THE ACHIEVEMENT OF STUDENTS THROUGH INSTRUCTION BY: THE CONVENTIONAL TEACHING METHOD PLUS FILM VERSUS THE CONVENTIONAL TEACHING METHOD PLUS FILM WITH DISCUSSION ON THE FILM

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The achievement of students through instruction by: the conventional teaching method plus film versus the conventional teaching method plus film with discussion on the film.

by

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ABSTRACT

The purpose of this study was to determine if any significant difference existed between the achievement of students through instruction by: the conventional teaching method plus film, and the conventional teaching method plus film with discussion on the film.

The study involved two grade seven classes within the St. Barbe South Integrated School Board.

Campbell and Stanley's "Pretest - Posttest Control Group" design was utilized in this study (Campbell and Stanley, 1970).

For the results of the study, two separate measures are available:

1. scores on the posttest for achievement, and
2. gain scores (posttest scores minus pretest scores) used to determine if any significant difference existed between high achievers and low achievers within the control group and the experimental group.

The T test (independent means) was used to determine if the mean scores were significantly different.

The results of the study indicated that a significant difference existed between the achievement of students using the conventional teaching method plus film and students using the conventional teaching method plus film with discussion on the film. The group of students using the conventional teaching method plus film with discussion on the film scored significantly higher.

It was also found that there was no significant difference between the achievement of high achievers and low achievers in the group using the conventional teaching method plus film only. There was a significant difference between the achievement of high achievers and low achievers in the group using the conventional teaching method plus film with discussion on the film. The high achievers scored significantly higher.

ACKNOWLEDGEMENTS

A study such as this is seldom undertaken by a single individual. I would like to acknowledge all those who helped to make this study possible. The guidance of Dr. G. Murphy and Dr. G. Fizzard is greatly appreciated. To the teachers and students of Greavett Memorial High School of Cow Head and Holy Cross School of Daniel's Harbour, who assisted or participated in the study, I wish to offer appreciation. I am also indebted to my wife, Kay, for her encouragement and typing.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Overview

In this chapter an attempt is made to explain the problem and its significance. The study is designed to see if there is any significant difference between the achievement of students through instruction by: the conventional teaching method plus film, and the conventional teaching method plus film with discussion on the film.

This chapter discusses the need for the study. Definitions of terms, the limitations of study and a summary of the proposal is included.

Statement of the Problem

Is there any significant difference between the achievement of students through instruction by: (a) the conventional teaching method plus film, and (b) the conventional teaching method plus film with discussion on the film?

Need for the Study

Teachers, including geography teachers, have accepted the fact that films are beneficial to their students. But Geography is undergoing great changes in terms of its philosophy and methodology and there is a continuing need to identify the factors responsible for effective teaching in terms of films. This point was made by Geoffery Lloyd (1975, p. 13)

> There has been the growth of the 'new geography', with its emphasis on ideas and concepts rather than rapidly-dating factual knowledge. At a more advanced level there is the use of quantitative techniques and theoretical models. This new geography has filtered through to the schools from above.

There is much evidence of methodological changes in geography and they can be seen in new-style text-books, workcards, kits, games, simulations, tapes and charts. Since there is an abundance of films and since geography is changing, then there is a continuing need to identify the factors responsible for effective teaching through the use of films.

Since many students are struggling in school, teachers should be concerned with more efficient ways of teaching concepts or skills to the low achievers. To date very little research has been done comparing results of low achievement students with the results of high achievement students through the use of films or films with discussion. If it can be shown that low achievement students can compare favourable with high achievement students through the use of films or films with discussion, then this will have very important implications for teachers especially in terms of how often films or films with discussion should be used.

Definition of Terms

The Encyclopedia of Education (1971, p. 9) gives the following definition of instructional film:

> Instructional film - This term includes all types of photographic film used for teaching purposes: motion picture, slides, filmstrips and transparencies. Although

> instructional films vary in their physical characteristics, they have certain common attributes. The visual images they contain are all printed on transparent acetate base through which light is transmitted. This projected light enlarges the images, usually upon a screen, but often through a television tube. Motion picture projections are most often presented in a sequential linear order.

The 16mm sound motion picture was used in this study.

Conventional teaching according to the Instructional Encyclopedia of the Social Sciences, Geer (1968, p. 560) "holds that it requires no more than Mark Hopkins, a boy and a log. Common sense tells us we may dispense with the log, but that there must be an understanding between the two that one knows more about something than the other and should impart it." According to this view, the act of teaching is a simple process: it is to give or impart knowledge.

The definitions of conventional teaching and discussion for this study are as follows:

Conventional teaching

The focus was on the unit North-Western Europe in the grade seven geography textbook, Introducing Earth, Part One. The students were expected to read this unit prior to classroom instruction. During class time the teacher elaborated, explained and questioned to find out if they read the unit. Time was also provided for the students to ask questions for clarification.

Discussion

In the control group, there was no preparation for the film or follow up after the film. In the experimental group,

the discussion was question-answer oriented. The experimental group was prepared for the film by receiving questions on paper. While they were viewing the film, they were asked to look for the answers. After the film, the teacher asked the prepared questions and the students answered orally.

Since the control and experimental groups received the same amount of instruction in terms of time, conventional teaching was shortened by twelve minutes in the experimental group to provide for discussion on the film.

Limitations of the Study

1. Since variables relating to the differences between the teachers were not controlled, student achievement may have been influenced.
2. The study was limited to forty-nine grade seven students as the control group and thirty grade seven students as the experimental group. Both the control and experimental groups were intact classes.
3. Since both the experimental group and control group were given the same pretest; then, increased sensitization of the subject after the pretest may not have been the same for both groups.

Summary

This chapter deals with the problem and its significance. The problem asks if there is any significant difference between the achievement of students through instruction by the conventional teaching method plus film, and the conventional teaching method plus film with discussion on the film. This problem needed to be studied

because this issue is important to teachers who rely heavily upon film at school. Three terms, instructional film, conventional teaching and discussion were defined to give a clearer understanding of the study.

CHAPTER II

REVIEW OF RELATED LITERATURE

The review of the research is divided into the following areas: history, knowledge, retention of knowledge, skill and the use of study guides with film or discussion on film.

History

Research involving the use of film is not new. It began in the United States around the time of the First World War. The first large scale research in the United States on the educational effectiveness of motion pictures was undertaken in 1919. This study was designed to investigate the effects upon the public of certain motion pictures used in various campaigns for the control, repression and elimination of venereal diseases, (K.S. Lashley and J.B. Watson, 1922, p. 3). In the experiment, the film was shown to approximately 500 people in the U.S. Army. The results showed that the film was found to be effective in conveying information on venereal disease and data on retention of information obtained from the film suggests that the main facts were well remembered up to five months after the showing. Although the motion picture showing was found to be effective in conveying information, very little evidence in this or in other studies is available to suggest that a single motion picture is effective in restructuring conduct or habits related to primal desires, Hoban (1970).

One of the most important aspects of early research was that it raised questions, stimulated further research and helped improve research designs.

The Eastman Kodak Company produced one of the first comprehensive libraries of silent motion pictures for instruction in geography, science and health. Wood and Freeman (1929) investigated the contributions that the use of films made to learning. They concluded that "the film gives the child clear-cut motions of the objects and actions in the world about him", (p. 221).

At approximately the same time that the Eastman Kodak Company was producing silent motion pictures for instruction, Yale University produced a series of silent instructional motion pictures known as the Chronicles of America Photoplays.

Knowlton and Tilton (1929), conducted a study of the contributions of the Yale Chronicles of the America Photoplays to teaching historical facts. Ten of these silent films were used in addition to the usual teaching materials in the experimental classes. The results were compared with those of control groups that were taught with usual materials and procedures only. The study involved the material covered in one semester of teaching. Knowlton and Tilton reported that the scores of the groups that received film instruction in addition to the regular instruction showed reliably greater gains than did the scores of groups that received the regular instruction only.

The research by Knowlton and Tilton in 1929 was one of the last studies dealing with silent motion pictures as instructional film makers began to concentrate on sound films at that time.

C.C. Clark (1932) made a comparison of sound films, silent films and lecture demonstrations prepared in "imitation" of the films. He found that three sound films in physical science were equally as effective as the lecture demonstrations given by the regular class instructors in conveying specific information. The three silent physical science films were about equally as effective in this informational learning as their corresponding lecture demonstration.

H.A. Wise (1939) conducted a study on the effectiveness of the Yale Chronicles of America Photoplays in teaching history while using eleventh grade pupils as subjects. The experimental group received instruction from ten silent photoplays that were used with the usual teaching materials and procedures. The control groups were taught with the usual teaching materials and procedures only. The study measured learning from one semester of teaching. Wise found that the groups receiving regular instruction plus film instruction showed reliably greater gains in historical knowledge than groups receiving regular instruction only.

In 1936, the American Council on Education evaluated the use of motion pictures in education. Of 1500 films used in classrooms throughout the country, 500 were selected as being educationally worthwhile. Teachers from several experimental

centers gave written descriptive accounts of the methods used in teaching with films and the results they observed.

In 1941, Bell, Cain and Lamoreaux conducted one such study. They investigated the effect of eight march of time films on the role of government in conservation and consumer protection upon the learning of fifth, seventh, ninth and eleventh grade pupils. They found that the fifth grade showed an increment in favour of the films which was significant almost at the five percent level. The seventh and eleventh grades showed a more reliable difference well under the one percent level. In the ninth grade, there was no difference between the film and the non- film (control) group.

The military studies in the United States during and immediately after World War II were very important in terms of their findings, but perhaps even more important in terms of the precise evaluative techniques used. Recent research has been carried on by the Instructional Film Research Program at the Pennsylvania State College plus many individuals too numerous to mention here.

Imparting Factual Knowledge by Film

One of the most popular studies of film which relates to knowledge of facts is the Holaday and Stoddard study (1933). This study was quite extensive involving approximately 3,000 children in grades 2, 3, 5, 6, 9 and 10, plus 200 graduate students and young faculty members. Seventeen

films were used in the study; ten of which were silent and seven sound films.

Holaday and Stoddard reached the following conclusions:

> 1. The general information of children and adults increased to a considerable extent by information correctly shown in motion pictures.
>
> 2. General information presented incorrectly by the pictures is frequently accepted as valid unless the incongruity is quite apparent. The content of a picture is accepted as authentic by a large percentage of the audience unless the errors contained are glaring.
>
> 3. Retention of the specific incidents of motion pictures is high. Children, even very young ones, can retain specific memories of a picture with a high degree of accuracy and completeness. The second-third grade group retained on the average nearly sixty percent as much as the group of superior adults. (pp. 77-78)

Two studies previously mentioned, the Knowlton and Tilton in 1929 and the Wise study in 1939 found that the scores of the groups receiving regular instruction plus film instruction exceeded those of the groups that received the regular instruction only.

