections in the assignments or "Guide". By having the students sign to varify that they had read the announcements, a record was provided to show if they attended class during the week. Some students worked for short periods of time, while others worked for two or three hours at a time.

Several individuals did take advantage of the class flexibility and attended class as it fit their schedule. Three students attended class during the daytime hours because they had the available time. Two students finished the basic instructional units early and did not return to the laboratory for several weeks when they turned in their optional assignments. Two students missed three weeks each for medical reasons, but neither suffered from missing class. Several students might have finished the class earlier, but the added load of optional assignments proved to be quite trying, as explained in the next section.

2. Were the attitudes of the students in the independent study class favorable toward that type of instruction when they finished the course?

A sub-test measure was derived from the course attitude questionnaire which provided data capable of measuring the students' attitudes toward the automated class and "Guide". The results of the measure, shown in Table 8, were rated on a fifty point scale. Scores in the range of 0-25 were considered to be negative attitudes and scores from 36-50 were considered to be positive attitudes. Scores which fell in the range of 26-35 were counted as neutral. The scores were derived from a group of ten questions on the attitude measure.

TABLE 8

ATTITUDES OF EXPERIMENTAL STUDENTS TOWARD COURSE METHODOLOGY

	Number	Percentage
Positive	15	39%
Negative	6	16%
Neutral	17	45%

Five of the six students who indicated a negative attitude toward the methodology also maintained negative attitudes about the course in general. Discussions with those students revealed that they were in their last semester of school when they learned that they had to take an educational media course to meet teacher certification requirements. The unexpected requirement caused them to react negatively toward the course.

Space was also provided on the attitude questionnaire so students could give their subjective opinions about the course. The following were mentioned most often, in decreasing order, with opinion one being most frequently mentioned.

Opinion One - The added optional assignments were too long, too many, and not relevant to their situation.

This may partially explain why so many students put the assignments off until the end of the semester.

Opinion Two - The flexibility and freedom of the class was very helpful and enjoyable because of being allowed to pace their work at their own discretion.

Opinion Three - The "Student's Guide" was very helpful in providing the organization and direction needed for progressing through the course.

Opinion Four - A few students indicated that they would have welcomed an opportunity to participate in at least two or three discussion sessions during the semester. They were basically concerned with materials production and equipment operation.

3. Did the "Student's Guide" provide sufficient direction and guidance for the students so they needed little or no assistance from the course instructor?

As indicated on some of the students' subjective evaluations of the class, the "Student's Guide" did appear to provide the necessary guidance in progressing through the course. The graduate assistant was requested to provide instructional assistance two times during the semester with requests involving production processes. The students were referred to materials which provided them with the necessary

instructions. There was a need for a full-time assistant to provide assistance with logistical problems, but the "Guide" provided enough guidance and direction to eliminate almost all need for a full-time instructor.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was conducted at the University of Oklahoma during the spring semester of 1973 and involved two sections of students enrolled in the course "Audiovisual Materials in Teaching."

The main purpose of the study was to determine whether or not the independent study media program, "Educational Media: An Automated Course," used in conjunction with the "Student's Guide", significantly affected the achievement of students taking the course "Audiovisual Materials in Teaching." The "Student's Guide" included thirteen units, each of which contained (1) an introduction, (2) behavioral objectives, (3) required assignments, (4) response items, (5) self-tests, (6) additional references, and (7) additional assignments. The "Guide" was expected to provide proper guidance and direction for the students so they would be able to progress independently from the professor and be able to perform at a better rate than if they had attended a formal lecture class.

Achievement gain for each student in the course was measured by using a pre- and post-test which contained 156 multiple-choice questions. The gain scores of the experimental group (automated instruction) were compared with the gain scores of the control group (conventional-lecture).

Cumulative grade point averages were collected for all students at the beginning of the course and their attitudes about the course were

measured at the end of the course. The data were analyzed to determine if either measure was significantly correlated with the students' performances in the course.

Records of attendance, completion of course work, and attitudes about course methodology were maintained on each student in the experimental group. That data were used to further evaluate the value of the "Student's Guide" in its automated, self-instructional method of teaching the course.

An analysis of covariance was used to analyze the performance of the two groups by covarying the pre-test scores which resulted in achievement gain scores. A Z-test of correlated independent samples was used to identify the amount of correlation between the students' achievement gain scores and other personal characteristics.

Findings and Interpretations

Hypothesis One - Hypothesis number one stated that there was no statistically significant difference between the pre- and post-test achievement gain scores computed for the experimental group (those students who were taught by the automated self-instructional method) and the pre- and post-test achievement gain scores computed for the control group (those students who were taught by the conventional-lecture method), when measured at the .05 level of significance.

An analysis of the results in testing Hypothesis One indicated that the experimental group (those students who used the automated instruction and "Guide") performed significantly better than the control group (those students who attended the conventional-lecture class.) The null hypothesis was tested at the .05 significance level and was rejected.

Hypothesis Two - Hypothesis number two stated that there was no statistically significant difference between the correlation of the achievement gain scores and cumulative grade point averages tabulated for the experimental group (automated instruction) and the

correlation of the achievement gain scores and cumulative grade point averages tabulated for the control group (conventional instruction). The level of significance was set at .05.

An analysis of the results in testing Hypothesis Two indicated no significant correlation between the high and low achievement gain scores and high and low cumulative grade point averages of either the experimental or the control groups, when tested at the .05 level of significance. Since there was no statistically significant difference, the null hypothesis was not rejected.

Hypothesis Three - Hypothesis number three stated that there was no statistically significant difference between the correlation of the achievement gain scores and attitude scores tabulated for the experimental group (automated instruction) and the correlation of the achievement gain scores and attitude scores tabulated for the control group (conventional instruction).

