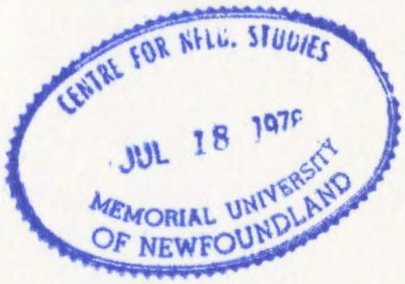
THE EFFECTS OF A SOCIAL STUDIES PROGRAMMED INSTRUCTION TEXTBOOK PLUS TEACHER INTERACTION ON THE ACHIEVEMENT AND RETENTION OF LOW READING ABILITY STUDENTS

HELEN E. FUREY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THE EFFECTS OF A SOCIAL STUDIES PROGRAMMED INSTRUCTION TEXTBOOK PLUS TEACHER INTERACTION ON THE ACHIEVEMENT AND RETENTION OF LOW READING ABILITY STUDENTS

by

Helen E. Furey

A Thesis submitted in partial fulfillment
of the requirements for the degree of
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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read and recommend to the Faculty of Graduate Studies for acceptance, a thesis, "The Effects of a Social Studies Programmed Instruction Textbook Plus Teacher Interaction on the Achievement and Retention of Low Reading Ability Students," submitted by Helen E. Furey in partial fulfillment of the requirements for the degree of Master of Education.

Supervisor, F. G. Jones
Department of Curriculum and Instruction

M. Brewster
Department of Curriculum and Instruction

(date)

L. Chiaramonte
Department of Sociology

ABSTRACT

The purpose of this study was to determine whether a social studies programmed instructional textbook plus teacher interaction produced positive, significant achievement and retention for low reading ability students at the grade six level.

The research experiment involved nine grade six classes within the Avalon Consolidated School Board and the Roman Catholic School Board of St. John's, Newfoundland. All students were administered a reading test, grades were computed and only low reading ability students were assigned to groups.

Three treatments, conventional teaching, programmed instruction, and programmed instruction plus teacher interaction, were utilized. Through the use of a Table of Random Selection (Glass and Stanley, 1970) the low reading ability groups were assigned to treatments. A 'Posttest Only Control Group' design was used to state the hypotheses. An analysis of covariance was conducted on the posttest and delayed posttest scores to test significant differences. The appropriate post-hoc test, Newman-Kuels (Winer, 1971), was used to test the significance of the difference between group means.

The results of the study indicated that the treatment group utilizing conventional teaching had significantly higher achievement and retention scores than the treatment group exposed to programmed instruction or the treatment group utilizing programmed instruction plus teacher interaction. The programmed instruction plus teacher interaction treat-

ment group had significantly higher achievement scores on the posttest than the treatment group receiving programmed instruction. However, no significant differences existed between the retention scores of these two treatment groups.

ACKNOWLEDGMENTS

I would like to express a deep gratitude to Dr. F. G. Jones for his continuous help and guidance throughout this study. His assistance in all phases of my research was invaluable and will not soon be forgotten.

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I am also indebted to the members of my family for their encouragement and moral support.

To My Mom and Dad

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*The researcher is not responsible for errors in materials published by the Anthropology Curriculum Project, Athens, Georgia, U.S.A.

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CHAPTER I

INTRODUCTION

"Curricula are designed so that students may learn" (Taba, 1962, p. 11). Curriculum models thusly indicate a directed plan for student learning. This structure is frequently omitted in learning materials, sometimes resulting in student inability to conceptualize. Such a problem is prevalent with low reading ability students who find it difficult to learn and retain knowledge when curricula appear to lack structure. Because reading disorders retard a high percentage of the population (Cooper, 1969) learning should be facilitated through a sequential arrangement of material.

A sequential arrangement of material is inherent in programmed instruction. Detailed analysis and carefully arranged sequences are the very essence of programming; thus, knowledge can be transmitted through the utilization of small steps, careful sequencing, immediate confirmation, and low error rate. The correct response is critical in providing positive motivation (Ornstein, 1971, pp. 3-6). Sentences are structured so that the correct response is obvious and reinforcement follows. This immediate feedback, an important feature of Skinner's linear programming, is based on Thorndike's "law of effect" (Leith, 1964). It is implied that when a response recurs, the more positive and satisfying are its after-effects. Such theories of learning as these would suggest that activity in learning is apt to be more effective than merely being told

(Leith, 1964).

Understanding and retention--two other traits of learning--are also distinctive in the structure of the programmed text. Biggs (1971) states that no other text enhances understanding and the retaining of content as does a programmed text. For most students understanding is facilitated through the self-pacing concept of programming. While encouraged to work at their optimum rate, wide variations in the speed in which a program is completed is characteristic of any class of students. Students using a programmed text are therefore able to proceed without distraction. Because of the hierarchical structure of the content students can easily proceed from one concept to another.

Programmed instruction was initially a self-instructional technique (Skinner, 1954), yet research by the Royal Navy has proven that human interaction with the learner is essential (Callandar, 1969). In the classroom low reading ability students required teacher interaction as these students tended to be more easily distracted from learning than did students of a higher ability.

Freed from the traditional task of decoding information the teacher can enrich pupil experience, act as a consultant, and provide additional information for those requiring it (Leith, 1964). Thus, the teacher can assume an even more important role in programmed instruction as he is freed from routine work and is left to concentrate on concept teaching and tutorial instruction (Callandar, 1969, p. 13). Further, because programmed instruction stresses convergent rather than divergent thinking it should not be used as a solitary teaching model, but as a means of accumulating factual data which are essential in the learning process.

It has been suggested that the low reading ability student can be stimulated in the utilization of the programmed text so that the rate and depth of learning are maximized, understanding is facilitated, retention is fostered, and motivation of the child is enhanced (Taker, 1965).

In most disciplines, especially the social studies, achievement and retention of the factual data are essential. As illustrated in a review of the literature, however, research utilizing programmed instructional materials with low reading ability students has been almost exclusively limited to the area of reading (see Table II).

With this in mind it is the researcher's intention to determine the effects of a social studies programmed text plus teacher interaction on the achievement and retention of grade six low reading ability students.

Purpose of the Study

The purpose of this study is to determine the effects of a social studies programmed text plus teacher interaction on the achievement and retention of grade six low reading ability students.

Specifically the researcher will try to answer the following questions:

(1) Will a social studies programmed text plus teacher interaction improve the achievement of grade six low reading ability students?

(2) Will a social studies programmed text plus teacher interaction facilitate retention for grade six low reading ability students?

Definition of Terms

Various terms used throughout the study are defined as follows:

Archeology Programmed Text is a self-instructional text which presents archeological data in small sequential steps. It provides immediate reinforcement through the restructuring of these simple steps into more complex ones.

Conventional teaching refers to the use of the lecture and discussion format of teaching. Content is based on the data presented in the programmed textbook.

Covert responding is the mental composition of a response made to each blank in a frame before turning a page to find the correct answer.

Linear programming consists of a simple question-answer format wherein data are structured so that the correct answer is obvious. This leads to immediate reinforcement and reshaping of simple frames into more complex ones.

Low reading ability students are those students in the study who obtained scores one-half a standard deviation below the mean score based upon the word meaning section of the Canadian Tests of Basic Skills.

Programmed instruction is a self-instructional technology wherein the student progresses at his own rate. The content is presented in small sequential steps and responses are elicited that are positively or negatively reinforced.

Teacher interaction refers to reciprocative communication between the teacher and the student. The teacher acts as both a consulting agent and motivational force in explaining concepts, answering student questions, and aiding the students whenever necessary.

CHAPTER II

REVIEW OF THE LITERATURE

The review of the literature describes research that is pertinent to this study. This chapter utilizes the following format: (i) antecedents of programmed instruction, (ii) research studies that compare programmed instruction to a non-programmed technique, (iii) research studies that utilize programmed instructional materials with low reading ability students, (iv) research studies that utilize programmed instructional social studies materials, and (v) summary.

Antecedents of Programmed Instruction

Unlike many technological innovations, programmed instruction was designed explicitly for education (Rossi and Biddle, 1966). With its roots in psychology and educational psychology, programming dates back to the early works of Pressey (1926). Pressey saw the automation of instruction in the teaching machine stressing it as an adjunct to the teacher. He began by experimenting with a machine that automatically gave and scored a test. He observed that in giving and scoring the test in this standardized manner his subjects were learning efficiently (Austwick, 1964).