H.C. Davis (1932) found that experimental groups taught with film were superior in mentioning items shown in the film; whereas, groups taught without film were superior in items not shown in the film.

H.E. Wise (1949) found that experimental groups taught with film were superior to the control group taught without film. The informational tests were directly related to the content of the biological science films used in the study.

A very extensive study was conducted by G. Scott (1949) dealing with learning in four social studies courses and

three different science courses. Six to fourteen films were used in each. The experimental and control groups came from between twenty-five to thirty-five high schools. Scott like Davis (1932) and Wise (1949) found that the influence of films on factual knowledge is specific to the areas covered by those films. Scott found that the film groups were superior on the specific area tests in the seven courses. However, in terms of standardized tests only two of the seven courses showed a reliable difference in favor of the film group.

In comparing three instructional methods (1) method "A", the eight millimeter single concept sound film; (2) method "B", the printed information sheet, and (3) method "C", the lecture, K.F. Hickman (1967) taught thirty basic descriptive geometry lessons extended over two consecutive semesters. Hickman found no significant difference between the three methods of teaching in terms of learning and retention.

In 1961, Ingli's findings supported earlier research in that pupils profit from film techniques. In this study, Ingli subjected fourth and fifth grade pupils to both film and nonfilm techniques. He found that film techniques were superior to the nonfilm teaching techniques in the areas of factual learning and vocabulary for both groups. However, only the fifth grade students showed a significant gain in thinking ability and retention of material learned at the end of the year.

Although most studies suggest that film use is superior to the conventional teaching method, some studies find no significant difference between the two. James A. Federici (1974) reported a study on the effectiveness of three social studies teaching-learning situations in fostering affective and cognitive changes. The subjects were exposed to three different teaching-learning situations: lecture/discussion, simulation game/discussion, and film/discussion. Although the results showed that the simulation game/discussion method was superior in changing student attitudes, no significant difference in effectiveness in teaching content was found between the three instructional modes. The three methods appeared to be equal. Hickman (1967) concluded, however, that since the film and printed information sheets required less time for presentation than the lectures; then, they were more efficient than the lecture method. The lecture method, although not as efficient, was found to be more economical.

Anthony J. Phair (1975) compared cognitive learning from a 16 mm motion picture, a 35 mm sound filmstrip, soundtrack only, and printed narration using immediate and delayed retention scores in sixth-grade social studies. The findings of this study suggested that media using combined visual and auditory communicative modes result in more effective learning than sound or print alone. The film and filmstrip were more effective than the printed narration

and the soundtrack print was found to be more effective than the auditory presentation.

In another study by K. Fisher (1976) on effectiveness of video-autotutorial instruction for a university course in science with a very large enrollment, the audio visual material was found to be superior when compared to more traditional instructional approaches.

Gredler (1976) found a significant difference between the gains made by the film and discussion group only. She found that the film and discussion group made the greater gains.

Retention of Knowledge from Films

The following studies suggest some important conclusions about the long-time effectiveness of films. They seem to indicate that knowledge gained from film may persist over a long period of time.

The Knowlton and Tilton study (1929) investigated the amount of long time retention of material learned from Yale photoplays. They found that the contribution of film in immediate learning and in retention of material learned is superior to non-film instruction; however, the contributions of films may be greater in immediate learning than in retention of material learned. One major exception to this was the learning of historical relationships other than those of time where the film groups were 43 percent superior in immediate learning to the non-film group.

Holaday and Stoddard (1933) studied the amount of long-time retention of factual information from films. They found that the retention of specific scenes remained high over a long period of time. On certain test items and sometimes of the entire tests, a certain age group had a higher average retention on tests or items a month and a half or three months after the picture was shown than it did the day after the picture. The results were more pronounced; however, with the second and third grade children than with the fifth and sixth, ninth and tenth and adults.

C.I. Houland, A.A. Lumsdaine, and F.D. Sheffield (1949) reported a study on the amount of long-time retention of factual information from films. They found that the experimental group (the film group) were superior to the non-film group on every item even at a nine week interval.

In 1949, Johnson investigated the relative effectiveness of sound motion pictures and filmstrips in promoting learning in geometry. Johnson was concerned with acquiring and retaining information, applying the information in new situations and acquiring and retaining certain skills. Johnson found that there was no significant difference between media, and there was no significant difference between using a medium and not using one. The experimental group was superior; however, in the retention of learning in those classes using three filmstrips and the sound films for the study of geometry of the circle. Johnson attempts

to explain the results in one of his conclusions.

> It appears that audio-visual aids which are developed for use in mathematics classes might be more effective as aids to learning if they were designed to supplement rather than repeat the type of instruction which the students have in the typical mathematics classroom. (Johnson, 1949, p. 372).

Skill Development

There are several competing theories on whether film can influence the development of cognitive skills. Two positions are widely held. The first position suggests that although film can convey knowledge quite readily, since knowledge can be coded in a medium, they cannot teach skills; skills being implicit cannot be so represented. The second position suggests that the development of skills can be fostered through media.

Rovet (1977) conducted a study to test the two theories and he concluded that film can indeed facilitate the development of cognitive skills and that this development depends on the explicit quality of the presentation as well as the initial skills of the viewer.

In terms of knowledge, retention of knowledge and skill development, if film merely repeats material that is usually presented by the instructor or the test, then they may be of little or no value to the learning process. On the other hand, as some studies have concluded (Rovet, 1977 and Johnson, 1949) when the film and text, or film and class teaching are

mutually reinforced and supplementary, learning is superior to the text or class teaching. The effectiveness of film when they are used to supplement usual teaching methods is more pronounced in terms of retention than immediate learning.

Much research has been done on the success or failure of educational films in the classroom and it is widely accepted than films are indeed beneficial in researching desired educational outcomes. Lewis Herman (1965) agreed with the benefits of educational films when he stated:

> The unqualified success of educational films has been so widely attested to that a prolonged discussion of their merits would indeed be gratuitous. Sufficient statistical proof exists in a vast number of film research programs and makes prolonged argument unnecessary. The mere fact that thousands of educational systems now rely on thousands of educational films to carry a great deal of the teaching burden significantly underlines the beneficial potentials of educational films. (p. 11)

The Use of Study Guides with Film or Discussion on Film

Some of the studies previously reviewed were not geared to film versus film with the use of study guides or discussion on the film, but they point out that when film and text or film and class teaching are mutually reinforced learning is more effective. The following studies are geared to such a problem.

J.H. Halsey (1936) found that a control group taught by the conventional method gained 90 percent; an experimental group taught by the conventional method plus the use of films

and slides gained 133 percent; whereas, another experimental group taught by discussion based on films and slides alone gained 191 percent.

In 1957, Pitkin reported a study involving a course by television. He found that students of low, average and superior abilities showed an increase in knowledge. In the study, students attending schools that gave considerable emphasis to the program by follow up activities did better than those using the television programs without much follow up.

The importance of using a prefilm test to identify points which are to be learned in a film has been studied by several researchers.

Lumsdaine, Sulzer and Kopstein (1961) found that a brief prefilm test of five sample micrometer readings significantly increased the amount learned from the film.

Several studies conducted by May and Lumsdaine (1958) also show that the amount learned from film can be increased substantially by giving oral or written instructions to direct the attention of students to important aspects before an instructional presentation.

As can be seen from the Lumsdaine, Sulzer and Kopstein study, giving a relevant prefilm test can be beneficial to learning. On the other hand, announcing that a test will follow instruction can be motivating as Houland, Lumsdaine and Sheffield (1949) found following significantly increased learning. Merely announcing a test did not work for Michael

and Maccoby (1953, 1961) when they tried using it for a similar purpose. This may be due to the fact that their subjects may have been maximally motivated.

Lumsdaine, Sulzer and Kopstein (1961) while comparing the experimental group that had pretest showings with the control group that did not have pretest showings found that the pretest helped emphasize the critical instructional objective (learning how to read the micrometer) as differentiated from other information (e.g. use and care of the micrometer) presented in the film. A similar effect for a pretest before a film designed to teach reading of meters and gauges was found in a study by Peterman and Bouscaren (1954).

The lack of effect on material not covered by participation questions has been noted in several studies, Michael and Maccoby (1953, 1961), Kanner and Sulzer (1956, 1961) and May and Lumsdaine (1958). In contrast to this, the results of a study by Hovland, Lumsdaine and Sheffield (1949) showed that the instruction afforded by the introductory exercise was shown to have positive effects on the material not expressly covered as well as on that specifically covered.

Vanderman (1971) investigated the extent to which instructional films by themselves can teach a body of factual information. The three comparative groups of ninth-grade students were taught a course in general science. One group saw a series of forty-four films and received no other instruction. The second group saw the films and studied

specially prepared short study guides. The third group was taught by teachers using a standard textbook and customary teaching techniques other than film. Test results showed that intermethod differences were small and generally not significant. The three methods were almost equal in effectiveness where the learning of factual information was the sole criterion.

A study conducted by Freden in 1973 was designed to investigate the effects of planned introductions on the written responses of selected ninth grade students to selected short experimental films. Freden prepared three instructions for each film. The first introduction termed "no introduction" told students only the film's title. The second introduction included the film title, director, awards and film subject. The third introduction included two questions related to the film plus the second introduction. The two questions were designed to direct students' thinking toward possible interpretations of the film. Freden found that introductions did contribute to significant differences in number of miscellaneous responses and in student enjoyment of film. The second introduction was superior to the other introductions in terms of miscellaneous responses and student enjoyment of the film.

A study conducted by John L. Magee in 1974 was concerned with two factors: film quality and types of introductions to the films. Two hypotheses concerning the introductions were made and they are: 1. There would be no significant difference

between the mean attitude scores concerning film material of the groups given a positive introduction to a film and the mean attitude scores concerning film material of the groups given a negative introduction. 2. There would be no significant difference between the mean of the factual learning scores of the groups given a positive introduction to a film and the mean of the factual learning scores of the groups given a negative introduction to a film.

Both hypotheses were rejected at the .01 level. Magee concluded that film introductions significantly affected students' attitude scores regarding the films viewed and the students given positive introductions achieved significantly more than students given negative introductions.