An analysis of the results in testing Hypothesis Three indicated no significant difference between attitude and achievement gain score correlations for either of the two groups when measured at the .05 level of significance.

There appeared to be a trend for the experimental group to have a negative correlation between their attitude and achievement gain, while the control group maintained a more positive correlation. Although it was not statistically significant at the .05 level, enough difference did occur between the two groups to imply that a positive attitude is not necessary for greater gain achievement in the automated class.

The students in the automated, self-instructional class took considerable advantage of the flexibility of the class and progressed at rates subject to their needs. Several of the students finished the course work much earlier than normally taken for a more conventional-lecture class. Two individuals attended class for only a few hours and finished the course work without added time in the laboratory.

Approximately forty percent of the students indicated they liked the automated course, while sixteen percent indicated negative attitudes. Forty-five percent of the class were basically neutral in their feelings toward the course.

The "Student's Guide" appeared to provide the necessary guidance to direct the students through the basic steps of the course. Little instructional assistance was needed in the class, but considerable help was needed in providing the logistics for the class. Some students indicated a desire for three or four discussion sessions during the semester.

Conclusions

From an analysis of the data in this study, the following conclusions were formed.

1. Under similar conditions, the automated, self-instructional method of teaching the course "Audiovisual Materials in Teaching," used in conjunction with the "Student's Guide", may result in better student achievement than a more conventional-lecture setting.

2. Cumulative grade point averages did not appear to make good predictors of success for students taking either form of instruction.

3. Good attitudes are not necessary for resulting in better achievement in the course.

4. When students are able to pace themselves according to their own desires without particular concern over missing an important class event, they tend to enjoy and take advantage of the flexibility of the class.

5. The "Student's Guide" should provide the necessary guidance for students which would eliminate any need for a full-time instructor, with regard to cognitive learning.

Recommendations

Based on the findings of this study, the following recommendations were made for future regard.

1. It is recommended that the "Student's Guide" and automated course be adopted as the main source of instruction for students taking the course "Audiovisual Materials in Teaching," leaving the instructor in a coordinator's role.

2. Careful consideration should be given to the selection of proper optional assignments which fit the needs of individual students.

3. Additional investigation should include specific individual traits of students which may have an effect on their success or failure in the automated course.

4. It is recommended that a similar study be conducted with students taking only the automated course, while more concern is given to pacing the time in completing the course.

5. A study similar to this one should include a greater population, and a pre-test on attitude would provide a good attitude change measure for possible interpretations.

6. A follow-up study should be included to study the retention of information maintained by the students who have been instructed by the various methods.

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APPENDIX A

"STUDENT'S GUIDE" UNIT I

UNIT I: HISTORICAL DEVELOPMENT OF EDUCATIONAL MEDIA

This unit is designed to prepare you to better understand various forms of audiovisual media in use in schools today through exposure to some of the high points of what past uses of media have been and where they started. The assumption made here is that some knowledge of beginnings helps a person place the present (and perhaps the future) in a clearer perspective.

In the short fifteen minute presentation provided by Unit I, one can only hope to achieve a broad overview of the history of educational media. That broad view, however, is what we hope you can gain from the unit. We hope, for example, that you will be able to characterize each of the four major periods outlined, and within that characterization, cite some examples of specific events which could serve to illustrate that period of time's major thrust and progress with regard to educational media development and use.

Incidentally, if you are interested in additional material on the history of motion pictures, we have provided some as part of Unit VI: "Motion Pictures in Education." If you would like to get all the historical material at once, get into Unit IV right after you complete Unit I. The history of film material is presented beginning at about one-third of the way through the unit.

A. Objectives

1. For specific given inventions such as the motion picture projector, the student will be able to correctly identify, from a list of names, two nineteenth century inventors whose inventions contributed to the communications revolution of the twentieth century.

2. The student will be able to correctly identify, from a list containing the names of several commercial organizations, the commercial organization that developed and produced the "filmstrip" as an instructional tool.

3. The student will be able to correctly identify, from a list of media, the medium associated with "schools of the air."

4. The student will be able to correctly identify, from a list of events, those historical events that enhanced the development and use of instructional media.

5. The student will be able to correctly identify, from a list of media, those media used in military instruction during World War II.

6. The student will be able to correctly identify, from a list of media, those types of media, developed in the post-World War II years, that were adaptations and improvements of training devices developed for instructional use during the war.

B. Required Assignments

1. View the sound filmstrip for Unit I, entitled, "Historical Development of Educational Media."

2. Complete the response items on the sheets which follow as you are viewing the sound filmstrip.

3. After viewing the filmstrip and completing the response items, complete the "Self-Test" for this unit. After you have completed the self-test, crease it on the perforations then carefully tear it out and turn it in as directed by your instructor.

C. Response Items for Unit I--Historical Development of Educational Media

Each item in this section should be responded to by the student at the time the sound filmstrip is viewed.

1. Teaching conducted on a one-to-one ratio is called _____.

2. Although the slate and a few simple devices were used, teaching by the tutorial process was largely an _____ experience.

3. In 1900 _____% of our high school age youth were enrolled in high school.

4. By 1957, this percentage had increased to _____%.

5. Prior to 1900, the work of such men as Edison, Marconi, and Eastman began to revolutionize mass _____.

6. In 1907 the _____ and _____ company was founded.

7. The first films used in instruction were adaptations of _____ films.

8. The first systematic attempt to collect non-book materials for school use was in 1905 at _____, _____.

9. The _____ Company was almost solely responsible for the development of the filmstrip as a teaching tool.

10. Between 1925 and 1935 many colleges established Educational Radio stations which were called _____.

11. _____ presented the largest educational or training task ever faced by this country.