Pressey foresaw in the process of reinforcement the potential for a technological revolution in education; yet, the impact of the notion failed to materialize in any substantial way. The lack of a

systematic approach to the preparation or programming of the materials because of the original orientation towards testing seems to be one of the primary causes of the lack of interest in programming at this time (Lysaught, 1967). Poor economic conditions during the 1930's and the Second World War also hindered its development.

Skinner (1954) revived interest in Pressey's work when he outlined the application of reinforcement theory to educational practice. Utilizing laboratory animals as his subjects and experimenting on their learning behaviour, Skinner devised a technology for presenting information to human learners. This was the concept of linear programming. According to the theory, a programme must be split into very short frames; each frame must meet with an active response and knowledge of results must be immediately forthcoming. In addition, the required responses must be sufficiently easy for the student to get ninety to ninety-five percent of them correct.

In contrast to the impoverished era of the 1920's, the educational and economic position of the United States had dramatically changed by the 1950's. There was an unfilled demand for workers in industry and for teachers in education. Skinner's ideas, among many, were closely examined because of the demand. Throughout the 1960's a continuous growth of literature and research added to Skinner's programmed learning format (Lysaught, 1967).

Skinner's work, however, did meet with some opposition from those who claimed that theories derived from research on animals were not applicable to human learning. In response to this criticism, Crowder devised the branching method of programming wherein information was given to students in much larger steps followed by multiple choice answers

(Callandar, 1969). If the correct answer was chosen the student proceeded along the main steps of the programme (as in Skinner's linear programme); if not, the student was informed why his answer was incorrect and was either returned to the original item of instruction or he had to branch off for additional information. Followers of Crowder claimed that this was a more humanistic approach to learning as remedial work was provided for the individual.

Until a few years ago a great deal of controversy existed between the protaganists of linear programming and the advocates of branching programming (Callandar, 1969). Linear programming was claimed to have exclusive emphasis in educational fields whereas branching programmes were emphasized only in industry. Today, programming includes both linear and branching formats. One significant addition has been made to Skinner's original theory of linear programming. He devised programmes to exist without teacher interaction. Research carried out by the Royal Navy supported the claim that programmed learning was most efficient when integrated with human instruction (Callandar, 1969, p. 13).

Thus, programming changed from the linear programmed method of Skinner's day to the instructional system that is utilized today. It now includes books, teaching machines, films, audio-visual devices, and simulations.

Research Studies that Compare Programmed Instruction to Non-Programmed Techniques

Mandle (1967), Pikas (1967), Bednarik (1968), Roebuck (1970), Jamieson (1971), and Rimmer (1971) have conducted research studies wherein programmed instructional materials have been compared to non-

programmed techniques and materials (see Table I). In these studies various variables have been utilized.

Mandle (1967) initiated a program for teaching music reading skills using the piano keyboard in conjunction with programmed learning and compared it with a conventional method of music instruction. The study included fourth, fifth, and sixth graders. A posttest before the second semester and a terminal test after the second semester were given. The Mann Whitney U Test was used to analyze obtained data. Test results in areas one and two, "staff knowledge" and "knowledge of tonal organization," were significantly higher for experimental students than for control students. Results in the other three areas revealed that typical methods were not successful and that the author's method had potential although it needed to be further developed.

Pikas (1967) compared traditional and programmed learning as a function of the comparison test. The dependency of the results on the correspondence between the learned material and the test content was measured by two different methods. In the first study an achievement test was compiled independent of the learning material. After the analysis of the correspondence in content between the test and the programme, the content similarity between the test and the learning task appeared to be the decisive variable in performance differences between traditional teaching and programmed learning. In the second study the degree of similarity between the test and the program was prepared in advance. The results showed a linear connection between this degree of similarity and the difference between programmed learning and traditional teaching. They did not, however, indicate the difference between the similarity and the group performances taken separately. Because of the

TABLE I

Research Studies Comparing Programmed Instruction to Non-Programmed Techniques

Author (Year)	Grade Level	Content Area	Treatment Comparison	Statistic Used	Outcome
Mandle (1967)	4, 5, & 6	Music	Conventional teaching versus a partial combination of keyboard activities plus programmed instruction learning materials	Mann-Whitney U Test	At .05 level of significance the experimental group obtained higher results on posttest scores than the control group.
Pikas (1967)	College Undergraduates	Psychology	Programmed learning versus conventional teaching	Analysis of Variance	A comparison between mean group scores indicated that the differences were significant (p= .01). However the experimental group had significantly higher gains on the posttest scores.
Bednarik (1968)	Elementary School	Physics	Conventional teaching versus a programmed textbook	t-test	A comparison of pretest and posttest mean scores indicated significant gains in each group.
Roebuck (1970)	4	Physics	Programmed textbook supplemented by standard school practical experiment and conventional teaching following the normal syllabus	Analysis of Covariance	A comparison of pretest and posttest scores indicated significant differences for both groups.

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TABLE I (continued)

Author (Year)	Grade Level	Content Area	Treatment Comparison	Statistic Used	Outcome
Rimmer (1971)	Junior High	Spelling	Programmed learning versus incidental learning	Analysis of Variance	The results indicated that the null hypothesis--that there was no significant difference between pretest and posttest mean scores—could be rejected at .01 level of significance.
Jamieson (1971)	80 female subjects, age range: 24-71	Mathematics	Programmed learning versus discovery learning	Analysis of Variance	Analysis of posttest scores indicated that there were no significant inter-group differences. However, the group scored on both criteria indicated significant differences.

experimental design, the programmed learning group showed better performance than did the traditional group. In a retention test sixteen days later the rank order of the groups was reversed, the traditional group showing significantly better performance than programmed learning.

Bednarik (1968) compared a programmed text to conventional teaching in an elementary physics course. Three groups of students were involved in the study. One group was taught gravitational field concepts by means of a specially prepared programmed text and the two other groups were taught by teachers using the prescribed physics textbook. A posttest was given to all students. A t-test comparing pretest and posttest mean scores indicated that there was significant improvement in each group.

Roebuck (1970) compared programmed and conventional instruction bewteen the achievement scores of two groups. Differences were found between the pretest and posttest means which suggested that the programmed instruction group had overtaken the conventional group. The programmed group began below the non-programmed group, but ended up with a higher score.

The author suggests possible reasons for the differences observed. An analysis of covariance was run and the analysis revealed a significant difference between the regression coefficients ($p = .001$) thus indicating that the pretest-posttest relation for the two sets was not of the same form.

Technically this experiment seems to indicate a gain for programmed instruction over conventional teaching; however, the results have no real bearing on this conclusion because the pretest-posttest forms varied.

Jamieson (1971) compared programmed and discovery learning at

two age levels to test for retention. Eighty female subjects, ranging in age from twenty-four to seventy-one, were given specially prepared courses of instruction in mathematics. Four groups, two experimental and two control, were utilized. Each group went through the prescribed treatment and received a posttest and delayed posttest as the treatments terminated. Results showed that groups that had learned by the discovery method did not experience a significant drop in retention scores on the principal test. It appeared that age was a more important variable than mode of learning in its effect on retention. But where differences in retention did occur between the two methods of learning, these favoured the discovery method.

Rimmer (1971) undertook a two-year study to consider if programmed instruction was a valid instrument for use in a junior high school over an extended period of time. Spelling was chosen to test the hypothesis that incidental learning was more satisfactory than a systematic method of learning spelling. An analysis of variance on the posttest scores indicated that the null hypothesis could be rejected at the .01 level of significance. Results showed that spelling was more effectively learned when structured; however, this was only applicable to the researcher's own class.

Comparative-type studies by Mandle (1967), Bednarik (1968), and Rimmer (1971) indicate that achievement is a function of programmed instruction. Retention, a crucial component of achievement, as indicated by Jamieson (1971) needs further examination.

Research Studies Utilizing Programmed Instructional Materials with Low Ability Students

Bobier (1964), Malpass (1966), Haring (1969), Rosenshine (1971), and Harrison (1971) have conducted studies researching the effect of programmed instruction on low reading ability students (see Table II). In these studies methods and materials differed. There appeared to be a consensus of opinion, however, that an educational programme for low reading ability students ought not to presume to know the limits of pupil potential, but ought to take the pupil where he is and set in motion a planned, highly supportive, day to day program designed to overcome existing deficiencies and move him to higher achievement levels (Abramowitz, 1968).