Another study on the use of positive and negative introductions was conducted by Milton Schulman in 1959. He made several conclusions based on the results of his study. Some of the conclusions are as follows:

1. Positive introductory sequences incorporated with a science film result in greater factual learning from the film.
2. Negative introductory sequences contained within a science film result in greater retention of factual information learned from the film two weeks after film viewing.

Bonner (1974) attempted to measure the effectiveness of a comparative advanced organizer. He found no significant difference in verbal ability between all groups that received different types of introductory material.

In 1977, Carole D. Chazin conducted a study on the effectiveness of suggested instructional films in conveying understanding of fourth grade social studies in selected public schools in New York City. Chazin designed the study to test the following hypotheses:

1. Students who have viewed the suggested instructional films will attain higher achievement test scores than will students who have not viewed these films.
2. Students who have viewed the suggested instructional films and have received instruction based on film-study will attain higher achievement test scores than will students who have not viewed these films.
3. Students who have viewed the suggested instructional films and have received instruction based on film-study guides will attain higher achievement test scores than will students who have viewed these films.

After the results of the experiment were in, the second and third hypotheses were accepted, but the first was not. The results show the superiority of the film study guides in attaining higher achievement test scores.

A study similar to the one conducted by Chazin (1977) was reported by Bunson (1978). Bunson investigated the effects of three different methods of film presentation used in classroom instruction on the cognitive achievement of sixth grade students. He used three groups in the study:

1. The control group (c) viewed the film alone.

2. The first experimental group (E1) viewed the film with the "advance samples" (a number of selected scenes copied from the body of the film, Ghatas, 1969).

3. The second experimental group (E2) viewed the film with the "advance samplers" plus "attention focusing directions" (specific instructions which accompany the "advance samplers").

Two conclusions were made following the results of the study.

1. "Advance samplers" with "attention focusing directions" were superior in film presentation in terms of immediate retention.

2. "Advance samplers" with or without "attention focusing directions" were superior to the control group in film presentation in terms of long term retention.

The result of the Magee study (1974), the Chazin study (1977) and the Bunson (1978) are similar in that established instructional techniques whether they are study guides or advance samplers applied by the instructor significantly increase the instructional effectiveness of a film. Further proof of this can be found in a study conducted by Brannon concerning educable mentally retarded children in terms of immediate learning, but not in terms of retention of learned film material.

The Brannon study (1965) consisted of twenty special classes of retarded subjects that were randomly assigned to one of the following techniques of film utilization:

Technique A: Introduction - film showing

Technique B: Introduction - film showing - film reshowing

Technique C: Introduction - film showing - pupil participation

Technique D: Introduction - film showing - discussion

Technique E: Introduction - film showing - discussion - film reshowing

The following conclusions were made after the results were obtained:

1. Film teaching with educable mentally retarded subjects which employs teacher introductions alone, or in combination with either discussions, film reshowings, or pupil participation results in significant learning.

2. Film teaching with educable mentally retarded subjects which employs teacher introductions in combination with either discussion, film reshowings or pupil participation, results in immediate learning which is significantly greater than the use of only teacher introduction with a film showing.

3. The retention of learned film material is high when educable mentally retarded subjects receive a knowledge of their test results, but there is no significant difference in retention between subjects who receive either immediate or delayed film test answers.

Not all studies are in full agreement that established instructional techniques applied by the instructor significantly increase the instructional effectiveness of a film.

A study conducted by Merle L. Eyestone (1966) disagrees with this claim. Eyestone found that subjects used in the

study gained more knowledge from the subject matter if no discussion is held than if discussion is held following a presentation, regardless of media used.

Discussion on Research

Several conclusions were drawn from related research:

1. Students can learn from films. They can learn factual knowledge (Holaday and Stoddard, 1933; Ingli, 1961 and Phair, 1975). There is also evidence that they can learn concepts, motor skills, attitudes and opinions.

2. When films and the conventional method of instruction (text and class teaching) are mutually reinforcing and supplementary, learning is more pronounced. (Johnson, 1949).

3. In most of the studies, the addition of films to the usual teaching had brought about greater achievement. In some studies for example, the use of film in three or four separate grades in one school may aid achievement in two or three of the grades; however, for some unexplainable reason the film may be of no benefit in one or two of the grades. (Bell, Cain and Lamoreaux, 1941).

4. One of the advantages of adding film to the usual method of instruction is that it helps students with the retention of the material (Knowlton and Tilton, 1929; Holaday and Stoddard, 1933 and Houland and Lumsdaine, 1949).

5. Established instructional techniques such as introductions, study guides and discussion applied by the teacher

significantly increases the instructional effectiveness of a film. (Magee, 1974; May and Lumsdaine, 1958 and Chazin, 1977).

Ideas indirectly concerning the problem

According to Chu and Schramm (1967) film has certain disadvantages when compared to other media, for example, television and radio, that might affect their use in instruction. Since most schools do not have a collection of films to meet their needs, they have to depend upon central libraries that deliver films usually by courier or mail. This system may prevent the teacher from getting the films at the exact time that he or she needs them. This system places an additional responsibility on the teacher because he or she has to know what films are available and he has to call for them at the appropriate time.

Chu and Schramm suggests that films do have certain advantages that may aid the geography teacher in planning for more effective instruction by bringing in study guides and stimulating discussion of films.

> The teacher can introduce the film at any time that seems to be optimal for it. The film can be stopped at any time for discussion. Any part of the film can be played over again for closer observation. The entire film can be reviewed if necessary. (p. 89).

Without being able to preview the film or to introduce it at any time and to stop it for discussion when the teacher

sees fit, then the use of study guides and discussion after showing would be greatly undermined.

The advantages and disadvantages reported by Chu and Schramm could certainly affect the educational outcome.

Films not only teach what we want them to teach, but according to Moore (1969) they can present a dehumanized view of man. This becomes a problem to the teacher in his attempt to facilitate learning to its maximum. Since the teacher can screen the films to be viewed by students, this problem is not as great in the school as it is outside. In the world today as Marshall Mcluhan puts it, the media of communication is no longer dominated by the printed word.

> By the time the average North American student graduates from high school, he has watched close to 15,000 hours of television and viewed approximately 500 films. This same student during the course of his schooling will be exposed to about 11,000 hours of instruction which we hope will equip him with the skills and the knowledge to enable him to reap the benefits of, and be of benefit to, our society. (G.J. Moore, p. 6).

According to Gerald Moore, we must protect the student from the barrage of visual impression to which he is subjected. Moore believes that this can be done in two ways: 1. control or censorship. 2. develop the students' critical spirit. Moore goes on to say that he hoped that the second of the two alternatives would prevail, and to do this it is necessary to examine and discuss films made by others but it is essential to get students involved in the production of a film so that they can become aware of the nature of the film.

The examination and discussion of films as suggested by this study would certainly be a step in the right direction in developing critical thinking of students.

Mr. W.G. Mitchell, assistant superintendent, Screen Education for the Ontario Department of Education, suggests one approach to facilitate classroom discussions on films.

Mitchell (1969) calls this approach the thematic approach and unlike simply running a film, then asking a class what they think, he suggests to place the film or films in a large framework and then to delve into some problem or situation to which the entire class can relate. To do this, one or more films dealing with the same general theme can often be tied in with a theme or topic encountered in geography. For example, assume that the theme of human conflict arises in the classroom; it may be conflict encountered in a geography class during a review of conservation. Films shown to students at this time can bring about a broader, more penetrating discussion on the whole question of human conflict. According to Mitchell:

> The idea would be to encourage students to assimilate relevant information from the film (or films), and then to place their own interpretation on that information. (Screen Education in Canadian Schools, p. 20).

Thoughts on the Problem

Films alone can teach but no educator or study has yet suggested that films should be used alone without other

variables, for example, discussion. May and Lumsdaine (1958) suggest that several principles are necessary for maximum utilization of film:

> 1. Ability Level. The best results are obtained with pupils who are capable of understanding the content of the film.
> 2. Curriculum content. The best results are obtained when a film is used in context with the subject taught and the unit of instruction.
> 3. Instruction before showing. The best results are obtained when the pupils have received prior instruction on the content of film and the purpose for seeing it and have been given a mental set to learn from it.
> 4. Participation periods at intervals during showing. Learning is increased if the film is stopped for practice or test questions.
> 5. Instruction after showing. Increased knowledge by clarifying obscure points in the film and by answering questions left unanswered by the film. (p. 310).

Many variables can influence the effectiveness of films in educating students and as J.W.N. Hill (1960) points out:

> There can, of course, be no single, exclusive correct procedure for using a film in a lesson. So many variables have to be considered that different methods of presentation have to be employed not only with each class or age group, but also with each film. (p. 90).

Hill goes on giving suggestions on the use of films and how they can be most effective. He uses a particular film "Golden Fleece" as an example.

Hill suggests that films should be introduced before the showing so as to stimulate interest and that they should supplement rather than interrupt the course being taught. Most educators would have to agree with the point that Hill

is trying to make. The point is that the basis of all good teaching is the pre-lesson preparation of the material.

In his use of the "Golden Fleece", Hill previewed the film four times to become aware of its concepts so as to be able to guide the students in their use of it. He points out that films should be used by the class for learning and not by the teacher for teaching. During the previewings, he discovered questions that needed answers and it helped him decide to use other visual material at certain strategic points in the lesson.

Hill used two devices to ensure proper use of the film by the pupils.

> 1. The first was the provision of background material. In previous lessons they had been given notes on the rainfall regions of Australia, and the Darling Basin had been named as the chief sheep region; the problem of drought and the methods by which stock are watered had been explained.
> 2. The use of the duplicated questionnaire issued and answered after the final screening of the film was more important. This form of questioning was preferred to the oral method for various reasons: the questions posed were such as to make the pupils analyse their impressions of the film and the great deal of information it conveyed, and to assimilate its total message. The questions themselves were simple and unambiguous and for the most part needed only the insertion of a single word to complete the answer. They were split into two sections; one requiring the recollection of facts from the film and the other needing some assessment of the qualities of the film itself. (p. 91-92).

The results of the questionnaire method compared favourable with results from oral questioning made on similar occasions. The questionnaire method involved all pupils for

a specified period of time; whereas, the oral questioning method limited the number of pupils who answered.

Hill organized the format of his lessons based on the film "Golden Fleece" as follows:

1. Introduction (5 minutes)

The students were given an outline of the story and they were made aware of the main points for which to look. In this way they were urged to be selective.

2. First screening (15 minutes)

According to Hill, geography teachers generally agree that one screening is insufficient for a film when it forms the basis of a lesson. He also suggests that the first screening should be continuous so as to contain enthusiasm and to foster unbroken concentration.