12. The _____ _____ was the most famous of the war time simulators.

13. Probably the most significant of the post war innovations was the development of _____ _____.

14. A post war development that grew directly from war time experience was the _____ _____.

15. The period of slow steady growth following World War II ended abruptly when _____ was _____ in 1957.

16. In 1958 Congress passed the _____ _____ _____ _____, which was the first in a series of acts aiding education.

17. The new philosophy of using which ever form of forms of media considered most appropriate for a task is called the _____ _____ _____.

D. SELF-TEST

Unit I: Historical Basis for the Use of Educational Media

These response items are to be taken by the student as soon as possible after the student completes the filmstrip unit which this covers.

Unless indicated otherwise, items have more than one response needed. You may need to check two, three or more of the choices.

1. Of the following inventors, who were among those whose inventions directly contributed to the 20th century "communications revolution?"
   - ☐ a. Thomas Edison
   - ☐ b. George Eastman
   - ☐ c. Marconi
   - ☐ d. Benjamin Franklin
   - ☐ e. Francis Drake

2. Of the following companies what ones were pioneers in the production of audiovisual media?
   - ☐ a. Audiovisual Media Productions, Inc.
   - ☐ b. Victor Animatograph Co.
   - ☐ c. General Electric
   - ☐ d. Twentieth Century Fox Studios
   - ☐ e. Society for Visual Education, Inc.

3. Of the following media, which is most closely associated with the "school of the air" program?
   - ☐ a. filmstrips
   - ☐ b. airborne media laboratories
   - ☐ c. television
   - ☐ d. radio
   - ☐ e. programed instruction

4. Which one of the following events most greatly influenced the development or use of educational media before the 1950's?
   - ☐ a. invention of the Link trainer
   - ☐ b. World War II
   - ☐ c. the Korean War
   - ☐ d. "Sessame Street"
   - ☐ e. the emergence of programed instruction

5. Of the following media, what ones were used as training aids during World War II?

   ☐ a. motion picture films

   ☐ b. simulators

   ☐ c. graphic materials (diagrams, charts, posters)

   ☐ d. models and mock-ups

   ☐ e. audio devices

   ☐ f. lantern slides and filmstrips

6. Of the following devices, what ones were adaptations or improvements of training devices utilized during World War II?

   ☐ a. electronic learning labs

   ☐ b. overhead projectors and slide projectors

   ☐ c. teaching machines and programed learning

   ☐ d. tape recorders

   ☐ e. multi-screen presentation controls

7. Of the following outlooks, what ones are the result of the thinking and activity stimulated by the NDEA and subsequent programs for the late 1950's?

   ☐ a. the concept that educational media is best considered as useful <u>teaching aids</u> or supplements

   ☐ b. the concept that educational media should be more <u>integrated</u> into curriculum and instruction than is implied by the idea of "teaching aids"

   ☐ c. the concept of "multimedia" educational designs

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F. Optional Learning Activities

1. Write a brief essay, describing in your own words, the philosophy of utilizing instructional media which has evolved since 1958.

2. Describe the problems and circumstances which lead to the downfall of radio as a viable instructional medium.

3. Describe some of the factors which might account for the fact that education seems to trail behind other sectors of society in the use of modern technology.

4. Discuss some of the problems involved for school systems when media are considered strictly as "aids" to instruction.

5. What are the provisions and what have been some of the effects of Titles I, II, and III of the Elementary and Secondary Education Act of 1965?

APPENDIX B

PRE- POST-TEST

1. Which type of transparency can be most quickly and easily produced?
   a. dry photo-copy
   b. thermal
   c. diazo
   d. color-lift

2. Which of these inventions made sound-on-film possible?
   a. the kinetograph
   b. the victrols
   c. the kinetoscope
   d. the photo-electric cell

3. Which process requires clay base paper?
   a. thermal
   b. diazo
   c. dry photo-copy
   d. color-lift

4. Which of these machines may be operated most satisfactorily in a fully lighted room?
   a. 2 x 2 slide projector
   b. opaque projector
   c. motion picture projector
   d. overhead projector

5. Which is the most abstract?
   a. the written word, automobile
   b. a picture of a car
   c. a toy car
   d. they are equally abstract

6. Visual representations of numerical data are called:
   a. charts
   b. graphs
   c. diagrams
   d. dioramas

7. As the teacher faces the class, the transparency is placed on the stage of the overhead projector in such a manner that the teacher views it:
   a. upside down and reversed
   b. upside down but not reversed
   c. rightside up but reversed
   d. in the normal reading position

8. Which type of audio materials can be expected to last longer?
   a. disc recordings
   b. tape recordings
   c. wire recordings
   d. no difference

9. Which of these machines requires the darkest room for satisfactory operation?
   a. 2 x 2 slide projector
   b. opaque projector
   c. motion picture projector
   d. overhead projector

10. Which of these is not a true statement?
   a. the communication process is basic to effective teaching
   b. both sender and receiver can improve their communication skills
   c. teaching communication skills is the responsibility of the speech teacher alone
   d. before the teacher can reinforce the message to the students he needs to receive feedback from the students

11. The most valid criticism levied against current programmed learning materials is:
   a. they don't allow students to move at varying speeds
   b. they are too verbal
   c. they are too complicated for practical use
   d. they are too concentrated

12. A major advantage of programmed instruction is that it can be used to:
   a. teach foreign languages
   b. disseminate information
   c. motivate students
   d. solve complex problems

13. A device which allows 2 x 2 inch slides, filmstrips, and motion picture film to be projected into a TV camera is a:
   a. video-tape recorder
   b. image-orthocon viewer
   c. vidicon viewer
   d. multiplexer

14. Which item represents a major advantage of audio-tape recordings as compared to disc recordings?
   a. they are more easily stored
   b. they are less expensive
   c. they are more available
   d. they are more easily produced by teachers