Bobier (1964) compared the gains in reading achievement of a group of second graders utilizing a programmed linguistic method, a matched group using a developmental method, and a third group using a basal phonetic method. For a period of sixty days each group was exposed to one of three treatments for one hour a day. At the end of the time significant gains were found favouring the programmed text and the developmental method over the basal phonetic method.

Malpass (1966) refers to a study by Kirk (1962) suggesting that over 30 percent of school age children from low socio-economic circumstances may be classified as slow learners. By the time these children reach junior high approximately 60 percent are retarded in their reading by one to four years.

Malpass researched the effects of differential programmed instruction on the acquisition and retention of word recognition, phrase recognition, sentence reading, and concomitant reading skills of slow

TABLE II

Research Studies Utilizing Programmed Instructional Materials with Low Reading Ability Students

Author (Year)	Grade Level	Content Area	Treatment Comparison	Statistic Used	Outcome
Bobier (1964)	2	Reading	Programmed instruction, a developmental method, and a phonetic method	Not available	Results indicate a significant gain for the programmed instruction group and the developmental method group over the group utilizing the phonetic method.
Malpass (1966)	1-2	Reading	Conventional teaching versus supplemented programmed instruction	Analysis of Variance	Gains made by the supplemented programmed instruction group were significantly greater than those made by the control group.
Haring (1969)	3, 4, and 5	Reading	Programmed instruction	Not available	Students progressed in reading levels from one and one-half to four years over five months of instruction.
Rosenshine (1969)	4	Reading	S.R.A. Reading Lab, programmed and	Analysis of Covariance	Significant gains on posttest scores were.

....continued

TABLE II (continued)

Author (Year)	Grade Level	Content Area	Treatment Comparison	Statistic Used	Outcome
			regular workbooks, and staff-prepared word analysis units		indicated but this was not substantially different for either group.
Harrison (1971)	1	Reading	Programmed instructional tutoring techniques	Analysis of Covariance	Only five of the original thirty-three students were found to have a low reading ability at the end of treatment.

learning children.

The researcher compared the efficiency of automated instruction utilizing programmed sequences prepared for the MAST Teaching machine and the same set of programmed instruction frames presented by a conventional linear programmed workbook method with standard classroom instruction. An analysis of variance was conducted on the posttest scores of each group. Results indicated that significant gains were made by the supplemented programmed instruction groups and that these were significantly greater than those made by the control group.

Haring (1969) carried out a study researching the effects of utilizing programmed instruction to improve the reading skills of disabled readers. Four boys from the third to fifth grades, severely disabled in reading, served as the experimental group. When learning conditions were individually appropriate each student averaged one hundred to two hundred more correct responses each day and spent very little time avoiding reading. The students progressed in reading levels from one and one-half to four years over five months of instruction.

Rosenshine (1971) aimed at developing an effective remedial instruction programme in an inner-city school and charted the progress of the subjects over a whole year. A similar successful study had been conducted previously over a nine-week period; thus it was desirable to ascertain whether the significant rate of growth that could be attained in a short period could be sustained for a school year.

The experimental group had daily work in small group instruction. Significant improvement on an achievement test was shown after the third ten-week period and was not substantially different from gains made by the control group. The author examined the problem of student persis-

tence and suggested how similar projects could be improved.

The concept of individualization was also researched by Harrison (1971). The author stated that reading, more than any other subject, required individualization with low reading ability students.

Harrison's programme focused on structured tutoring and mastery learning. Each tutor was trained in structured tutoring techniques in teaching the prescriptives which constituted the criteria objectives for each child. Thirty-three students were exposed to the treatment receiving individual tutoring throughout the period. Rankings at the end of the treatment disclosed that only five of the students could be considered to have a low reading ability.

Individualization in the educational setting is the key to reading improvement (Harrison, 1971; Rosenshine, 1971). Programmed instruction provides this individual attention (Harris, 1964; Malpass, 1966; Haring, 1969) as "it takes the pupil where he is and sets in motion a highly supportive, day to day program designed to overcome existing deficiencies and to move him to a higher achievement level" (Abramowitz, 1968).

Research Studies Utilizing Programmed Instructional Social Studies Materials

Schearer (1963), Campbell (1963), Ryan (1966), French (1968), Okunrotifa (1968), and Tali (1969) conducted experiments in which the feasibility of utilizing programmed instruction in the social studies area was determined (see Table III).

Shearer (1963) was primarily concerned with the differentiation between teachers using programmed materials over a specific time interval. Assuming that there were no differences in the effectiveness with which

TABLE III

Research Studies Utilizing Programmed Instructional Social Studies Materials

Author (Year)	Grade Level	Content Area	Treatment Comparison	Statistic Used	Outcome
Shearer (1963)	Secondary	History	Programmed instruction versus conventional teaching on long term retention	Analysis of Covariance	Difference between immediate and delayed test means were significant ($p = .05$) for all groups. Analysis of variance on retention decrements revealed no significance among the groups ($p = .05$).
Campbell (1963)	5-6	Geography	Self-directed classes, linear programming and regular classes	Analysis of Covariance	An overall significant difference ($p = .001$) was found among classes. The regular classes learned more ($p = .001$) but took more time.
Ryan (1966)	4	Geography	Programmed unit of geography utilized in four different ways	Analysis of Covariance	Significant gains were indicated for the supplemented programmed group over the programmed group.

....continued

TABLE III (continued)

Author (Year)	Grade Level	Content Area	Treatment Comparison	Statistics Used	Outcome
French (1968)	7	Geography	Chinese linear programme and its Japanese counterpart	t-test	A "t" value of the significance of the difference of the means was computed for each group. The means obtained were significant at .05 level.
Okunrotifa (1968)	Secondary	Anthropology	A programmed textbook	Analysis of Govariance	The achievement scores were significantly higher at .05 level of confidence for the programmed group. Attitude change was also indicated to be significantly higher for the experimental group.
Tali (1969)	7	History	Linear constructed programmed textbook	Not available	Posttest scores indicated a significant gain in mean scores for all students.

they conducted initial instruction employing a composite of conventional and programmed methods, did methods in retention appear later between groups?

In the study the original learning material pertained to the national administration of that decade. A delayed posttest consisting of eighty items was given nineteen weeks after the initial administration. A total of 150 secondary students participated in the original study and of these 124 took the delayed posttest.

An analysis of covariance was used to evaluate differences between programmed and non-programmed groups. History grade point average served as the predicting variable.

Results indicated that (1) groups which used programming did not differ significantly from groups taught in the conventional manner at either the college preparatory or the general level, (2) each of the six groups tested exhibited a significant drop in mean retention scores, and (3) variations in teacher presentation style did not affect retention.

The study appears to reinforce a number of studies described by Pressey and Robinson, 1944 (Shearer, 1963), in which investigators found that only a small percentage of materials learned in the classroom was retained over a period of time.

Time taken, rather than retention, was the variable analyzed in a study by Campbell (1963). Campbell's research indicated that in terms of time and criterion test scores, there were clearly no differences in effectiveness between self-directed and linear use of the individualized geography programs. Comparing the individualized programme conditions with regular instruction involving group-paced, teacher-led use of the

programmes showed no clear differences in overall effectiveness. The regular classes did, however take more time.

The researcher concluded from his findings that a topic such as global geography has many heterogeneous units. Highly structured ideas and principles were associated closely with discrete, disjointed facts and names. Thus, with a topic such as global geography the best potential for self-direction may be in varying the student activity according to the predominant type of learning required.

The focus of a study by Ryan (1966) was to determine whether significant differences occurred in the achievement of 164 fourth grade pupils on a programmed unit of social studies content utilized in various ways.

The linear programmes were written by the investigator on the general geographical features of Japan. The programmes coincided with five sections of material in a fourth grade text on Japan. The treatments were organized around four different utilizations of the programmes. (1) Pupils of the programme-reading group were introduced to content through a programme, and then read from a textbook covering the same content on the next day. (2) A programme-activity group used the programme content introduction and had follow-up lessons which consisted mainly of map work on Japan. (3) The programme group was unsupplemented, using only the programme. (4) A reading-programme group used the textbook for content introduction and the programme for a follow-up lesson the next day.

Two hypotheses were tested at the .05 level of significance. The main hypothesis was concerned with whether there were significant differences in achievement among the four treatment groups. Utilizing an analysis of covariance (language and reading achievement served as

covariates) significant results for the criterion measures except the posttest of specific facts and the retention test of main ideas were indicated. The supplemented groups scored significantly higher than the programme group on both the total of retention tests and total of post-test measures.