3. Interval (10 minutes)

Rewinding of the film took place during this time; however, this time was put to good use. Several items were discussed, but not in detail as time was limited. They included: foot rot, processing of wool (with the use of wall charts), and the various sub-divisions into which the film would be broken in the second showing were explained to the students.

4. Second screening; broken into sections (25 minutes)

At the end of each section, the film was stopped and questions were answered and misunderstandings and confusions were untangled. Further use of visual aids and charts were complementary to the film. Hill points out; however, that

they should be chosen with great care and the timing of their introductions should be carefully planned as often the addition of aids can confuse and do more harm than good without careful planning.

5. Questionnaire and marking (20 minutes)

15 minutes for answering and 5 minutes for marking.

6. Follow-up to lesson.

The follow up in this case was confined to one home-work period in which the children drew a map showing the distribution of sheep in Australia, the rivers Murray and Darling and the four main ports in Australia. Hill suggested other activities such as a written summary (mature students only), and some aspects of film could have been the subject for further research, e.g. the sheep.

Hill made suggestions to what can be done with a film, but again he suggested that there can be no one single procedure for using a film. Richard A. Lacey (1972) agrees with the statement above and he sets out to give some procedures for making better use of films. Three major guidelines govern these procedures:

1. Make no assumptions

No matter how well prepared you are, how long or earnestly you have taught, you cannot anticipate how students will experience a movie.

2. Treat style as content

The pictorial value in a film, the details, the elements of rhythm, color, pace and composition are the content.

3. Ask for and offer feelings about the film. Lacey suggests that this is the best way that he knows to begin facilitating because the discussion becomes personal not academic.

Some procedures suggested by Lacey are as follows:

1. Examine feelings surrounding whatever interests students at the moment.

This procedure as suggested by Lacey is derived from a theory of Gestalt psychology. The theory states that whatever concerns us most will dominate our thoughts and feelings. Basically, it means that we as individuals assign different degrees of importance to various elements which depend upon our past experience, factors in our immediate environment and how we perceive ourselves.

2. The here and now wheel

The student draws a wheel and writes a feeling he has at the moment on each spoke. Then the feelings can be shared and discussed. The here and now wheel can be used for several purposes. It can be used to inform you and your students of the specific variations in class climate, to examine strong unexpressed feelings, and to identify feelings about particular parts of a film. The wheel is often useful in midscreening or with a film that attempts to evoke a succession of feelings.

3. Treat feelings as content

This procedure can be useful with all film but is especially useful with documentaries. Lacey states that:

> If students can study documentaries in terms of feelings, their ideas about all movies will become much more firmly rooted in their emotional as well as their intellectual responses to the experience. The ability to trust our feelings becomes especially important as we try to distinguish between propaganda and art. (p. 68).

4. Before - after exercises

The use of before - after exercises such as role-playing, discussion and writing to reveal the impact of a film upon our feelings or attitudes is often effective because the students are active.

Ken Beattie of the University of Massachusetts developed one such exercise for Emico's, An Occurance at Owl Creek Bridge.

> Before showing the film, he divided the class into several sections, instructing them that they were all part of a chain of command which was to construct, justify, and carry out an order for executing a man strongly suspected of collusion with the enemy. They were to carry the order down the line from group to group until they had accomplished the task. As the class became involved in the exercise, there was sufficient evidence, whether execution might be delayed, and so forth. Finally the execution by hanging was dramatized; the exercise consumed about 30 minutes. (p. 75).

After seeing the film, the group was asked to repeat the exercise.

> The second time the exercise took only a few minutes. There was almost no questioning; everyone simply wanted to get it over with as quickly as possible. In discussing their feelings and behavior afterward, students acknowledged that they resisted going through the whole process again, but more importantly, they were also aware that they wanted to absolve themselves of any individual involvement or

> responsibility for the man's death. They simply followed orders. Ironically, their empathy with the condemned man in the film made them behave more impersonally. (p. 75).

5. An exercise in value clarification: The value continuum.

Since films stimulate feelings and thoughts, they are a good source of material for value clarification. The value continuum contains a full range of alternatives. When an issue is identified, two polar positions should be stated. The issue of pollution is one example of this. One position might be that pollution should be strictly controlled, whereas, the other position would be that pollution should be uncontrolled in order to foster free enterprise. The two positions should be stated as extremely as possible and students may place themselves on the continuum in relation to these positions. They should explain their choices and suggest other alternatives.

The value clarifying approach is very useful for exploring the effect of a film upon students because it encourages the student to explore his thoughts and feelings and to consider acting on them.

6. Exercise in comparing and contrasting films.

Again Lacey suggests that feelings and intuitions of the audience should be treated as well as the elements and implications of the movie when comparing and contrasting films. Lacey goes on to say that it is not useful to compare or contrast what is obvious, but we should point out what is not obvious by revealing differences within

similarities and vice versa. The main objective is to train students how to see.

The teaching technique to be used with film according to F. Goldman and Linda Burnett (1971) basically is to see, discuss and analyze good films. The following is a list of characteristics that they recommend to teachers using films:

1. Keep lectures brief, any lecture used should be absolutely essential for understanding the film and why it is being shown.
2. The teacher should pre-screen, analyze and understand the film before showing it to the class. At this time key questions should be prepared to encourage discussion.
3. After viewing the film, the teacher initiates discussion on whatever is most appropriate to the film, then he or she retreats but encourages student discussion. The teacher then summarizes points made and invites comments on them.
4. The teacher controls the discussion only when it is straying too far away from the subject under study. The teacher brings on one of his questions from the prepared list when the time is right and he makes sure that all essentials have been discussed and their meanings, relationships and implications analyzed.

Charles Grenier (1969) summed up Goldman and Burnett's discussion of teaching technique by writing:

> After sharing a film, you talk with the kids, but more important, you listen to them. Listen to them discuss their feelings, their thoughts, themselves. Don't worry about your questions. Listen for theirs. Lead them back to the film whey they get too far astray; move them, without pushing, toward making connections, toward seeing relationships; but

> don't belabor the old kinds of relationships; setting to theme, mood to plot, character to language. Explore relationships that are relevant to the kids, to their own lives. Let them free-wheel with their imaginations. How very little attention we've paid to the inward eye, the vision, the "stuff that dreams are made on." Encourage discussion which is honest and free. Above all, don't force them to see the film your way. (p. 163).

G.C. Marchant (1974) in expressing views on the efficiency of film in education listed the following questions as being important to researchers.

> To what extent does the effectiveness of a film depend on, firstly, the content and structure of the film itself; and secondly, the way which it is used? (p. 11).

Marchant made several comments in trying to answer the above questions.

1. Marchant stated that research has shown that film is more effective when it is projected in sections of five or six minutes duration and depending on the film when the sound is turned off.

The last part may be true for some films as the teachers' own commentaries may be better suited to the class; however, some educators would question the first part of the statement. Hill (1960), for example, suggests that teachers generally agree that one screening is insufficient for a film. He also suggests that the first showing should be continuous so as to contain enthusiasm. The second showing, however, should be broken into sections.

2. An objective test paper needs to be devised for each section of the film and given at each respective pause.

3. Other research has shown that better results can be obtained if the teacher's commentary is written using a lower age vocabulary than that of the students. The work of May and Lumsdaine support such results.

4. The object test should be marked by the pupil himself after completion because learning is influenced significantly by the immediate knowledge of results that the pupil experiences.

Summary of Chapter

No study has yet proven that students cannot learn from films. Students can learn factual knowledge, concepts, motor skills, attitudes and opinions from film; however, when the film and test or film and class teaching are mutually reinforced and supplementary learning is superior. An example of such superiority lies in the retention of material.

Research has also shown that established instructional techniques such as introductions, study guides and discussion applied by the teacher significantly increases the instructional effectiveness of a film.

Most educators agree that several conditions are necessary for maximum utilization of film. Some of these conditions are as follows:

1. proper introduction before the showing,
2. the film should be shown at least twice to maximize learning,

3. the second showing should be divided into sections and discussion or test questions should be used at the appropriate interval and

4. discussion after the final showing should be used to clarify obscure points in the film.

This discussion should be more oriented to listening to the students than talking to them.

Many devices can be used to ensure proper use of films. Devices such as Lacey's exercise in value clarification or Hill's questionnaire method are all beneficial to the educational process. However, most educators would agree that there is no single exclusive, correct procedure for using a film in a lesson.

CHAPTER III

DESIGN OF THE STUDY

Preview Section

This chapter focuses on a description of the research instruments, selection of classes and subjects, groupings and treatment of data. It utilizes the following format: 1. restatement of problem, 2. hypotheses, 3. procedure - the nature and selection of the sample, 4. treatment of data, 5. experimental design, 6. instruments and 7. summary.

Restatement of Problem

Is there any significant difference between the achievement of students through instruction by: the conventional teaching method plus film, and the conventional teaching method plus film with discussion on the film?

Null hypothesis

There will be no significant difference between the posttest mean scores of treatment group I using the conventional teaching plus film, and treatment group II using the conventional teaching method plus film with discussion on the film.

H_0: $\bar{X}_{1.1} = \bar{X}_{1.2}$

Alternative hypothesis

The posttest mean scores of treatment group II using

the conventional teaching method plus film with discussion on the film will be significantly higher than the posttest mean scores of treatment group I using the conventional teaching method plus film without discussion on the film.

Sub - hypothesis 1

There will be no significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement students in the control group and the gain mean scores of the low achievement students in the control group.

Alternative

The gain mean scores of the high achievement students in the control group will be significantly higher than the gain mean scores of the low achievement students in the control group.

Sub - hypothesis 2

There will be no significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement students in the experimental group and the gain mean scores of the low achievement students in the experimental group.

Alternative

The gain mean scores of the high achievement students in the experimental group will be significantly higher than the gain mean scores of the low achievement students in the experimental group.

Experimental Design

Campbell and Stanley's "Pretest - Posttest Control Group" design was utilized in this study (Campbell and Stanley, 1970). The format of the design used in the study was as follows:

R O_o X_1 O_1

R O_o X_2 O_1

where,

R = the experimental and control group

O_o = pretest

X_1 = treatment in control group

X_2 = treatment in experimental group

O_1 = posttest

Since both the control and experimental groups were intact classes (all the grade seven students at the Holy Cross High School in Daniel's Hr. and all the grade seven students at Greavett Memorial High in Cow Head) a pretest was given to determine if any significant difference existed between the two. The pretest is in Appendix D.