15. What are recognizable three-dimensional representations of real things called?
   a. copies
   b. models
   c. mock-ups
   d. specimen

16. Distance is easier to estimate on which size globe?
    a. 12 inch
    b. 16 inch
    c. 18 inch
    d. 36 inch

17. Which item represents an advantage of clingboards?
    a. content is easily manipulated
    b. students prefer three dimentional materials
    c. students enjoy making the instructional material
    d. A and B

18. Dramatic simplicity is a characteristic of which of the following?
    a. clingboards
    b. chalkboards
    c. bulletin boards
    d. posters

19. Which item represents the correct temperature setting for the dry-mounting process?
    a. 250
    b. 270
    c. 225
    d. 265

20. Which of these processes is the least messy?
    a. wet-mounting
    b. dry-mounting
    c. rubber cement-mounting
    d. they are equally messy

21. Which of these is <u>not</u> a principle for the effective use of flat pictures?
    a. use few rather than many pictures
    b. integrate pictures with the lesson
    c. use color rather than black and white pictures
    d. use pictures for specific purposes

22. Which item represents an advantage of handmade transparencies?
    a. they can be produced quickly
    b. they are informal
    c. they are less likely to be ruined in storage
    d. multiple copies can be made quickly

23. Which color setting is appropriate for producing thermal transparencies on a thermofax machine?
    a. red
    b. white
    c. green
    d. buff

24. A translucent master is necessary for producing which type of transparency?
    a. diazo
    b. thermal
    c. color-lift
    d. dry photo-copy

25. Which of the following theories implies forced learning?
    a. behavioristic
    b. Gestalt
    c. mental discipline
    d. associationistic

26. The most notable instructional innovation since World War II is:
    a. cinemascope
    b. instructional television
    c. sound filmstrips
    d. language labs

27. Which item represents a medium that was not used for instructional purposes during World War II?
    a. motion picture film
    b. filmstrip
    c. television
    d. mock-ups

28. Which communications medium was used by schools of the air?
    a. motion picture film
    b. radio
    c. television
    d. all of the above

29. The person generally credited with initiating the development of the branching approach to programming is:
    a. Crowder
    b. Pressey
    c. Skinner
    d. Green

30. A device which allows visual images to be recorded and played back at future times is the:
    a. multiplexer
    b. vidicon camera
    c. synchronizer
    d. videotape recorder

31. A major advantage of disc recordings as compared to audio-tape recordings is:
    a. they are non-erasable
    b. they use capstan drive
    c. they are more easily operated
    d. they are commercially produced

32. What do we call three dimensional representations of real things which do not necessarily look like the object being represented?
    a. copies
    b. models
    c. mock-ups
    d. specimen

33. A disadvantage of globe usage for instructional use is:
    a. accuracy
    b. simplicity
    c. color
    d. bulkiness

34. Hook and loop boards are particularly advantageous for use with:
    a. flannel cut-outs
    b. magnetic materials
    c. heavier objects
    d. none of these

35. Which of these represents a function of bulletin boards?
    a. they facilitate study of single copy materials
    b. they stimulate student interest
    c. they create an atmosphere conducive to learning
    d. all of the above

36. Which item represents the correct temperature setting of the heat press for laminating a visual?
    a. 250
    b. 225
    c. 270
    d. 280

37. Which of these materials is not used in dry-mounting?
    a. rubber cement
    b. poster board
    c. dry-mount tissue
    d. butcher paper

38. Which of these is usually preferable when using flat pictures for instructional purposes?
    a. rapid inspection of many prints
    b. thoughtful study of a few prints
    c. they are equally sound practices
    d. neither is a sound practice

39. Which item represents a type of drawing material that is appropriate for producing handmade transparencies?
    a. grease pencils
    b. felt tip pens
    c. marsh pens
    d. all of the above

40. Which of these usually will not reproduce on a thermal transparency?
    a. India ink
    b. ball point pen
    c. soft lead pencil
    d. electrographic pencil

41. The text material on an overhead transparency master should not exceed:
    a. 10 x 10 inches
    b. 7 1/2 x 9 1/2 inches
    c. 8 1/2 x 11 inches
    d. 11 x 14 inches

42. Filmstrips which are accompanied by records are called:
    a. slide-tapes
    b. visual recordings
    c. sound filmstrips
    d. viewgraphs

43. A major advantage of 2 x 2 slides is:
    a. they are less expensive than filmstrips
    b. they have a smaller format than filmstrips
    c. the sequence of pictures can be more readily changed than filmstrips
    d. they are easier stored than filmstrips

44. Material which reflects rather than allowing light to pass through it is called:
    a. refraction material
    b. translucent material
    c. mirror image material
    d. opaque material

45. Which of these is used primarily to facilitate information storage?
    a. micro-film
    b. micro-projection
    c. film-strips
    d. 2 x 2 slides

46. Which item represents the best utilization technique for still projected media?
    a. follow-up activities
    b. a knowledge of composition
    c. skill in running audiovisual equipment
    d. flexible pacing

47. A teacher must be knowledgible in several areas to effectively utilize audiovisual materials. Which item best represents an area in which teacher should have a basic understanding?
    a. standardized tests
    b. I Q scores
    c. learning theory
    d. individual differences

48. Which item represents the type of motion picture film commonly used in single-concept loop cartridges?
    a. regular 8mm
    b. 16mm
    c. super 8mm
    d. A & C

49. The man who invented the kineoscope was:
    a. George Eastman
    b. Thomas Edison
    c. Varney Arnspiger
    d. none of the above

50. Which of these motion picture techniques can be used to visualize an invisible process?
    a. time-lapse
    b. slow motion
    c. flash-back
    d. animation