The second hypothesis was concerned with the relationship between intelligence and success on the criterion measures. Significant correlations with IQ were found for each of the four treatments.

The author recommended from these results further studies integrating other techniques of instruction with programmes and the continuance of attempts to measure the effectiveness of programmes in terms of their particular function within a given instructional situation.

French (1968) evaluated the difference in learning using lecture and intrinsically programmed methods. The purpose of the study was two-fold: (1) to prepare instructional materials using a branching, programmed self-instruction paradigm, and (2) to evaluate students' learning using this method of instruction. The materials for both treatments were prepared by the researcher, the major difference in the two being the existence of periodic questions within the programmed materials, and the lack of any questions within the lectures. The experimental variable was (a) post-achievement test in Chinese and Japanese cultural concepts, and (b) to measure attitude change regarding Chinese and Japanese culture concepts viewed both in Eastern and Western contexts. An analysis of covariance was used to control for variance. Analysis of variance and "t" tests were used to determine significance. In light of the analysis of the data, the following conclusions were drawn:

1) Knowledge gains were significantly higher (at .05 level) using

the programmed self-instructional method.

2) Attitude gain was significantly higher (at .05 level) using both programmed self-instruction and a lecture method. However, the use of modified gain scores for within group attitude change indicated a higher gain for the programmed self-instruction groups.

3) Efficiency in terms of instructional time was determined to be much higher for the programmed self-instruction groups than the lecture groups. Mean times indicated that less than seven instruction hours were needed for the two programmed groups whereas the two lecture groups required ten instructional hours.

Time was also a variable in a study by Okunrotifa (1968). An American programme adapted to the Nigerian culture was analyzed as to achievement and time. In these programmes the author found no significant differences in the time it took to do either programme.

Forty Nigerian pupils participated in this study. Pupils were randomly assigned to two groups; one to be taught by an American programme, and the other by the same programme adapted to the Nigerian culture. On the basis of an analysis of the data obtained it was found that: (1) there was no significant difference in performance in terms of achievement scores of students who used the original programme, (2) there was no significant difference in the time required to complete the two programmes, and (3) the attitude of the students who used the modified programme was more favourable than those of the control group.

While the study suggests certain criteria for modification of programmes it does not investigate which of the criteria was responsible for greater effectiveness of the modified programme.

Tali (1969) used the linear-type constructed response to test

the feasibility of using programmed instruction in the social studies area. In the study 227 grade seven students were pretested on the content of the programme and then instructed to pursue the programmed unit on their own. Posttest results indicated acceptable achievement for all students although the more intelligent students recorded higher gain scores. Time was not a factor in achievement. Tali concluded that programmed materials were more successful with average or more intelligent students.

In the review of the literature using social studies materials the necessity of augmenting programmed instructional materials becomes increasingly obvious (Campbell, 1963; Ryan, 1966).

Augmentation of a social studies programmed instruction textbook in the form of teacher interaction will be analyzed in the present study.

Summary

Available research in programmed instruction indicates that social studies materials are conducive to programming. From these studies there appears to be evidence indicating that achievement and retention are positively affected by programmed instruction.

Research studies that analyze the achievement and retention of low reading ability students were almost exclusively limited to reading. Many of these studies indicated the feasibility of utilizing programmed instruction augmented with other media or teaching techniques. From the review of the literature no research studies could be obtained analyzing the effects of social studies programmed instruction materials on the achievement and retention of low reading ability students.

As a result of this finding the researcher has planned a study

that will analyze the effects of a social studies programmed textbook on the achievement and retention of low reading ability students at the grade six level.

CHAPTER III

METHOD

This chapter focuses on a description of the research instruments; collection of the data; and analysis of the data. It utilizes the following format: (1) materials used, (2) experimental design, (3) procedure, (4) hypotheses, and (5) summary.

Materials Used

Two treatment materials were used in the study. A programmed instructional textbook, Archeological Methods (Thomas, 1967), was utilized in two treatment groups and a conventional booklet, Archeology, was used in the third treatment group.

Archeological Methods

Archeological Methods was developed by Georgelle Thomas in partial fulfillment of a Doctorate of Education dissertation on programmed instruction. The content parallels the Archeological Methods section of The Development of Man and His Culture, developed by the Anthropology Curriculum Project at the University of Georgia, Athens, Georgia, U.S.A. This text was originally published for grade five students.

Archeological Methods is a programmed instructional textbook; thus, it is self-pacing and self-instructional. Knowledge on rudimentary archeological data is transmitted through the utilization of small steps, careful sequencing, and immediate confirmation. Sentences are structured

so that the correct response is obvious and reinforcement follows immediately. Because the textbook is self-pacing the student progresses through the content at his own rate.

Validity and Reliability. On completion of the programmed text, Archeological Methods, the author put it through a series of individual pilot trials and conducted a field test on it. The purposes of these were: (1) to identify frames with which students had unusual difficulty, (2) to evaluate the pre- and posttests in terms of item difficulty, possible ambiguities, and appropriateness of options, and (3) to discover errors, omissions, and other unanticipated difficulties in procedure and instructions.

Two consultants on the staff of the Anthropology Curriculum Project in Athens, Georgia, U.S.A., examined the programmed text after all revisions based on the trial runs and field trips had been made. Minor changes in emphasis and content of the programmed text were made as a result of their comments.

The Spache reading formula was used to determine the reading level of the final revision (Thomas, 1967). It was established at 2.89 however, this gives only a rough index of the reading difficulty of the material. Because the present study utilizes low reading ability students this reading level was used.

Archeology

Archeology, a conventional booklet composed by the researcher, was the second treatment. This booklet contained the data utilized in Archeological Methods; however, it had none of the characteristics of a programmed textbook.

The booklet was divided into five sections. These were (1) archeology, (2) organic and inorganic materials, (3) sites and locations, (4) excavation, and (5) age of sites and artifacts. Each of these was short and could be taught in one class session. Each section contained rudimentary knowledge and examples of the concepts being explained. Pupil exercises were included on various sections.

Validity and Reliability. Three graduate students were asked to make comments concerning any aspects of the conventional booklet, Archeology, and the programmed instructional textbook, Archeological Methods, that were incongruent. Apart from minor changes suggested by the panel of specialists, the structure of the two treatment instruments was the only aspect that differed.

Fry's readability test (Fry, 1962) was conducted on the content in Archeology. The booklet indicated a reading level of grade five. Fry's readability test was considered appropriate because it correlates highly with the Dale-Chall, S.R.A., and the Flesch and Spache formulas for reading.

Evaluation Instruments

The evaluation instrument was comprised of fifty-four, four-foil multiple choice items. Students were required to choose an answer from four possible choices and to respond on an answer sheet.

The test items focused on important concepts that were relevant to the content of Archeological Methods and Archeology.

This instrument was published with the programmed instructional textbook, Archeological Methods.

The reliability coefficient of the evaluation test form using

the Kuder-Richardson Formula 21, was .95: construct validity was .80 using the California Test of Mental Maturity (Thomas, 1967).

Canadian Tests of Basic Skills

The Canadian Tests of Basic Skills (King, 1968) is a standardized procedure used in various provinces of Canada to determine how well each student has mastered the basic skills. Items of approaching difficulty have been arranged in the various tests to provide a logical pattern resulting in tests of uniform length and reliability (King, 1968, p. 3).

Forty-four items from the grade six vocabulary test in the Canadian Tests of Basic Skills were administered to all students. In each item a word was given and students were required to choose its synonymn from a word list.

Validity. The Canadian Tests of Basic Skills was developed from the extensive work in test construction carried out at the University of Iowa for over thirty-five years. Fourteen editions of the broad level form of the Iowa--Every Pupil Tests of Basic Skills were constructed and used in the Iowa Testing Programme. Early in 1966 one of the U.S. editions was tried out in a special pilot project in a representative sample of Canadian schools.

Identification and analysis of the skills tested have been based upon extensive research resources. These were textbooks, courses of study, and instructional procedures throughout Canada.

Reliability. In the Canadian Tests of Basic Skills each test is long enough to provide a sound basis for drawing inferences about individuals. In the multi-level test battery, the pupil spends his time only

on items appropriate to his grade level.

The items assigned to a particular grade were selected because the tryout data had shown satisfactory difficulty and discriminating power at that level.