By tossing a coin, the researcher determined that the grade seven class at Greavett Memorial, Cow Head was used as

the control group and the grade seven class at Holy Cross, Daniel's Hr. was used as the experimental group.

Treatment of Groups

Two treatments were used in this study. Treatment one was conventional teaching plus film and treatment two was conventional teaching plus film with discussion on the film.

Unit and Films

The unit taught by the conventional teaching method in both treatments was the unit North-Western Europe, the Scandinavian countries Norway, Sweden and Finland, pp. 148 - 164 in the grade VII geography test Introducing Earth, part one, by L.F. Hobley, 1970.

The three films selected to be used in both treatments were as follows:

1. Timber in Finland, 18 minutes, colour, 1970.

"This film depicts the great network of lakes and rivers that gives Finland a water highway to transport her valuable timber to mills." Department of Education Catalogue, 1976-77, pp. 193.

2. Industrial Region in Sweden, 18 minutes, colour, 1970.

Shows one of the unique areas in Sweden where modern industry is combined with semi-rural living. Three basic resources - timber, water and iron ore - have been utilized to industrialize and thereby to raise the standard of living. Department of Education Catalogue, 1976-77, p. 194.

3. Scandinavia - Rewards of Excellence, 18 minutes, colour, 1967.

Shows the location, agriculture and the high standard of living in Denmark, Sweden and Norway, and explains common cultural characteristics and their fundamental differences. Department of Education Catalogue, 1967-77, p. 193.

The three films were validated by a panel of five experienced teachers on the basis of the criteria as shown in the evaluation form in Appendix A. The results are shown in Appendix B.

Objectives of the Lesson

The objectives were based partly on the unit North-Western Europe and partly on the three films. The objectives can be found in Appendix C, and the teachers day by day plans in Appendix H. The objectives were written in performance form in that they always said what a learner is expected to be able to do. They were based on Robert F. Mager's guide-lines as suggested in Preparing Instructional Objectives, 1975.

Since the affective domain is very difficult to measure; then, the study was concerned with the cognitive domain as suggested by B.S. Bloom in Taxomony of Education Objectives, 1966.

Times Used for Study

Both the control group and experimental group were

exposed to the unit and films for six classes. Every class period was forty minutes long. The first, second and fourth classes consisted of conventional teaching only for both the control and experimental groups. The third, fifth and sixth classes for the control group consisted of conventional teaching plus the films. The third, fifth and sixth classes for the experimental group consisted of conventional teaching plus the films with discussion on the films.

The films were shown as follows so that they would be presented following the relevant content:

day three - Scandinavia - Reward of Excellence
day five - Industrial Region in Sweden
day six - Timber in Finland

Two teachers were involved in the study; one to teach the control group and another to teach the experimental group.

Conventional Teaching plus Film

The films were shown only once. The teacher involved with the control group avoided using introductions to the films, study guides and discussion on the films.

Conventional Teaching plus Films with Discussions on the Films

The teaching technique used with the films in this study was basically discussion. The definition of discussion given in Chapter I applied here. The researcher having prescreened and analyzed the films prepared key questions, Appendix T, to encourage discussion. The questions were given to the

students in the experimental group before they saw the film. They were told by the teacher to watch for the answers while viewing the films.

After showing the film, the teacher introduced the questions, one at a time, from the prepared list. The teacher introduced each question when the time was right, and he made sure that all essentials had been discussed and their meanings, relationships and implications analyzed. The teacher controlled the discussion only when it was straying too far away from the subject under study.

Teachers

The following criteria was used in the selection of teachers for this study:

1. The teachers selected had at least a grade IV teaching certificate.
2. They had at least five years of teaching experience. Five years in which geography had been taught.
3. They had done at least eight geography courses and one social studies methods course at university.

Supervision and Record Keeping

Constant supervision was necessary to ensure that experimental conditions did not give one group an advantage over the other. To do this, the researcher had to make regular visits to check the conditions. In addition, the teachers were asked to keep strictly to the daidy plans as

included in Appendix H and to note absences, interruptions and unusual occurrences.

The tests

Two sets of tests were used by each group for various purposes:

(a) pretest - This test was designed to determine if any significant difference existed between the control group and experimental group prior to the study.

(b) posttest - This is a test for achievement given at the end of the experimental instruction period.

All tests were constructed by the researcher, and they were designed to test for the cognitive domain as suggested by Benjamin S. Bloom (1966). The coefficient of reliability for all the tests was found by the split-half technique.

Since the objectives of the unit and films were written in performance form, and since both the pretest and posttest were designed to measure the same objectives; then, the pretest and posttest were made up of the same questions, but they were in different order. Since both the experimental group and control group were given the same pretest; then, the researcher assumed that any increased sensitization of the subject after the pretest was the same or similar for both groups. This may not have been the case, however, in a study of this kind and it has been included as a limitation.

Validity of Tests

The same five teachers used to validate the films were used to validate the pretest and posttest. The teachers were asked to make comments concerning any aspects of the tests with regard to their validity. In other words, did the tests measure what they were supposed to measure. Changes were made where necessary. These five teachers were selected on the basis of the following criteria:

1. They had at least a grade four teaching certificate.
2. All have taught geography for at least six years.
3. All teachers have completed at least twelve geography courses at Memorial University.
4. All teachers have completed the social studies methods course at Memorial University.

Neither of the two teachers selected for the study were used in the validating of the course.

Measuring the Results

For the pretest the means of the control group and the experimental group were calculated, and the difference between the means of each group was tested for significance. The T test (independent means) was used to determine if the mean scores were significantly different.

For the results of the study, two separate measures are available.

1. Scores on the posttest for achievement, and

2. gain scores (posttest scores minus pretest scores) used to determine if any significant difference existed between high achievers and low achievers within the control group and the experimental group.

The data for number 1 was divided into two groups, conventional plus film and conventional plus film with discussion on the film. Their means were calculated and the difference between the means of each group was tested for significance on the posttest. The T test (independent means) was used to determine if the mean scores of grade seven students in the conventional plus film group was significantly different from the mean scores of grade seven students in the conventional plus film with discussion on the film group. A two-tailed test was used in this case.

The data for number 2, the gain scores, was also divided into groups. The teacher in the control group divided his class into two groups on the basis of past achievement. One group consisted of high achievers and the other group consisted of low achievers. The experimental group was also divided on the basis of past achievement into a group of high achievers and a group of low achievers. Past achievement for both the control groups and the experimental groups was determined by averaging scores from unit tests. Students who scored an average of 65% or more were considered high achievers; whereas, students who scored an average of less than 65% were considered low achievers. The students were

unaware of this division, and the division was only used to see if any significant difference exists between the means of the high achievers and low achievers within the control group and within the experimental group.

Expected Results and Expected Acceptance of Rejection of Hypotheses

No study was found by the researcher to indicate that discussion or other instructional techniques when used with film is inferior to film use only. A majority of studies indicated the opposite; that being, discussion when being used with film is superior to film use only. The teaching method in which discussion and film are used together improves student learning. The opinions of well-known educators support such findings (Magee, 1974; May and Lumsdaine, 1958; and Chazin, 1977). The results of this study should be similar to the findings of the related literature, and it should point out that the conventional teaching method plus film with discussion on the film is superior to the conventional teaching method plus film only. Since very little research has been done on high achievers versus low achievers in terms of film use with or without discussion, it holds much interest.

If the findings are similar to the findings of the related literature and the researcher expects them to be; then, the null hypotheses will be rejected and the alternative hypotheses accepted.

Summary

This chapter includes the following: 1. restatement of problem, 2. hypotheses, 3. procedure - the nature and selection of sample, 4. treatment of the data, 5. experimental design and 6. instruments.

As illustrated in the experimental design, "Pretest - Posttest Control Group" (Campbell and Stanley, 1970) every student received a pretest, a treatment and posttest. A two-tailed T test (independent means) was utilized.

Statements were made hypothesizing the significance of the mean scores of treatment group I, the conventional teaching plus film, and treatment group II, conventional teaching plus film with discussion on the film.

The following titles fall under the procedures of the study: (1) experimental design, (2) treatment of groups, (3) units and films, (4) time used for the study, (5) conventional teaching plus films, (6) conventional teaching plus films with discussion on the films, (7) teachers, (8) supervision and record keeping, (9) the tests, (10) validity of tests, (11) measuring the results and (12) expected results and expected acceptance or rejection of hypotheses.

CHAPTER IV

RESULTS AND DISCUSSION

Results

While testing the null hypothesis (Appendix I) H_O: $X_{1.1} = X_{.1.2}$, the value of T was found to be 2.60 which proved to be significant at the .05 level.

TABLE I

Treatment Group I mean	Treatment Group II mean	Difference	T-Score
41.94	55.07	-13.13	-2.60

Significance

.05 level

df = 77

For a .05 level of confidence t = 2.000 (two-tailed)

For a .01 level of confidence t = 2.660 (two-tailed)

Since the data was significant at the .05 level, the null hypothesis was rejected at the .05 level of significance but not at the .01 level of significance. There is a significant difference between the posttest mean scores of treatment group I using the conventional teaching plus film, and treatment group II using the conventional method plus film with discussion on the film.

Since the null hypothesis, H_O: $X_{1.1} = X_{.1.2}$, was rejected and since the mean of the posttest scores for treatment group II, 55.07, is higher than the mean of the

posttest scores for treatment group I, 41.94; then, the alternative hypothesis was accepted. The posttest mean scores of treatment group II using the conventional teaching method plus film with discussion on the film was significantly higher than the posttest mean scores of treatment group I using the conventional teaching method plus film with no discussion on the film. The results agree with the results of the related literature in that discussion on films facilitate learning.

One problem that teachers have always faced is a high failure rate among low achievement students. Teachers should always seek to find methods of instruction to help low achievement students reach their maximum potential. Sub-hypothesis 1, sub-hypothesis 2 and their alternatives attempted to see how low achievement students compared with high achievement students in both the control and experimental groups.

While testing sub-hypothesis 1, Appendix J, the value of T was found to be .48 which was not significant at either the .05 or the .01 level of significance.

TABLE II

Control Group

High Achievement Students Gain Scores Mean	Low Achievement Students Gain Scores Mean	Difference	T-Score
38.08	35.46	2.62	.48

Significance
Nil.

df = 46

For a .05 level of significance t = 2.00 (two-tailed)

For a .01 level of significance t = 2.66 (two-tailed)

Since the data was not significant at either the .01 level or the .05 level, sub-hypothesis 1 was accepted and its alternative rejected. There was no significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement students in the control group and the gain mean scores of the low achievement students in the control group.