51. Which of these factors cause super 8 films to be a significant improvement over regular 8mm?
    a. better color film
    b. larger picture area
    c. quieter operation
    d. more economical

52. Which would you not check if a projector fails to produce a picture?
    a. projection lamp
    b. exciter lamp
    c. power cord
    d. classroom circuit breaker

53. Which tape recording speed is more suited for recording music?
    a. 1 7/8 ips
    b. 3 3/4 ips
    c. 7 1/2 ips
    d. no difference

54. When referring to motion picture film, 16mm refers to the:
    a. speed
    b. width
    c. length of the film
    d. thickness of the film

55. Which communication channel is more appropriate for an instructional task that requires overt reinforcement and feedback to clarify understanding?
    a. verbal (audio-tape)
    b. visual verbal (instructional television)
    c. verbal (programmed instruction)
    d. verbal (face to face)

56. Which of these barriers to communication is often a product of the others listed?
    a. physical discomfort
    b. excessive verbalism
    c. daydreaming
    d. none of these

57. Which part of the communication model is most closely associated with decoding messages?
    a. sender
    b. channel
    c. receiver
    d. none of these

58. The sender can then give approval, corrections, or additional information based on the receiver's _____:
    a. symbols
    b. channels
    c. reinforcement
    d. feedback

59. A practice commonly associated with the scientific approach to instruction is:
    a. one-way communication
    b. teacher centered
    c. verbal communication
    d. reinforcement

60. A disadvantage of 35mm filmstrips is:
    a. they are too expensive
    b. they are easily lost
    c. they are easily damaged
    d. all of the above

61. Which of these allows group viewing of microscope slides?
    a. microfiche
    b. micro-cards
    c. micro-film
    d. micro-projection

62. Although all are transparencies in the broad sense, which of these sizes is most often referred to as a transparency?
    a. 2 x 2
    b. 2 1/4 x 2 1/4
    c. 3 1/4 x 4
    d. 10 x 10

63. A teacher must be knowledgible in several areas to effectively utilize audiovisual materials. Which item best represents an area in which the teacher should have a basic understanding?
    a. a variety of instructional methods
    b. availability of educational media
    c. the concepts being taught
    d. all of the above

64. A major advantage of rear projection is:
    a. the wide viewing angle
    b. it is condusive to note-taking
    c. it reduces the need for room darkening
    d. the use of mirrors

65. The inventor of the flexible film base was:
    a. Thomas Edison
    b. Varney Arnspiger
    c. Oleg Kodak
    d. George Eastman

66. Which of the following is not a good practice in the utilization of instructional films?
    a. showing only part of a film
    b. using a film as a introduction to other activities
    c. leaving the lights on to facilitate note-taking
    d. all of the above

67. Which of these motion picture techniques makes action which occurs too slowly for observation more easily observed?
    a. time-lapse
    b. flash-back
    c. slow motion
    d. animation

68. According to research, note-taking during films is likely to be:
    a. detrimental
    b. beneficial
    c. of no consequence either way
    d. none of these

69. The most suitable method for erasing tape quickly is by:
    a. an alcohol solution
    b. running through the recorder on fast forward
    c. an electro-magnet
    d. all of these

70. At what speed are silent 16mm films projected?
    a. 8 frames per second
    b. 16 frames per second
    c. 24 frames per second
    d. 32 frames per second

71. Which of the following affects the synchronization between the sound and picture on a sound motion picture?
    a. exciter lamp
    b. tone control
    c. lower loop
    d. sound drum

72. Multi-channel presentations are most effectively used when:
    a. the channels are properly integrated
    b. the concept to be learned is highly abstract
    c. the level of maturity of the learner is low
    d. all of the above

73. Which communication channel is more appropriate for an instructional task that required an intermittent return to material previously covered?
    a. oral (face to face)
    b. oral (audio-tape)
    c. print
    d. visual-verbal (slide-tape)

74. If the word "seahorse" causes a child to visualize a horse, he is experiencing:
    a. day-dreaming
    b. feedback
    c. referent confusion
    d. imperception

75. When the receiver gives the sender an indication of the success of the communication, this response is called:
    a. symbols
    b. channels
    c. reinforcement
    d. feedback

76. Which practice implies a scientific approach to instruction?
    a. exploration
    b. identification
    c. problem solving
    d. all of the above

77. A modern instructional device greatly improved since World War II is the:
    a. model
    b. mock-up
    c. graph
    d. overhead projector

78. The historical event primarily responsible for the establishment of the National Defense Education Act in 1958 was:
    a. the Korean War
    b. the cold war
    c. placement of Sputnik in orbit
    d. nuclear testing

79. Which company was primarily responsible for the development of the filmstrip as an educational tool?
    a. Bell and Howell
    b. Kodak
    c. Herman DeVry
    d. Society for Visual Education

80. Which historical event was most responsible for creating an interest in research and development of instructional aids?
    a. World War I
    b. World War II
    c. the 1929 depression
    d. modular scheduling

81. A post World War II technological development that originated from military instructional practices was:
    a. the link trainer
    b. sound filmstrips
    c. electronic language laboratories
    d. models

82. Memorization and drill is most characteristic of which of the following learning theories?
    a. mental discipline
    b. associationistic
    c. experimental
    d. Gestalt

83. Which part of the communication model is most closely associated with encoding messages?
    a. sender
    b. channel
    c. receiver
    d. none of these

84. A psychological barrier which is inherently associated with the lecture method of teaching is:
    a. physical discomfort
    b. excessive verbalism
    c. daydreaming
    d. referent confusion

85. Which of Piaget's learning stages is characterized by individuals who are able to visualize highly abstract concepts?
    a. pre-operational
    b. post-operational
    c. formal operational
    d. concrete operational