Experimental Design

Campbell and Stanley's "Posttest Only Control Group" design was utilized in this study (Campbell and Stanley, 1969). The format of this design as used in the study was as follows:

R	X_1	O_1	O_2
R	X_2	O_1	O_2
R	X_3	O_1	O_2

Where,

R = the experimental and control classes

X = treatment

O_1 = posttest

O_2 = delayed posttest

While it is difficult to know whether the experimental and control classes were equal before the differential treatment, Campbell and Stanley (1969, p. 25) suggest that "the most adequate all-purpose assurance of lack of initial biases between groups is randomization." Because the classes were randomly chosen and the groups randomly assigned to treatments through the use of a Table of Random Selection (Glass and Stanley, 1970) equality was assumed.

While an anthropological unit, "The Archaic Maritime Indians,"

had been introduced into the program of studies for grade six, many schools overlooked it; thus, the presentation of this novel subject matter predisposed the use of a pretest.

Procedure

The following format was utilized for assignment of groups to treatments:

TABLE IV

Experimental Layout for Treatment Groups

T_1	T_2	T_3
$X_{1,121}$	$X_{26,122}$	$X_{51,123}$
.	.	.
.	.	.
.	.	.
$X_{25,121}$	$X_{50,122}$	$X_{75,123}$
$\bar{X}..._1$	$\bar{X}..._2$	$\bar{X}..._3$

Subscript: student, posttest, delayed posttest, treatment

The sample for this study was comprised of nine groups of grade six, low reading ability students within the Avalon Consolidated and the Roman Catholic School Boards of St. John's, Newfoundland.

The supervisors of these school boards were asked to provide nine classes of grade six students. All students were administered forty-four vocabulary items from the Canadian Tests of Basic Skills. The grand mean was computed and students who performed less than one-half a standard deviation below the mean were defined into number of schools and groups

involved.

Research Design

A 1x3 analysis of covariance with two measures of effect was used in this experimental study. Analysis of covariance utilizing the reading test as the covariate was used to control variability due to the variation in the low reading ability scores.

The Newman-Kuels test of differences between means (Winer, 1971, pp. 191-195) was used as the appropriate post hoc test. This was utilized to test the significance of differences between the treatment procedures.

Treatment Groups

Three treatments were used in this study. Treatment one was conventional teaching; treatment two was programmed instruction; and treatment three was programmed instruction plus teacher interaction.

The components of each treatment group are outlined in Table V.

Treatment Group I. The conventional teaching group (T_1) received the same data as were contained in the programmed instructional textbook, Archeological Methods. Each teacher in this group was given a booklet, Archeology, and was instructed to teach the data through lectures and class discussion. In this group teacher motivation and teacher interaction were keys to the student's learning.

Treatment Group II. The group receiving programmed instruction (T_2) was included in the study to insure that results in T_1 and T_3 were due to treatments rather than to the novelty of using the new programmed instruction textbooks.

TABLE V

Components of Treatments

Components of Treatments	Treatment Group I	Treatment Group II	Treatment Group III
Teacher lectures	X	0	0
Teacher motivation	X	0	X
Class discussion	X	0	0
Structured content	X	X	X
Continuous reinforcement	0	X	X
Presentation of content in small, hierarchical steps	0	X	X
Detailed analysis of content	0	X	X
Immediate confirmation	0	X	X
Self-pacing	0	X	X
Self-instructional	0	X	X
Teacher concept explanation	X	0	0
Structured concept explanation	X	X	X
Student teacher interaction	X	X	0

X: Present in treatment

0: Absent in treatment

Students in this group were given the programmed instruction text, Archeological Methods, and thus were exposed to all the components of programming. The archeological data were presented in structured, hierarchical steps. Students were given a detailed analysis of content, immediate confirmation, and content reinforcement. The programmed text was self-pacing and self-instructional and students were thus required to work at it alone. No teacher interaction or motivation was permitted in this group (see Table V).

Treatment Group III. The third treatment group (T_3) received the programmed instruction textbook, Archeological Methods, and this was supplemented with teacher interaction. Thus, the students were not only exposed to the data through programming, but also had the teacher to motivate them and to consult with them. The teacher explained the terminology, answered student questions, explained key ideas, and aided the students whenever necessary.

Hypotheses

The following research hypotheses were used in this study:

1. $H_o: \bar{X}_{\cdot 1 \cdot 1} = \bar{X}_{\cdot 1 \cdot 2} = \bar{X}_{\cdot 1 \cdot 3}$

   There will be no significant difference between the posttest mean scores of treatment group I, treatment group II, and treatment group III.

   Alternative, $H_1: \bar{X}_{\cdot 1 \cdot 1} \neq \bar{X}_{\cdot 1 \cdot 2} \neq \bar{X}_{\cdot 1 \cdot 3}$

   There will be a significant difference in the posttest mean scores of treatment group I, treatment group II, and treatment group III.

2. $H_o: \bar{X}_{..21} = \bar{X}_{..22} = \bar{X}_{..23}$

There will be no significant difference in the delayed posttest mean scores of treatment group I, treatment group II, and treatment group III.

Alternative, $H_1: \bar{X}_{..21} \neq \bar{X}_{..22} \neq \bar{X}_{..23}$

There will be a significant difference in the delayed posttest mean scores of treatment group I, treatment group II, and treatment group III.

The following hypotheses were tested at .05 level of significance using the Newman-Kuels test of difference between means as the appropriate post hoc analyses.

3. $H'_o: \bar{X}_{1\cdot 1} = \bar{X}_{1\cdot 2}$

There will be no significant difference in the posttest mean scores of treatment group I and treatment group II.

Alternative, $H_1: \bar{X}_{1\cdot 1} \neq \bar{X}_{1\cdot 2}$

There will be a significant difference in the posttest mean scores of treatment group I and treatment group II.

4. $H_o: \bar{X}_{1\cdot 1} = \bar{X}_{1\cdot 3}$

There will be no significant difference in the posttest mean scores of treatment group I and treatment group III.

Alternative, $H_1: \bar{X}_{1\cdot 1} \neq \bar{X}_{1\cdot 3}$

There will be a significant difference in the posttest mean scores of treatment group I and treatment group III.

5. $H_o: \bar{X}_{1\cdot 2} = \bar{X}_{1\cdot 3}$

There will be no significant difference in the posttest mean

scores of treatment group II and treatment group III.

Alternative, $H_1: \bar{X}._{1\cdot 2} \neq \bar{X}._{1\cdot 3}$

There will be a significant difference in the posttest mean scores of treatment group II and treatment group III.

6. $H_o: \bar{X}.._{21} = \bar{X}.._{22}$

There will be no significant difference in the delayed posttest mean scores of treatment group I and treatment group II.

Alternative, $\bar{X}.._{21} \neq \bar{X}.._{22}$

There will be a significant difference in the delayed posttest mean scores of treatment group I and treatment group II.

7. $H_o: \bar{X}.._{22} = \bar{X}.._{23}$

There will be no significant difference in the delayed posttest mean scores of treatment group II and treatment group III.

Alternative, $H_1: \bar{X}.._{22} \neq \bar{X}.._{23}$

There will be a significant difference in the delayed posttest mean scores of treatment group II and treatment group III.

8. $H_o: \bar{X}.._{21} = \bar{X}.._{23}$

There will be no significant difference in the delayed posttest mean scores of treatment group I and treatment group III.

Alternative, $H_1: \bar{X}.._{21} \neq \bar{X}.._{23}$

There will be a significant difference in the delayed posttest mean scores of treatment group I and treatment group III.

Limitation of the Study

While it was suggested that the researcher analyze students'

attitudes towards programming this was omitted and the experiment dealt only with the effects of programming.

Summary

The treatment instruments were administered to all students who were selected at the start of the study. As illustrated in the experimental design, "Posttest Only Control Group" (Campbell and Stanley, 1969), each student received a treatment, posttest, and retention test. A 1x3 analysis of covariance with two measures of effect was utilized.

Statements were made hypothesizing the significance of the mean scores of treatment group I, treatment group II, and treatment group III on the posttest and retention test. Chapter IV discusses the findings of the research study in light of these hypotheses.

CHAPTER IV

FINDINGS

This study was undertaken to determine whether a social studies programmed instructional textbook plus teacher interaction produced positive, significant achievement in low reading ability grade six students in comparison to conventional teaching or programmed instruction alone. Each of the three treatment groups was administered a reading test, a posttest, and a delayed posttest.