While testing sub-hypothesis 2, Appendix K, the value of T was found to be 2.324 which was significant at the .05 level.

TABLE III

High Achievement Students Gain Scores Mean	Low Achievement Students Gain Scores Mean	Difference	T-Score
57.22	38.9	18.32	2.324

Significance

.05 level

df = 26

For a .05 level of confidence t = 2.056 (two-tailed)

For a .01 level of confidence t = 2.779 (two-tailed)

Since the data was significant at the .05 level, sub-hypothesis 2 was rejected at the .05 level of significance but not at the .01 level of significance.

There is a significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement students in the experimental group and the gain mean scores of the low achievement students in the experimental group.

Since sub-hypothesis 2 was rejected and since the mean of the gain scores for the high achievement students, 57.22, is higher than the mean of the gain scores for the low achievement students, 38.9,; then, the alternative hypothesis was accepted. The gain mean scores of the high achievement students in the experimental group is significantly higher than the gain mean scores of the low achievement students in the experimental group.

Discussion

Since the null hypothesis was rejected, the researcher assumed that the discussion on the film was the main variable for the significant difference between the mean of the control group and the mean of the experimental group. The experimental group consistently scored higher than the control group. The experimental group has six scores of 80% or above, whereas, the highest mark for the control group was 74%. The experimental group had one mark under 20%, whereas, the control group had ten under 20%.

No significant difference was found between the mean score of the low achievers and the mean scores of the high achievers in the control group; therefore, sub-hypothesis 1

was accepted. The mean score of the low achievement students was 35.46. This seems to indicate that the high achievers scored below their potential rather than the low achievers scoring above theirs.

Some high achievement students had only 4%, 6%, 10% and 15% as gain scores (posttest scores - pretest scores) and only eight out of twenty-four had gain scores of 50% or more. This leads the researcher to believe that students were not motivated enough or that they had difficulty with the method of instruction. To motivate students in both the control group and the experimental group, the students were told that the results would count as one unit test. While some high achievement students scored low, two low achievement students had gain scores of 61% and 65%. Perhaps this showed the benefits of instruction by film to these two low achievers.

After testing sub-hypothesis 2, it was found that the high achievement students scored significantly higher than the low achievement students in the experimental group. However, some high achievement students had gain scores of 20%, 21% and 29%, while one low achievement students had a gain score of 79%.

The results of this study support the well known fact that individual students learn in different ways. The low achievement student in the experimental group with a gain score of 79% apparently received the kind of instruction that he needed. Other students achieved very low marks through the conventional teaching method plus film and

discussion on the film. Perhaps they needed other instructional methods. The researcher concluded that teachers must know every individual student, know how they learn most efficiently, and then, must plan lessons to meet their needs.

The finding that the gain score means of the high achievers and the gain score means of the low achievers for the experimental group students were different is most interesting. There is an indication of a relationship between a student's past achievement and "new" learning dependent on the method used to present the "new" knowledge. High achievers seem to gain more from the "new" method than low achievers. High achievers seem to process "new" knowledge more readily than low achievers.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The purpose of this study was to determine if there was any significant difference between the achievement of students through instruction by: the conventional teaching method plus film, and the conventional teaching method plus film with discussion on the film.

It was hypothesized that there was no significant difference between the posttest mean scores of treatment group I using conventional teaching plus film, and treatment group II using conventional teaching plus film with discussion on the film.

Two sub-hypotheses were also tested:

Sub-hypothesis 1

There will be no significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement students in the control group and the gain mean scores of the low achievement students in the control group.

Sub-hypothesis 2

There will be no significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement students in the experimental group and the gain mean scores of the low achievement students in the experimental group.

In analyzing previous research, it was found that students can learn factual knowledge, concepts, motor skills, attitudes and opinions from film; however, when the film and test or film and class teaching are mutually reinforced, supplementary learning is superior. Research has also shown that established instructional techniques such as introductions, study guides and discussion applied by the teacher significantly increases the instructional effectiveness of a film.

The control group and the experimental group consisted of all the grade seven students at Greavett Memorial High School in Cow Head and the Holy Cross High School in Daniel's Harbour.

Campbell and Stanley's "Pretest - Posttest Control Group" design was utilized in this study (Campbell and Stanley, 1970).

For the results of this study, two separate measures were available. 1. Scores on the posttest for achievement, and 2. gain scores (posttest scores minus pretest scores) used to determine if any significant difference existed between high achievers and low achievers within the control group and the experimental group. For the null hypothesis, the means of the control group and the experimental group were calculated, and the difference between the means of each group were tested for significance. For sub-hypothesis one and sub-hypothesis two, the means of the high achievers and low achievers were calculated for both the control group and

the experimental group, and the difference between the means within the control and the experimental group were tested for significance.

The null hypothesis was rejected at the .05 level as it was found that the posttest mean scores of treatment group II using the conventional teaching method plus film with discussion on the film was significantly higher than the posttest mean scores of treatment group I using the conventional teaching method plus film with no discussion on the film.

Sub-hypothesis one was accepted and its alternative rejected. There was no significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement and the gain mean scores of the low achievement students in the control group.

Sub-hypothesis two was rejected at the .05 level of significance and its alternative accepted. There was a significant difference between the gain mean scores (posttest scores - pretest scores) of the high achievement students and the low achievement students in the experimental group. The high achievement students scored significantly higher.

Conclusion

A significant difference existed between the achievement of students using the conventional teaching method plus film and students using the conventional teaching method plus film with discussion on the film. The group of students

using the conventional teaching method plus film with discussion on the film scored significantly higher.

While testing sub-hypothesis one, it was found that there was no significant difference between the achievement of high achievement students and low achievement students in the control group (the group using the conventional teaching method plus film only).

While testing sub-hypothesis two, it was found that there was a significant difference between the achievement of high achievement students and low achievement students in the experimental group (the group using the conventional teaching method plus film with discussion on the film). The high achievement students scored significantly higher.

Recommendations

Teachers

1. Since this study has shown that discussion when applied after viewing films is superior to just film viewing alone in terms of the instructional effectiveness, it is recommended that teachers never show films without using discussion or some other established instructional technique.

Additional Research

1. Further research into how often teachers in Newfoundland schools use established instructional techniques

may have some merit.

2. Since the high failure rate among low achievers is one of the major problems faced by the teacher, additional research into the motivation and learning styles of low achievers is needed.
3. The results of this study support the well known fact that individual students learn in different ways. Research is needed to determine how much individualized instruction is taking place in Newfoundland schools today.

During the discussion of the results, the researcher concluded that teachers must know every individual student, know how they learn most efficiently, and then, plan lessons to meet their needs.

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APPENDIX A

Film Evaluation Form

1. Film title _____

2. Producer and year _____

3. Length in minutes _____

4. Quality	excellent	good	fair	poor
a. relevance to curriculum				
b. accuracy and authenticity				
c. organization of content				
d. suitable number of concepts				
e. suitability of length				
f. technical quiality of picture				
g. technical quality of sound				
h. useful for instruction				
i. current up to date information				
j. wide audience appeal				

5. Subject or content area of film _____

6. Unit of study _____

7. Recommended age level(s): primary ___, Intermediate ___, Junior ___, High ___, College ___, Adult ___

8. Remarks _____

9. Suggested utilization: If appropriate to level and content areas, would you use this film in your class?

   Yes _____ No _____

10. Overall rating: excellent _____ good _____ fair _____

    poor _____

Evaluated by _____

APPENDIX B

Film Evaluation Form

1. Film title Timber in Finland

3. Producer and year 1970

3. Length in minutes 18 minutes

4. Quality	excellent	good	fair	poor
a. relevance to curriculum		3	2	
b. accuracy and authenticity	1	3	1	
c. organization of content		4	1	
d. suitable number of concepts	1	3	1	
e. suitability of length		5		
f. technical quality of picture		5		
g. technical quality of sound	1	4		
h. useful for instruction	1	4		
i. current up to date information		3	2	
j. wide audience appeal	1	3	1	

5. Subject or content area of film Geography

6. Unit of study Scandinavia

7. Recommended age level(s): primary ___, Intermediate ___, Junior 5, High ___, College ___, Adult ___

8. Remarks ___

9. Suggested utilization: If appropriate to level and content areas, would you use this film in your class?

Yes 5 No ___

10. Overall rating: excellent 1 good 3 fair 1

poor ___

Evaluated by ___

Film Evaluation Form

1. Film title Scandinavia - Reward of Excellence
2. Producer and year 1967
3. Length in minutes 18 minutes

4. Quality	excellent	good	fair	poor
a. relevance to curriculum	2	3		
b. accuracy and authenticity	1	3	1	
c. organization of content	1	4		
d. suitable number of concepts		4	1	
e. suitability of length	2	3		
f. technical quality of picture	1	3	1	
g. technical quality of sound	2	3		
h. useful for instruction	2	3		
i. current up to date information		3	2	
j. wide audience appeal		4	1	

5. Subject or content area of film Geography
6. Unit of study Scandinavia
7. Recommended age level(s): primary ___, Intermediate ___, Junior 5, High ___, College ___, Adult ___
8. Remarks ___
9. Suggested utilization: If appropriate to level and content areas, would you use this film in your class?

   Yes 5 No ___

10. Overall rating: excellent 1 good 4 fair ___

    poor ___

Evaluated by ___

Film Evaluation Form

1. Film title Industrial Region in Sweden

2. Producer and year 1970

3. Length in minutes 18 minutes

4. Quality	excellent	good	fair	poor
a. relevance to curriculum	2	3		
b. accuracy and authenticity		5		
c. organization of content	1	4		
d. suitable number of concepts	1	3	1	
e. suitablity of length		5		
f. technical quality of picture		3	2	
g. technical quality of sound		4	1	
h. useful for instruction	3	2		
i. current up to date information		3	2	
j. wide audience appeal	1	4		

5. Subject or content area of film Geography

6. Unit of study Scandinavia

7. Recommended age level(s): primary ___, Intermediate ___, Junior 5, High ___, College ___, Adult ___

8. Remarks ___

9. Suggested utilization: If appropriate to level and content areas would you use this film in your class?

   Yes 5 No ___

10. Overall rating: excellent ___ good 5 fair ___

    poor ___

Evaluated by ___

APPENDIX C

Objectives of Lesson

Performance objectives for both the control group and experimental group are based partly on the unit North-Western Europe and partly on the three films mentioned previously.