86. Lenses should always be cleaned with:
    a. soft cloth
    b. carbon tetrachloride
    c. lint-free lens paper
    d. lint-free chamois

87. Which motion picture film size is most commonly used in education?
    a. 8mm
    b. 16mm
    c. 35mm
    d. 70mm

88. Tape recorders erase automatically when:
    a. rewinding
    b. recording
    c. playing
    d. in fast forward

89. Which of the following is the most suitable instrument for removing hard deposits from the pressure plate of a projector?
    a. a pocket knife
    b. a wire brush
    c. a wooden toothpick
    d. a straightened paperclip

90. Which of these is an advantage of super 8mm over 16mm?
    a. better color film
    b. larger picture area
    c. quieter operation
    d. more economical

91. Which of these motion picture techniques is used to represent a return to an earlier time?
    a. a time-lapse
    b. flash-back
    c. slow motion
    d. animation

92. Which item represents the historical event that had the greatest effect on the use of motion picture films as an instructional tool?
    a. National Secondary School Act of 1965
    b. National Defense Education Act of 1958
    c. World War II
    d. Sputnik

93. Which is the most appropriate question a teacher should consider in determining whether or not a motion picture film is the correct medium to use for teaching a particular concept?
    a. is the film available
    b. is the film interesting
    c. does the concept require motion
    d. is the film expensive

94. Which of these may be used to clinch a film presentation?
    a. class discussion of the film
    b. an oral quiz
    c. written reports from other sources on the film's subject
    d. all of the above

95. Which item best represents a valid criterion for selecting still-projected media to present a concept?
    a. materials are easier to find
    b. projection techniques are simple
    c. motion is not essential to the concept
    d. the conept is a visual one

96. A 10 x 10 inch transparency is often referred to as:
    a. a super slide
    b. a hand-made transparency
    c. an overhead transparency
    d. a lantern slide

97. Transparent material which uses hinges to allow for progressive presentation is commonly called:
    a. progressive disclosure
    b. a hinged transparency
    c. an overlay transparency
    d. a multi-media transparency

98. Which item represents the best medium for sequential rearrangement?
    a. filmstrips
    b. 2 x 2 slides
    c. motion pictures
    d. sound filmstrips

99. Small film formats which contain large amounts of information are generally called:
    a. microforms
    b. microscope slides
    c. microplates
    d. condensed slides

100. Which item represents an advantage of 2 x 2 slides?
    a. they have larger format than filmstrips
    b. they are more easily stored than filmstrips
    c. they are less expensive than filmstrips
    d. they are easily produced by teachers

101. Which psychological barrier is caused by the learner using a faulty frame of reference?
    a. physical discomfort
    b. excessive verbalism
    c. daydreaming
    d. referent confusion

102. Which of Piaget's learning stages is characterized by individuals who can understand observed processes yet lack the ability to understand the same processes when related through more abstract symbols?
   a. pre-operational
   b. concrete operational
   c. formal operational
   d. pre-formal operational

103. Which of the following functions primarily as a shock absorber on a motion picture projector:
   a. feed sprocket
   b. upper loop
   c. pressure plate
   d. lower loop

104. At what speed are sound 16mm films projected?
   a. 8 frames per second
   b. 16 frames per second
   c. 24 frames per second
   d. 32 frames per second

105. Which of the following is the most suitable instrument for cleaning dust and lint from the aperture?
   a. wooden toothpick
   b. pipe cleaner
   c. pocket knife
   d. tweezers

106. According to research the use of color in films:
   a. is necessary to most concepts
   b. aids social understanding
   c. is more beneficial
   d. none of these

107. Which of these motion picture techniques make action that occurs too quickly for observation more easily observed?
   a. time-lapse
   b. flash-back
   c. slow motion
   d. animation

108. Which of these techniques is used to make extremely small objects more visible?
   a. animation
   b. tele-photo photography
   c. micro-photography
   d. slow motion

109. The first feature length sound motion picture was:
   a. The Great Train Robbery
   b. Toll of the Sea
   c. The Al Jolson Story
   d. The Jazz Singer

110. Which item is not an example of good motion picture projection techniques?
   a. fading the volume when the film ends
   b. gradually increasing the volume when the picture begins
   c. darkening the room before starting the projector
   d. rewinding the film immediately after showing it

111. Which item represents the best criterion for selecting still projected media to present a concept?
   a. a combination of still projected media is better than any single type
   b. it is an effective means of communicating factual information
   c. materials are highly available
   d. A & C

112. Which slide size is sometimes referred to as a latern slide?
   a. 35mm
   b. 126
   c. 3 1/4 x 4
   d. 127

113. Which piece of equipment does not use film?
   a. carousel projector
   b. filmstrip projector
   c. micro-projector
   d. micro-fiche viewer

114. Which of the following is not an appropriate use for filmstrips?
   a. to provide a basis for understanding symbols
   b. to help teach skills
   c. to show motion
   d. to focus group attention

115. Slides which require specially designed glasses in order to view them are called:
   a. bi-optical slides
   b. stereo albums
   c. stereo viewers
   d. stereo slides

116. Which process requires masters that contain a high carbon content?
   a. thermal
   b. Diazo
   c. dry photo-copy
   d. color-lift

117. Which item represents an advantage of thermal transparencies?
   a. they can be produced from inks with a high carbon content
   b. multiple copies are easily produced
   c. masters can be made from colored pencils
   d. they look more professional than transparencies made by other methods

118. Which of the following are criteria for selecting flat pictures for educational purposes?
   a. clarity
   b. truthfulness
   c. suitability to the teaching concept
   d. all of the above

119. A suitable material for displaying photographic prints without damaging the print is:
   a. straight pins
   b. thumb tacks
   c. glue
   d. an easel

120. Which material is used in dry-mounting a flat picture?
   a. laminating film
   b. dry-mount tissue
   c. dry-mount glue
   d. contact paper