A 1x3 analysis of covariance was used with the posttest and delayed posttest scores with the reading test serving as the covariate.

Mean scores were collated for each of the three treatment groups and the appropriate post hoc test, the Newman-Keuls Test of Differences Between Means (Winer, 1971, pp. 191-195) was used to determine the significance of the difference between the mean scores. The level of significance was stated *a priori* at .05.

This chapter presents the findings from the analysis of the two measures of effect obtained from the three treatment groups.

Presentation of Findings

Hypothesis One

The first hypothesis postulated that no significant difference would exist between the posttest mean scores of treatment group I, treatment group II, and treatment group III. The F ratio for this hypothesis

was significant at .001 (see Table VI). Therefore, the null hypothesis, $H_o: \bar{X}_{.1\cdot1} = \bar{X}_{.1\cdot2} = \bar{X}_{.1\cdot3}$, was rejected and the alternate hypothesis, $H_1: \bar{X}_{.1\cdot1} \neq \bar{X}_{.1\cdot2} \neq \bar{X}_{.1\cdot3}$, was accepted. It was concluded that a significant difference existed between the posttest mean scores for treatment group I, treatment group II, and treatment group III.

Hypothesis Two

The second null hypothesis stated that no significant differences would exist between the delayed posttest mean scores of treatment group I, treatment group II, and treatment group III. The findings of this hypothesis are found in Table VII. The F ratio was significant at the .001 level. Thus, the null hypothesis, $H_o: \bar{X}_{..21} = \bar{X}_{..22} = \bar{X}_{..23}$, was rejected and the alternate hypothesis, $H_1: \bar{X}_{..21} \neq \bar{X}_{..22} \neq \bar{X}_{..23}$, was accepted. It was concluded that there was a significant difference between the delayed posttest mean scores of treatment group I, treatment group II, and treatment group III.

Because significance was found on the posttest and delayed posttest results, the Newman-Kuels Test of Difference Between Means (Winer, 1971, pp. 191-193) was used as the appropriate post hoc test for the posttest and delayed posttest scores. The results of this analysis produced the outcomes given in Table VIII.

Hypothesis Three

The third hypothesis postulated that there would be no significant difference in the mean posttest score of treatment group I and the mean posttest score of treatment group II. The observed difference of these two mean scores was 7.28 (see Table VIII). The critical value, as observed in the Distribution of the Studentized Range Statistic (Winer,

TABLE VI

Analysis of Variance of the Posttest by the Treatment with the Covariate

Sources of Variation	Sum of Squares	DF	Mean Square		Significance of F
Covariate	625.740	1	625.740	16.246	.001
Main Effects of Treatment	646.619	2	323.309	8.394	.001
Explained	1271.359	3	424.120	11.011	.001
Residual	2696.172	70	38.517		
Total	3968.531	73	54.363		

TABLE VII

Analysis of Variance for the Delayed Posttest by the Treatment with the Covariate

Sources of Variation	Sum of Squares	DF	Mean Square		Significance of F
Covariate	1190.700	1	1190.700	32.475	.001
Main Effects of Treatment	606.093	2	303.047	8.265	.001
Explained	1796.793	3	598.931	16.335	.001
Residual	2566.589	70	36.666		
Total	4363.383	73	59.772		

TABLE VIII

Newman-Kuels Test of Differences Between Means for Posttest Mean Scores

	$\bar{X}\ldots_2$	$\bar{X}\ldots_3$	$\bar{X}\ldots_1$
$\bar{X}\ldots_2$	--	5.34*	7.28*
$\bar{X}\ldots_3$	--	--	4.92*
$\bar{X}\ldots_1$	--	--	--

*Significant at .05 level.

1971, pp. 870-871) was 2.83. The observed difference exceeded the critical value; thus, the null hypothesis, H_o: $\bar{X}_{\cdot 1 \cdot 1} = \bar{X}_{\cdot 1 \cdot 2}$, was rejected and the alternate hypothesis, H_1: $\bar{X}_{\cdot 1 \cdot 1} \neq \bar{X}_{\cdot 1 \cdot 2}$, was accepted at the .05 level of significance. It was concluded that there was a significant difference between the mean posttest scores of treatment group I and treatment group II, the first group having reaped the higher mean.

Hypothesis Four

Hypothesis four stated that there would be no significant difference in the mean posttest score of treatment group I and the mean posttest score of treatment group III. Findings are reported in Table VIII. The observed difference between the mean scores of treatment group I and treatment group III was 4.92. This observed difference exceeds the critical value of 3.40; thus the null hypothesis, H_o: $\bar{X}_{\cdot 1 \cdot 1} = \bar{X}_{\cdot 1 \cdot 3}$, was rejected and the alternate hypothesis, H_1: $\bar{X}_{\cdot 1 \cdot 1} \neq \bar{X}_{\cdot 1 \cdot 3}$, was accepted at the .05 level of significance. It was concluded that a significant difference existed between the mean posttest scores of treatment group I

and treatment group III. The treatment group receiving conventional teaching indicated a significantly higher mean posttest score than the treatment group receiving programmed instruction plus teacher interaction.

Hypothesis Five

The fifth hypothesis stated that there would be no significant difference between the mean posttest score of treatment group II and the mean posttest score of treatment group III. Table VIII shows that the observed difference between these two means was 5.34. The critical value from the Studentized Range Statistic (Winer, 1971, pp. 870-871) was 2.83. The observed difference exceeds the critical value; thus, the null hypothesis, $H_o: \bar{X}_{\cdot 1 \cdot 2} = \bar{X}_{\cdot 1 \cdot 3}$, was rejected and the alternate hypothesis, $H_1: \bar{X}_{\cdot 1 \cdot 2} \neq \bar{X}_{\cdot 1 \cdot 3}$, was accepted at the .05 level of significance. It was concluded that there was a significant difference in the mean posttest scores of treatment group II and treatment group III. The treatment group receiving programmed instruction plus teacher interaction had a significantly higher mean posttest score than the treatment group receiving programmed instruction.

On the posttest scores treatment group I, the conventional teaching group, indicated significant gains over treatment group II, the programmed instruction group, and treatment group III. Treatment group III, the programmed instruction plus teacher interaction group, also indicated significant gains over treatment group II at the .05 level of significance.

The Newman-Kuels Test of Difference Between Means was also used with the delayed posttest scores. The analysis produced the results given in Table IX.

TABLE IX

Newman-Kuels Test of Differences Among Means for Delayed Posttest Scores

	$\bar{X}..{}_{22}$	$\bar{X}..{}_{33}$	$\bar{X}..{}_{11}$
$\bar{X}..{}_{22}$	--	.85	6.49*
$\bar{X}..{}_{33}$	--	--	5.64*
$\bar{X}..{}_{11}$	--	--	--

*Significant at .05 level.

Hypothesis Six

The sixth hypothesis stated that there would be no significant difference in the mean delayed posttest scores of treatment group I and treatment group II. The observed difference of these two mean scores was 6.49 (see Table IX). The critical value, as observed in the Distribution of the Studentized Range Statistic (Winer, 1971, pp. 870-871), was 3.40. The observed difference exceeds the critical value; thus, the null hypothesis, $H_o: \bar{X}..{}_{11} = \bar{X}..{}_{12}$, was rejected and the alternate hypothesis, $H_1: \bar{X}..{}_{11} \neq \bar{X}..{}_{12}$, was accepted at the .05 level of significance. It was concluded that there was a significant difference in the delayed posttest mean scores of treatment group I and treatment group II. The treatment group receiving conventional teaching indicated significantly higher mean delayed posttest scores than the treatment group receiving programmed instruction.

Hypothesis Seven

Hypothesis seven postulated that there would be no significant

difference in the delayed posttest mean scores of treatment group I and treatment group III. The observed difference between these two mean scores was 5.64. The critical value was 3.45; thus, the observed value is significant at the .05 level. The null hypothesis, $H_o: \bar{X}..._{21} = \bar{X}..._{23}$, was rejected and the alternate hypothesis, $H_1: \bar{X}..._{21} \neq \bar{X}..._{23}$, was accepted at the .05 level of significance. The treatment group receiving conventional teaching had a significantly higher delayed posttest mean score than the treatment group receiving programmed instruction plus teacher interaction.