A. Students will be able to write the correct answer in the blank.

1. What is the major form of power found in the Scandinavian countries? 1. _____
2. The most important non renewable resource of Sweden is 2. _____
3. The Atlantic coast of Norway is marked by deep cuts, whereby the sea extends inland sometimes as far as 100 miles. They are called 3. _____
4. What Scandinavian country has one of the largest mercantile marines? 4. _____
5. Most logs are transported to the paper mills in Finland by what means of transportation? 5. _____
6. Sweden specializes in producing percision products from her minerals. What product was in demand during World War II? 6. _____
7. What Scandinavian country is noted for its herring catches? 7. _____

8. What is the major problem of large cities in Sweden? 8. _____

9. What is Finland's most valuable renewable resource? 9. _____

10. The most valuable renewable resource of Norway is 10. _____

B. Students will discuss in writing the similarities and differences that exist between the Scandinavian countries and the Atlantic Provinces.

C. Students will be able to explain in writing, why the climate of Norway is warmer than that of Sweden in the winter even though Sweden does not reach quite so far North as Norway and it extends a little further South.

D. Students will be able to explain in writing, why Sweden began to explore and develop its North in much the same way that the people of Canada and the United States developed their West during the 19th century.

E. Students will explain what is meant by "Reward of excellence" in relationship to

(a) how fish are used in Norway,

(b) the use of iron ore and electricity in Sweden, and

(c) the use of the forest in Finland.

APPENDIX D

Pretest

Geography Grade VII Name: _____

North-Western Europe

Please answer all questions. All sections are of equal value. (20%)

Section A

Please write the correct answer in the blank at the right of the page.

1. What is the major form of power found in the Scandinavian countries? 1. _____
2. The most important non renewable resource of Sweden is 2. _____
3. The Atlantic Coast of Norway is marked by deep cuts, whereby the sea extends inland sometimes as far as 100 miles. They are called 3. _____
4. What Scandinavian country has one of the largest mercantile marines? 4. _____
5. Most logs are transported to the paper mills in Finland by what means of transportation? 5. _____
6. Sweden specializes in producing percision products from her minerals. What product was in demand during World War II? 6. _____
7. What Scandinavian country is noted for its herring catches? 7. _____

8. What is the major problem of large cities in Sweden? 8. _____

9. What is Finland's most valuable renewable resource? 9. _____

10. The most valuable renewable resource of Norway is 10. _____

Section B 20%

Discuss the similarities and differences that exist between the Scandinavian countries and the Atlantic Provinces.

Section C 20%

Explain why the climate of Norway is warmer than that of Sweden in the winter even though Sweden does not reach quite so far North and it extends a little further South.

Section D 20%

Explain why Sweden began to explore and develop its North in much the same way that the people of Canada and the United States developed their West during the 19th century.

Section E 20%

Explain what is meant by "Reward of excellence" in relation to (a) how fish are used in Norway,

(b) the use of iron ore and electricity in Sweden, and

(c) the use of the forest in Finland.

APPENDIX E

Questions prepared on the films and given to the students before they viewed them.

Timber in Finland

1. What physical features of Finland seem to stand out?
2. How is the timber transported from the forest to the mills?
3. How do the people of Finland hope to increase the yield of their forest products?
4. Why do the loggers cut the timber in winter?
5. In what ways is the logging industry in Finland similar to that of Newfoundland?
6. In what ways is Finland similar and different to Newfoundland and the other Atlantic Provinces?
7. How do the people of Finland make full use of their natural resources?

Scandinavia - Reward of Excellence

1. What is meant by "Reward of Excellence"?
2. In what ways do the people of Norway make full use of their natural resources, eg. fish?
3. What fish are caught in Norway?
4. What crops are grown and what animals are kept in Norway?
5. How does Sweden make full use of its natural resources, eg. water power and iron ore?
6. Why is the quality of work very important to the people of Scandinavia?

7. In what ways are Norway and Sweden similar and different to the Atlantic Provinces of Canada?

Sweden - Industrial Region

1. What physical features of Sweden are similar to Newfoundland?
2. What are three of Sweden's most important natural resources?
3. Why are industries in Sweden highly mechanized?
4. In what ways is life in Sweden similar to and different from life in Newfoundland and the other Atlantic Provinces?
5. Why are the products of Northern Sweden important to the economy of Sweden even though it is not so heavily populated as the Southern part?

APPENDIX F

The time spent during each class was as follows:

Day 1

Control group and experimental group 40 minutes of conventional teaching.

Day 2

Control group and experimental group 40 minutes of conventional teaching.

Day 3

Control group

22 minutes conventional teaching

18 minutes film

Experimental group

10 minutes conventional teaching

2 minutes reading questions on film

18 minutes film

10 minutes discussion on film

Day 4

Control group and experimental group 40 minutes of conventional teaching.

Day 5

Control group

22 minutes conventional teaching

18 minutes film

Experimental group

10 minutes conventional teaching

2 minutes reading questions on film

18 minutes film

10 minutes discussion on film

Day 6

Control group

22 minutes conventional teaching

18 minutes film

Experimental group

10 minutes conventional teaching

2 minutes reading questions on film

18 minutes film

10 minutes discussion on film

APPENDIX G

Posttest

Geography Grade VII Name: _____

North-Western Europe

Please answer all questions. All sections are of equal value. (20%)

Section A

Explain why Sweden began to explore and develop its North in much the same way that the people of Canada and the United States developed their West during the 19th century.

Section B

Explain what is meant by "reward of excellence" in relation to: a. how fish are used in Norway

b. the use of iron ore and electricity in Sweden, and

c. the use of the forest in Finland.

Section C

Discuss the similarities and differences that exist between the Scandinavian countries and the Atlantic Provinces.

Section D

Explain why the climate of Norway is warmer than that of Sweden in the winter even though Sweden does not reach quite so far North as Norway and it extends a little further South.

Section E

Please write the correct answer in the blank at the right of the page.

1. The Atlantic Coast of Norway is marked by deep cuts, whereby the sea extends inland sometimes as far as 100 miles. They are called 1. _____
2. What is Finland's most valuable renewable resource? 2. _____
3. Sweden specializes in producing percision products from her minerals. What product was in demand during World War II? 3. _____
4. What Scandinavian country has one of the largest mercantile marines? 4. _____
5. The most valuable resource of Norway is 5. _____
6. The most important non renewable resource of Sweden is 6. _____
7. What is the major form of power found in the Scandinavian countries? 7. _____
8. Most logs are transported to the paper mills in Finland by what means of transportation? 8. _____
9. What Scandinavian country is noted for its herring catch? 9. _____
10. What is the major problem of large cities in Sweden? 10. _____

APPENDIX H

Day 1 - Conventional teaching both groups

On day one, the teachers for both groups will give background information on three of the Scandinavian countries - Norway, Sweden and Finland. In the background information, the teacher will stress the following points:

1. The Scandinavian countries are highly civilized.
2. Their people are historically linked to the sea; yet they are heavily industrialized.
3. The heavy industrialization depends upon their natural resources.

Norway - fish, land for agriculture, forest for pulp and paper, rivers for hydro-electricity and fiords for transportation.

Sweden - forest for pulp and paper, lumber, iron ore for steel products such as ships and ballbearings, land for agriculture and rivers for hydro-electricity and transportation.

Finland - forest for pulp and paper and lumber, rivers for transportation and hydro-electricity.

4. Scandinavian countries are covered by coniferous forests.
5. Their major form of power is electricity created by converting the energy of the mountain rivers.
6. Teachers will point out the similarities and differences that exist between the Scandinavian countries and Canada's Atlantic Provinces.

Similarities

a. The fiord of Norway are similar to those of Newfoundland, e.g. Bonne Bay

b. The mountain ranges fold into the seas.

c. The forests (coniferous)

d. Mining iron ore Sweden - Labrador, Nfld.

e. Farming

Differences

a. Scandinavian countries are much more industrialized.

b. They are more efficient in that they utilize every part of their natural resources

c. Points of interest - e.g. Close to 1,000 years ago, the Vikings sailed from the Scandinavian countries to the east coast of Canada (L'anse au Meadows) but their attempts to settle here failed

Day 2 Conventional teaching both groups.

After lecturing on the background of the Scandinavian countries, the teacher will ask questions to analyze and probe to see if objectives are being met. The questions will be on points stressed on day 1. They are as follows:

1. Why are the Scandinavian countries highly industrialized?
2. What natural resources do they depend upon for heavy industry?
3. What is the major form of power?
4. What similarities and differences exist between the Scandinavian countries and Canada's Atlantic Provinces?

The teacher will also lecture on Norway and in the lecture will stress the following points:

1. Norway's climate is mild in the winter compared to other countries with the same latitude because warm winds blow in from the Atlantic.
2. The physical features of Norway consists of mountains folding into the sea to create fiords.
3. The industries of Norway are affected by its natural conditions and resources.

Homework will be assigned for students in that they will have to read the section on Norway, pp. 148-153.

Day 3 Control group - conventional teaching plus film only

Experimental group - conventional teaching plus film with discussion on the film.

After lecturing on Norway and having the students read the section, the teacher will ask questions. The questions will be on points stressed on day two and the reading. The teacher will clarify answers to the questions when necessary and allow for spin off questions to be asked by the pupils.

The questions are as follows:

1. What are the natural conditions of Norway like, e.g. their climate and geography?
2. How are Norway's industries related to their natural conditions and resources?
3. Why are the winter temperatures of Norway mild compared to other countries with the same latitude?

The teacher in the experimental group will not be able to spend as much time on each question as the teacher in the control group because the experimental group will have discussion on the film. The control group will have 22 minutes and the experimental group 10 minutes to discuss the three questions on Norway.

Although every effort will be made to clarify the questions, it will not be possible for the teacher in the experimental group to clarify the questions to the same extent that the teacher in the control group can. This will apply to days five and six as well because films will be shown then.

After the allotted time has been spent on the questions, the control group will view the film only; whereas, the experimental group will be given questions on the film to read in two minutes. The film to be shown is called Scandinavia - Reward of Excellence and the questions on the film are in Appendix E. After reading the questions, the students in the experimental group will be told to watch for the answers while viewing the film. The experimental group will discuss the questions on the film for ten minutes after it has been shown.

Day 4 Conventional teaching both groups.

The section on Sweden (pp. 156-160) will be assigned to read at the beginning of the class; then, the teachers will lecture on the section. In lecturing on the section, the teacher will stress the following points:

1. The climate of Sweden is extreme.
2. The geography, e.g. physical features, consist of forest, moorland, mountains and rivers.
3. The industries of Sweden are related to their natural conditions and resources.
4. Sweden's renewable resources consist of the forest for lumber, land for agriculture and rivers for transportation and water power.
5. Sweden's non renewable resources consist of iron ore, copper, gold, silver and arsenic.