121. A type of graph that is useful for plotting trends is the:
   a. bar graph
   b. line graph
   c. circle graph
   d. pie graph

122. Captions used to draw the reader closer in order to present additional information is a characteristic of which of the following?
   a. posters
   b. bulletin boards
   c. magnetic boards
   d. clingboards

123. Which item represents an advantage of clingboards?
   a. inexpensive
   b. highly visual
   c. sequential development
   d. all of the above

124. Which item represents an advantage of flat maps?
   a. they depict detailed information about small portions of the earth's surface
   b. they depict the total surface of the earth
   c. portability
   d. all of the above

125. Which of these items represents the most realistic instructional materials?
   a. globes
   b. dioramas
   c. models
   d. mock-ups

126. Most broadcast educational television stations receive some programs from:
   a. NBC
   b. FCC
   c. NET
   d. NRA

127. Which item represents a function of the teacher who utilized programmed instruction?
   a. motivation
   b. guidance
   c. coordination
   d. all of the above

128. There are several proceedures to be followed when developing programmed instructional materials. Which item best represents one of those?
   a. determine whether the program reduces failure
   b. determine the speed at which learning occurs
   c. determine the objectives of the instructional situation
   d. determine the cost of developing program

129. A simulator developed and used in military training during World War II was the:
   a. computer
   b. parachute simulator
   c. drivers simulator
   d. link trainer

130. A modern educational device improved and made more portable since World War II is the:
   a. slide projector
   b. tape recorder
   c. overhead projector
   d. all of the above

131. Which of these senses is used more often in instructional situations?
   a. vision
   b. hearing
   c. touch
   d. taste

132. Which type size is preferable for use on transparencies intended for general classroom use?
   a. pica
   b. elite
   c. primary
   d. all are equally acceptable

133. Transparencies reproduced by the dry photo-copy method are developed by:
   a. heat
   b. ammonia fumes
   c. photographic chemicals
   d. light

134. Which of these practices can save transparency film?
   a. the use of test strips
   b. running the machine faster than usual
   c. running the machine more slowly than usual
   d. none of the above

135. Which item represents an advantage of the color-lift method of transparency production?
   a. color transparencies can be made from pictures in certain magazines
   b. they do not require the use of transparent film
   c. they require little time to produce
   d. they have a professional appearance

136. Which of these is most available to classroom teachers?
   a. filmstrips
   b. mock-ups
   c. flat pictures
   d. motion picture films

137. Before laminating, flimsy materials should be:
   a. soaked in hardening solution
   b. washed with vinegar
   c. dry-mounted
   d. none of these

138. Good instructional cartoons have three characteristics. Which item more nearly represents one of these characteristics?
   a. they must use highly abstract symbols
   b. they must be funny
   c. they must be appropriate for the experience level of the student
   d. they must be satirical in nature

139. Which of these is not characteristic of a good poster?
   a. simplicity
   b. attractiveness
   c. multi-purpose
   d. a brief text

140. The most important factor that enables students to distinguish features on globes is:
   a. latitude lines
   b. lettering
   c. color
   d. embossed surfaces

141. The globe is an example of which of these?
   a. diorama
   b. simulation
   c. mock-up
   d. model

142. Which item represents a type of audio material not commonly used without accompanying visual material?
   a. radio
   b. optical sound recordings
   c. disc recordings
   d. magnetic tape recordings

143. Most broadcast TV programs are transmitted over which frequency range?
   a. UHF
   b. AM-FM
   c. FCC
   d. VHF

144. Which size videotape must be used for television programs broadcasting under FCC regulations?
   a. one inch
   b. two inch
   c. one-half inch
   d. all of the above

145. Branching programs usually utilize:
   a. a constructed response
   b. a multiple choice response
   c. a true-false response
   d. a written response

146. A professional media specialist who works primarily with printed materials is generally called:
   a. an audiovisual specialist
   b. a media technician
   c. a librarian
   d. a clerk

147. When projecting a film in the usual manner, the feed reel on a 16mm projector turns:
   a. clockwise
   b. counter-clockwise
   c. the opposite direction than the take-up reel
   d. none of the above

148. Which type graph shows continuous data most accurately?
   a. line graph
   b. pictoral graph
   c. bar graph
   d. pie or circle graph

149. With which media has most research been concerned?
   a. instructional film
   b. overhead transparencies
   c. filmstrips
   d. tape recordings

150. Which is the most recently developed type of sound recording?
   a. disc recording
   b. tape recording
   c. wire recording
   d. optical recording

151. Which is easiest to produce by hand drawing methods?
   a. 35mm
   b. super slides
   c. lantern slides
   d. 10 x 10 transparencies

152. Which of these is a legitimate criterion for use in selecting the viewing methodofor flat pictures?
   a. the purpose for which they are being used
   b. the size of the viewing group
   c. the size of the prints
   d. all of the above

153. Which of these means of learning is the most concrete?
   a. lecture
   b. direct experience
   c. television
   d. motion pictures

154. Which of these has the most limited range?
   a. VHF
   b. 2500 Mhz
   c. UHF
   d. no difference

155. Carefully selected and used media has proven effective in teaching:
   a. skills
   b. factual knowledge
   c. attitudes
   d. all of these

156. Which of these is an important consideration when selecting symbols and channels for communications?
   a. the operational level of the learner
   b. the complexity of the concept
   c. the abstractions of the media
   d. all of these

APPENDIX C

ATTITUDE EVALUATION INSTRUCTIONS

TO: Oklahoma University Education Students

SUBJECT: Assistance in Reasearch

Your assistance is needed in the forming of judgements about attitude statements. The statements on the attached pages represent items on their way to becoming part of an experimental research project dealing with an automated course.