Hypothesis Eight

Hypothesis eight postulated that there would be no significant difference in the delayed posttest mean scores of treatment group II and treatment group III. The observed difference between these two mean scores was .85 (see Table IX) and the critical value was 2.83. Because the observed difference is less than the critical value, the null hypothesis, $H_o: \bar{X}..._{22} = \bar{X}..._{23}$, was accepted. It was concluded that there was no significant difference in the delayed posttest scores of treatment group II and treatment group III.

Summary

Statistically significant differences were found for each of the treatment groups on the posttest at the .05 level. Results indicated that conventional teaching rather than programmed instruction or programmed instruction plus teacher interaction was more effective in the achievement of social studies content for low reading ability grade six students. Programmed instruction plus teacher interaction was also

indicated to be more significant in achievement over programmed instruction.

The delayed posttest results suggested that conventional teaching was more effective than either programmed instruction or programmed instruction plus teacher interaction for retention of social studies content by low reading ability, grade six students. No significant differences existed between the treatment group utilizing programmed instruction and the treatment group using programmed instruction plus teacher interaction.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study researched the effects of a social studies programmed instructional textbook on the achievement and retention of grade six low reading ability students. Three treatments--conventional teaching, programmed instruction, and programmed instruction plus teacher interaction--were randomly assigned to nine groups of grade six low reading ability students through the use of a table of random selection (Glass and Stanley, 1970).

In conjunction with the study the following research questions were posed:

(1) Will a social studies programmed textbook plus teacher interaction increase the posttest achievement of grade six low reading ability students?

(2) Will a social studies programmed textbook plus teacher interaction facilitate retention for grade six low reading ability students?

A 'Posttest Only Control Group' design (Campbell and Stanley, 1969) was used to determine whether significant achievement and retention changes were obtained after each group had been exposed to the treatments.

Summary of the Findings

The results of this study indicate:

1. The treatment group receiving conventional teaching achieved significantly higher at the .001 level of significance on the posttest than the treatment group receiving programmed instruction plus teacher interaction and the treatment group receiving programmed instruction.

2. The treatment group receiving programmed instruction plus teacher interaction achieved significantly higher, at the .05 level of significance, on the posttest than the treatment group receiving programmed instruction.

3. The treatment group receiving conventional teaching retained significantly higher, at the .001 level of significance, on the delayed posttest than the treatment group receiving programmed instruction plus teacher interaction and the treatment group receiving programmed instruction.

4. There was no significant difference in the delayed posttest scores for the treatment group receiving programmed instruction and the treatment group receiving programmed instruction plus teacher interaction.

Educational Implications of the Findings

On the posttest and delayed posttest the treatment group receiving conventional teaching indicated significant gains in achievement and retention over the treatment groups receiving programmed instruction plus teacher interaction and the treatment group receiving programmed instruction.

Findings also indicated that the treatment group receiving programmed instruction plus teacher interaction made significant gains in achievement over the treatment group receiving programmed instruction.

These results indicate that programmed instruction plus teacher interaction was not as effective a factor as conventional teaching in the achievement and retention of low reading ability grade six students. The components of treatment group III which were not included in treatment group I appeared to have a negative effect on the posttest and delayed posttest scores. These were: structured hierarchical content, continuous reinforcement, detailed analysis of content, immediate confirmation, self-pacing, self-instruction, structured concept explanation and defined teacher interaction. Possible positive components in conventional teaching were teacher lectures, class discussion, teacher concept explanation and total teacher interaction. It could follow from the research results that the element of teacher interaction in the form of teacher lectures, teacher motivation and class discussion is essential for low reading ability students at the grade six level. This is the only component present in both treatments I and III which is absent in treatment group II (see Table V). This could possibly account for significantly higher posttest mean scores in these two groups ($\overline{X}_{.1.1} = 26.86$, $\overline{X}_{.1.2} = 19.58$, $\overline{X}_{.1.3} = 23.37$).

In comparative research studies by Bednarik (1968), Rimmer (1971), and Jamieson (1971) (see Table I), it was concluded that significant differences occurred for both conventional teaching treatment groups and programmed instruction treatment groups in pretest and posttest scores although no group indicated significant gains over the other. Malpass (1966) found supplemented programmed instructional

groups produced more significant gains over conventional teaching for low reading ability grade two students in the area of primary reading (see Table II). Rosenshine (1969) did not find any significant difference in the field of reading for elementary students working through a programmed instruction treatment or a conventional teaching treatment (see Table II).

The present research study indicates that low reading ability grade six students need the continuous interaction with the teacher that conventional teaching provides. Low reading ability students do not appear to achieve or retain social studies material from programmed instruction even when supplemented by limited teacher interaction as they do from conventional teaching, thus indicating an unreadiness to learn from structured, hierarchical content when complete teacher interaction is lacking.

Recommendations for Future Research

The following recommendations are suggested based upon the results of this research study:

1. A replication of this study utilizing time as a variable.

2. A research study that analyzes the effects of a social studies programmed instructional textbook plus teacher interaction on the achievement and retention of average and high reading ability grade six students.

3. A research study that examines the effects of conventional teaching supplemented by a social studies programmed instruction textbook on the achievement and retention of low reading ability grade six students.

4. An experiment that considers the effects of a social studies programmed instructional textbook plus teacher interaction on grade six low reading ability students with student attitude as a variable.

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APPENDIX A

ARCHEOLOGICAL METHODS, A PROGRAMMED TEXT

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(The material in this programmed book parallels the Archeological Methods sections of THE DEVELOPMENT OF MAN AND HIS CULTURE: Pupil Text and Pupil Guide, Grade 5, developed by The Anthropology Curriculum Project, University of Georgia, Athens, Georgia.)

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APPENDIX B

PRONUNCIATION GUIDE FOR ARCHEOLOGICAL METHODS

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APPENDIX C

ARCHEOLOGICAL METHODS TEST FORM B

ARCHEOLOGICAL METHODS TEST
FORM B

Do not make any marks on this test. You will be given an answer sheet and your teacher will explain to you how to use it.

1. Which of these is made of organic material?

   (1) a stone arrowhead
   (2) an animal bone
   (3) a tin can
   (4) a piece of pottery

2. The careful removal of dirt from a site is called

   (1) exploration
   (2) interpretation
   (3) excavation
   (4) seriation

3. Archeologists call the ways of life of a group of people its

   (1) archeology
   (2) artifacts
   (3) culture
   (4) history

4. Heavy rains sometimes wash the dirt away from buried artifacts. This is an example of

   (1) erosion
   (2) dendrochronology
   (3) habitation
   (4) stratigraphy

Here is a sketch of an excavation through several strata of soil. Use the sketch to help you answer question 5.

```
TOP OF GROUND
   LAYER A
      I
      B
      I
      C
      I
      D
```

5. An artifact found in layer B would be older than

   (1) artifacts in layer D only
   (2) artifacts in layer C only
   (3) artifacts in layers C and D
   (4) artifacts in layer A only

6. If you use relative dating on an object, you

(1) decide whether it is older than, less old than, or the same age as some other object
(2) decide whether it is radio-active or not
(3) decide about how many years old it is
(4) measure how deep it was buried in the ground

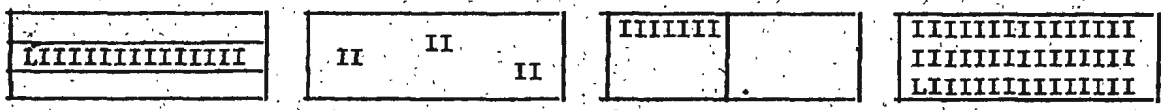
7. Which of these is an example of CULTURE?

(1) a school
(2) color of skin
(3) waterfall
(4) a vein of coal

8. Tree ring dating is called

(1) calendrical
(2) dendrochronology
(3) carbon-14
(4) stratigraphy

Here are some sketches of excavation methods. The dark places are where dirt has been removed. Questions 9 through 12 are about the sketches.