Day 5 Control group - conventional teaching plus film only

Experimental group - conventional teaching plus film with discussion on the film.

The following questions on Sweden will be asked orally by the teacher. Again the teacher will ask as many different students as possible and the teacher will clarify answers when necessary.

Questions on Sweden

1. What are the natural conditions of Sweden like, e.g. their climate and geography?
2. How are Sweden's industries related to their natural conditions and resources?

After the allotted time has been spent on the questions, both groups will view the film, Industrial Region in Sweden. The control group will view the film only; whereas, the experimental group will be given questions (Appendix E) on the film to read in two minutes. After reading the questions, the students will be told to watch for the answers while viewing the film. After the film has been shown, ten minutes will be used to discuss the questions on the film.

Homework will be assigned for students in that they will have to read the secion on Finland, pp. 160-161.

Day 6 Control group - conventional teaching plus film only

Experimental group - conventional teaching plus film with discussion on the film.

The following questions on previously assigned readings on Finland will be asked orally by the teacher.

1. What are the natural conditions of Finland like, e.g. their climate (temperature) and geography (physical features)?
2. How are Finland's industries related to their natural conditions and resources?

After the allotted time has been spent on the questions, both group will view the film, Timber in Finland. The control group will view the film only; whereas, the experimental group will be given questions on the film to read in two minutes (Appendix E). After reading the questions, the students will be told to watch for the answers while viewing the film. After the film has been shown, ten minutes will be used to discuss the questions on the film.

APPENDIX I

Null Hypothesis

Experimental Group

X	$(X_2 - \bar{X}_2)$	$(X_2 - \bar{X}_2)^2$
50	-5.07	25.70
79	23.93	572.64
27	-28.07	787.92
71	15.93	253.76
63	7.93	62.88
63	7.93	62.88
81	25.93	672.36
70	14.93	222.90
32	-23.07	532.22
30	-25.07	628.50
44	-11.07	122.54
91	35.93	1,290.96
52	-3.07	9.42
85	29.93	895.80
20	-35.07	1,229.90
69	13.93	194.04
54	-1.07	1.14
96	40.93	1,675.26
31	-24.07	579.36
56	.93	.86
24	-31.07	965.34
53	-2.07	4.28
45	-10.07	101.40
8	-47.07	2,215.58
80	24.93	621.50
53	-2.07	4.28
57	1.93	3.72
90	34.93	1,220.10
56	.93	.86
22	-33.07	1,093.62
1652		16,051.72

$\bar{X}_2 = 55.07$

Control Group

X	$(X_1 - \bar{X}_1)$	$(X_1 - \bar{X}_1)^2$
40	+1.94	3.76
54	12.06	145.44
50	8.06	64.96
70	28.06	787.36
19	-22.94	526.24
50	8.06	64.96
34	-7.94	63.04
4	-37.94	1,439.44
42	.06	.0036
34	-7.94	63.04
68	26.06	697.12
6	-35.94	1,291.68
6	-35.94	1,291.68
60	18.06	326.16
74	32.06	1,027.84
14	-27.94	780.64
74	32.06	1,027.84
68	26.06	697.12
42	.06	.0036
66	24.06	578.88
22	-19.94	397.60
28	-13.94	194.32
36	-5.94	35.28
66	24.06	578.88
17	-24.94	622.00
14	-27.94	780.64
34	-7.94	63.04
12	-29.94	896.40
50	8.06	64.96
43	1.06	1.12
71	29.06	844.48
61	19.06	363.28
63	21.06	443.52
70	28.06	787.36

Control Group (Continued)

19	-22.94	526.24
28	-13.94	194.32
61	19.06	363.28
66	24.04	578.88
56	14.06	197.68
42	.06	.0036
30	-11.94	142.56
38	-3.94	15.52
48	6.06	36.72
25	-16.94	286.96
34	-7.94	63.04
18	-23.94	573.12
26	-15.94	254.08
56	14.06	197.68
46	4.06	16.48
2055		20,396.649

$\bar{X}_1 = 41.94$

H_0: $U_1 = U_2$ H_0 at .05 level

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{\bar{X}_1 - \bar{X}_2}} = \frac{41.94 - 55.07}{\sqrt{\frac{(N_1 - 1)\,S_1^2 + (N_2 - 1)S_2^2}{N_1 + N_2 - 2}\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

$$= \frac{-13.13}{\sqrt{\frac{(48)\,\frac{20,396.65}{(48)} + (29)\,\frac{16,051.72}{(29)}}{77}\left(\frac{1}{49} + \frac{1}{30}\right)}}$$

$$= \frac{-13.13}{\sqrt{\frac{36,448.37}{77}\left(\frac{1}{49} + \frac{1}{30}\right)}} \doteq \frac{-13.13}{\sqrt{\frac{473.36}{1}\left(\frac{1}{49} + \frac{1}{30}\right)}}$$

$$= \frac{-13.13}{\sqrt{\frac{473.36}{1}\left(\frac{30}{1470} + \frac{49}{1470}\right)}} = \frac{-13.13}{\sqrt{\frac{473.36}{1}\left(\frac{79}{1470}\right)}}$$

$$= \frac{-13.13}{\sqrt{473.36 \times .0537}} = \frac{-13.13}{\sqrt{25.419}}$$

$$= \frac{-13.13}{5.0417} = -2.60$$

df. $N_1 + N_2 = 49 + 30 - 2 = 77$

$95t77 = 2.00$

Reject H_0: $U_1 = U_2$

Accept H_1: $U_1 \neq U$ at .05 level

APPENDIX J

Control Group — Gain Scores

High Achievement Students

X	$(X_1 - \bar{X}_1)$	$(X_1 - \bar{X}_1)^2$
36	-2.08	4.33
46	7.92	62.73
47	8.92	79.57
68	29.92	895.21
15	-23.08	532.69
50	11.92	142.09
28	-10.08	101.61
4	-34.08	1,161.45
40	1.92	3.69
32	-6.08	36.97
53	14.92	222.61
4	-34.08	1,161.45
6	-32.08	1,029.13
56	17.92	321.13
68	29.92	895.21
10	-28.08	788.49
60	21.92	480.49
58	19.92	396.81
36	-2.08	4.33
47	8.92	79.57
22	-16.08	258.57
28	-10.08	101.61
36	-2.08	4.33
64	25.92	671.85
24 | 914		9,435.92
$\bar{X}$ = 38.08		

Control Group — Gain Scores

Low Achievement Students

X	$(X_2 - \bar{X}_2)$	$(X_2 - \bar{X}_2)^2$
12	-23.46	550.37
30	-5.46	29.81
10	-25.46	648.21
44	8.54	72.93
43	7.54	56.85
65	29.54	872.61
61	25.54	652.29
57	21.54	463.97
51	15.54	241.49
7	-28.46	809.97
22	-13.46	181.17
39	3.54	12.53
58	22.54	508.05
46	10.54	111.09
38	2.54	6.45
26	-9.46	89.49
36	.54	.29
42	6.54	42.77
21	-14.46	209.09
26	-9.46	89.49
10	-25.46	648.21
18	-17.46	304.85
45	9.54	91.01
44	8.54	72.93
851		6,765.92

$\bar{X} = 35.46$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{\bar{X}_1 - \bar{X}_2}}$$

$$= \frac{38.08 - 35.46}{\sqrt{\frac{(N_1 - 1)\ S_1^2 + (N_2 - 1)\ S_2^2}{N_1 + N_2 - 2}\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

$$= \frac{2.62}{\sqrt{\frac{(23)\frac{9,435.92}{23} + (23)\frac{6,765.92}{23}}{46}\left(\frac{1}{24} + \frac{1}{24}\right)}}$$

$$= \frac{2.62}{\sqrt{\frac{16,201.84}{46}\left(\frac{1}{24} + \frac{1}{24}\right)}}$$

$$= \frac{2.62}{\sqrt{352.21\left(\frac{2}{24}\right)}}$$

$$= \frac{2.62}{\sqrt{352.21\ (.083333)}}$$

$$= \frac{2.62}{\sqrt{29.350832}}$$

$$= \frac{2.62}{5.4176408}$$

$$= .48$$

df. $N_1 + N_2 - 2 = 46$

95t77 = 2.021

Accept H_o: $U_1 = U_2$ No significant difference

APPENDIX K

Experimental Group — Gain Scores

High Achievement Students

X	$(X_1 - \bar{X}_1)$	$(X_1 - \bar{X}_1)^2$
68	10.78	116.21
21	-36.22	1,311.89
69	11.78	138.77
56	-1.22	1.49
56	-1.22	1.49
74	16.78	281.57
66	8.78	77.09
75	17.78	316.13
65	7.78	60.53
54	-3.22	10.37
88	30.78	947.41
29	-28.22	796.37
46	-11.22	125.89
20	-37.22	1,385.33
51	-6.22	38.69
43	-14.22	202.21
80	22.78	518.93
69	11.78	138.77
18) 1030		6,469.14

$\bar{X}_1 = 57.22$

Experimental Group — Gain Scores

Low Achievement Students

X	$(X_2 - \bar{X}_2)$	$(X_2 - \bar{X}_2)^2$
39	.1	.01
25	-13.9	193.21
26	-12.9	166.41
42	3.1	9.61
44	5.1	26.01
79	40.1	1,608.01
20	-18.9	357.21
6	-32.9	1,082.41
51	12.1	146.41
57	18.1	327.61
389		3,916.90

$\bar{X}_2 = 38.9$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{\bar{X}_1 - \bar{X}_2}} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(N_1 - 1)S_1^2 + (N_2 - 1)S_2^2}{N_1 + N_2 - 2}\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

$$= \frac{57.22 - 38.9}{\sqrt{\frac{(17)S_1^2 + (9)S_2^2}{26}\left(\frac{1}{18} + \frac{1}{10}\right)}}$$

$$= \frac{18.32}{\sqrt{\frac{17\left(\frac{6,46914}{17}\right) + 9\left(\frac{3,916.9}{9}\right)}{26}\left(\frac{5}{90} + \frac{9}{90}\right)}}$$

$$= \frac{18.32}{\sqrt{\frac{10386.04}{26}\left(\frac{14}{90}\right)}}$$

$$= \frac{18.32}{\sqrt{399.46307\ (.155555)}}$$

$$= \frac{18.32}{\sqrt{62.138477}} = \frac{18.32}{7.8827962} = 2.324$$

df. $= N_1 + N_2 - 2 = 26$

95t77 =/ 2.052

Significant difference