It is hoped that your assistance in judging the POSITIVE or NEGATIVE tones of the statements toward the course will provide a basis for constructing an attitude scale which will be given to students who will be exposed to the automated course as a learning experience.

DIRECTIONS

After reading the statement, circle one of the numbers which you believe to be the most representative of the location of the statement along a continuum 1 through 5. The number 1 would be assigned to the most negative statements, 5 to the most positive and 3 to neutral statements. What I need is your judgement of the scale value of the statement, NOT your attitude toward automated instruction.

Thank you for your assistance.

Roger N. Tipling
Doctoral Student

APPENDIX D

ATTITUDE MEASURE

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

The following statements will enable you to evaluate the course "Audiovisual Materials in Teaching". You should circle the number which represents your true feelings about each statement. The numbers are arranged in a continuous scale which ranges from strongly disagree (1) to stongly agree (5).

THE CHOICES YOU MAKE WILL IN NO WAY AFFECT YOUR GRADE IN THIS COURSE.

1 2 3 4 5	1.	I consider this course to be one of the most valuable courses offered in the College of Education.
1 2 3 4 5	2.	If I were to take this course again, knowing that it is taught in the two different ways, I would choose the same method of instruction that I had this time.
1 2 3 4 5	3.	This course has provided me with the proper information to consider several other possible methods of communicating with people.
1 2 3 4 5	4.	This course was too general and did not provide enough practical information.
1 2 3 4 5	5.	The methods of instruction used in this class were good examples of proper use of educational media.
1 2 3 4 5	6.	This class gave ample opportunity for interaction with other students inthe class.
1 2 3 4 5	7.	I would enjoy taking other courses that are taught like this one.
1 2 3 4 5	8.	I personally cannot see how this course can be of any use to me.
1 2 3 4 5	9.	This subject would be worthwhile if it were taught in a different way.
1 2 3 4 5	10.	The value of this course is very significant for people in Education.
1 2 3 4 5	11.	The objectives of the lessons in this class were quite clear.
1 2 3 4 5	12.	I found this class to be very enjoyable.
1 2 3 4 5	13.	I believe that all Education students should be required to take this course.
1 2 3 4 5	14.	This class allowed ample opportunity for interaction with the professor.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

1 2 3 4 5 15. I believe that there were too many assignments in this class.

1 2 3 4 5 16. This class gave ample opportunity for self-expression of my thoughts about media.

1 2 3 4 5 17. The presentation of information in this class was very well organized.

1 2 3 4 5 18. The information covered by this course was extremely interesting.

1 2 3 4 5 19. A large amount of valuable information can be derived from this type of course.

1 2 3 4 5 20. This course has increased my qualifications to teach and/or work in a resource center.

1 2 3 4 5 21. This course was not worth the time and effort it required.

1 2 3 4 5 22. This class involved too much use of media and not enough human interaction to disseminate the information.

1 2 3 4 5 23. This course required too much work outside of class time.

1 2 3 4 5 24. I wish more of my classes would be taught this way.

Other comments (text, guide, etc.)_____

_____

_____

_____

_____

_____

_____

APPENDIX E

RAW DATA

CONTROL GROUP

STUDENT'S NUMBER	PRE-TEST SCORE	POST-TEST SCORE	GAIN	ATTITUDE SCORE	GRADE POINT AVERAGE
01	101	115	14	87	2.68
02	107	103	-4	84	3.02
03	72	87	15	79	2.30
04	92	105	13	89	2.89
05	66	85	19	109	2.61
06	82	107	25	69	3.36
07	97	117	20	97	3.02
08	76	125	49	78	2.55
09	106	116	10	85	2.24
10	49	82	33	101	3.36
11	87	118	31	80	3.19
12	116	117	1	67	2.71
13	85	93	8	79	2.39
14	96	100	4	87	3.55
15	75	105	30	87	2.35
16	91	103	12	83	2.64
17	88	98	10	86	3.15
18	85	112	27	95	3.80
19	86	109	23	69	2.69

4:15 EXPERIMENTAL GROUP

STUDENT'S NUMBER	PRE-TEST SCORE	POST-TEST SCORE	GAIN	ATTITUDE SCORE	GRADE POINT AVERAGE
01	81	119	38	99	2.89
02	79	93	14	81	2.51
03	74	135	61	96	2.47
04	83	123	40	106	3.07
05	100	142	42	93	3.92
06	68	137	69	52	2.52
07	55	129	74	57	2.63
08	110	142	32	101	2.65
09	92	131	39	104	2.89
10	75	101	26	85	3.22
11	84	130	46	101	3.70
12	78	110	32	93	2.69
13	77	118	41	49	2.48
14	96	136	40	79	3.00
15	71	129	58	51	2.69
16	89	133	44	99	3.53
17	76	111	35	90	2.70
18	80	126	46	87	2.93
19	79	129	50	89	2.98

7:00 EXPERIMENTAL GROUP

STUDENT'S NUMBER	PRE-TEST SCORE	POST-TEST SCORE	GAIN	ATTITUDE SCORE	GRADE POINT AVERAGE
01	87	110	23	74	3.00
02	98	121	23	57	2.73
03	104	139	35	90	3.00
04	101	131	30	79	3.60
05	70	113	43	91	2.50
06	67	127	60	92	2.30
07	115	143	28	93	2.92
08	75	128	53	71	3.40
09	85	111	26	88	2.40
10	97	125	28	90	2.59
11	95	123	28	69	2.42
12	83	106	23	91	2.14
13	101	129	28	75	2.50
14	85	134	49	82	3.53
15	100	140	40	100	3.63
16	85	110	25	61	2.25
17	82	117	35	55	2.83
18	92	135	43	88	2.61
19	73	131	58	87	2.70