A B C D

9. Which of the above excavations is a trench excavation?

(1) A
(2) B
(3) C
(4) D

10. Which of the excavation methods would tell an archeologist the most about what is buried at a site?

(1) A
(2) B
(3) C
(4) D

11. Which of the excavations would probably cost the most money and take the most time?

(1) A
(2) B
(3) C
(4) D

12. Which of the above excavations is a quadrant excavation?

(1) A
(2) B
(3) C
(4) D

13. Which of these is made of inorganic material?

(1) a leather shoe
(2) a ham bone
(3) a piece of wood
(4) a stone arrowhead

14. The layers of earth in which objects are found is important in which kind of dating?

(1) absolute
(2) dendrochronology
(3) carbon-14
(4) stratigraphy

15. Which of these would an archeologist be LEAST likely to do?

(1) study the habits of wild animals
(2) search for artifacts
(3) write articles to be published
(4) excavate a site

16. Imagine you are an archeologist excavating a site. In what order would you use these tools?

(1) buldozer, small brush, shovel
(2) bulldozer, shovel, small brush
(3) shovel, bulldozer, small brush
(4) small brush, shovel, bulldozer

17. Scientists who learn about man's past by studying artifacts are

(1) geologists
(2) biologists
(3) archeologists
(4) stratigraphers

Here is a sketch of an excavation showing different strata. The circled numbers show where objects were found. Use the sketch to answer question 18.

18. Object 3 is older than

(1) object 1 only
(2) object 4 only
(3) object 1 only
(4) objects 1 and 4

19. The dating method which gives a more or less fixed date is called

(1) absolute
(2) relative
(3) seriation
(4) stratigraphy

20. Objects that are made by man are called

(1) organic
(2) inorganic
(3) sites
(4) artifacts

21. Style and shape of artifacts is important in what type of dating?

(1) stratigraphy
(2) dendrochronology
(3) seriation
(4) calendrical

22. What sort of tools do archeologists use?

(1) hammers, nails, and screwdrivers
(2) brooms, mops, and pans
(3) picks, shovels, and tape measures
(4) saws, ladders, and axes

23. Which word describes material which was or is living?

(1) inorganic
(2) organic
(3) prehistoric
(4) historic

24. Imagine you are an archeologist. You find the bones of many wild animals and many smooth round stones in an excavation. You will probably decide that the people hunted animals for food using the smooth round stones. This part of an archeologist's job is called

(1) intuition
(2) preservation
(3) interpretation
(4) description

25. Which method of dating measures the rate of chemical change in objects?

(1) stratigraphy
(2) carbon-14
(3) potassium-argon
(4) both 2 and 3

26. A habitation site is where people

(1) killed animals
(2) lived
(3) hunted
(4) worshipped

27. Which statement is TRUE?

(1) Artifacts are man-made objects.
(2) Most people today do not own any artifacts.
(3) Artifacts are always worth a lot of money.
(4) A bird nest is an artifact.

28. The study of man's past through written records is

(1) anthropology
(2) archeology
(3) biology
(4) history

29. A method of dating using different calendar systems developed by man is

(1) relative dating
(2) seriation dating
(3) calendrical dating
(4) stratigraphic dating

30. Very old artifacts are often found buried in the ground. How do they get buried?

(1) They get buried on purpose, like in graves.
(2) They get buried by volcanoes and earthquakes.
(3) They get buried by dust and dirt over years and years of time.
(4) All of the above are ways that artifacts get buried.

31. What is the best order of work for an archeologist?

(1) locate site, excavate, preserve
(2) excavate, publish, interpret
(3) preserve, locate site, interpret
(4) publish, preserve, excavate

32. Putting broken objects back together is called

(1) inspiration
(2) restoration
(3) excavation
(4) interpretation

33. Here are some artifacts we use today. Imagine you are an archeologist a thousand years from now. Which artifact would you MOST LIKELY find?

(1) a china coffe cup
(2) baseball bat
(3) bar of soap
(4) dish cloth

34. The dating method which can only be used on trees or objects made of wood is called

(1) dendrochronology
(2) preservation
(3) stratigraphy
(4) seriation

35. A word that archeologists use to describe material that has never been alive is

(1) organic
(2) inorganic
(3) historic
(4) prehistoric

36. The years before writing was invented and written records kept is called

(1) prehistoric
(2) historic
(3) olden days
(4) the Middle Ages

37. Protection of an artifact from injury or decay is called

(1) excavation
(2) preservation
(3) salvation
(4) termination

38. Which of these is something we CANNOT learn about prehistoric people from their artifacts?

(1) how they talked
(2) what they ate
(3) what they wore
(4) what kind of homes they had

39. A place archeologists excavate is called

(1) an anthropologist
(2) a quadrant
(3) a site
(4) a strata

40. Imagine that you are an archeologist. You excavate a site and locate an animal skull. Which dating method would you use on the skull to give the most exact date?

(1) carbon-14
(2) dendrochronology
(3) stratigraphy
(4) seriation

41. Absolute dating methods help answer which one of the following questions:

(1) Is this object older than, less old than, or the same age as that object?
(2) Is this object radio-active?
(3) About how many years old is this object?
(4) How deep was this object buried in the ground?

42. Which of these is an artifact?

(1) animal bone
(2) stone
(3) vase
(4) leaf

43. An archeologist is a person who studies

(1) climates of the earth
(2) how the earth was formed
(3) types of animals
(4) prehistoric cultures

44. Which of the sentences below tells us why we do not know everything about prehistoric man?

(1) Prehistoric man did not look like us.
(2) The only information we have is from the artifacts that have been found.
(3) Very few people are interested in prehistoric man.
(4) No careful studies of prehistoric man have been made.

45. A prehistoric site is a site that

(1) has not been excavated
(2) does not contain artifacts
(3) was used before written records were kept
(4) always contains dinosaur bones

46. A place where people went for religious purposes is called

(1) a ceremonial site
(2) a habitation site
(3) a historic site
(4) a seriation site

47. Which one is NOT an artifact?

(1) cow
(2) dime
(3) spoon
(4) calendar

48. A person who is not an archeologist

(1) should dig a site very carefully
(2) should not try to dig a site at all
(3) should dig a site only if it is on his own property
(4) should not dig a site unless it is small

49. Artifacts that have not lasted a long time were probably made from

(1) inorganic material
(2) organic material
(3) seriation material
(4) stone material

50. Here are some different kinds of sites. Which is the POOREST one for preservation of artifacts?

(1) cave site
(2) desert site
(3) frozen site
(4) jungle site.

APPENDIX D

ARCHEOLOGY

ARCHEOLOGY

People born thousands of years from now can learn about our customs and ways of life. They can read books, look at movies, or listen to recordings. People in the future will be able to learn about us from our writings, our recorded music, and other written and spoken records.

How can we learn about the people who lived thousands of years ago? How can we study man and his way of life before writing, or movies, or records were even invented?

Archeology studies how man lived long ago. Archeologists are the scientists who study archeology. Archeologists study the people of long ago. They often study "prehistoric" people. Prehistoric simply means "before written records." The long time before writing was invented is called "prehistory." When writing was invented and man began to keep records of events, history began.

Archeologists are scientists who study ancient people. Ancient people are people who lived long ago. Archeologists study ancient man's way of life or his culture. Culture is all of the things that make up ways of living. Culture includes things like: a) the way people eat, b) the houses people live in, c) the language people speak, and d) the way people worship God. Different groups of people have different cultures. For example, ours is different from the Eskimo's culture. We eat different things. We live in different kinds of houses. We speak a different language.

Things made by man are called artifacts. Anything at all that is made by people is an artifact. This includes all sorts of things

from a stone axe to a coat to a rocket. If it is man-made it is an artifact.

Match the correct words with the numbers:

1. man-made object
2. leaf of a tree
3. scientists who study ancient man and his culture
4. before writing was invented
5. way of life of a group of people
6. after writing was invented

_____ culture
_____ artifact
_____ archeologists
_____ historic

Organic and Inorganic Material

Organic material comes from plants or animals. You already know that when plants or animals are no longer living, they change. They rot or decay. So organic material is made from plants or animals and will rot or decay.

Inorganic material is easy to understand if you know the meaning of the word, organic. Inorganic is just about the opposite of organic. Inorganic means not made from animals or plants. They will not rot or decay. Here are some examples of inorganic materials: stone, glass, and metal. These materials are not made from plants or animals. They are not made from anything that has every been alive. They will not rot or decay. They are inorganic materials.

Thus, organic means coming from plants and animals. These organic materials will decay. Inorganic means not made from plants or animals or anything that has ever been alive. They will not rot and decay.

Man used both organic and inorganic materials to make artifacts. Only inorganic artifacts last. We do not know much about the organic

5. How do we describe the people who lived before written records were kept?

____ historic

____ prehistoric

Sites and Locations

Archeologists study artifacts. Where do they find these artifacts? Most of the time artifacts are buried in the ground. How in the world do they get buried?

Here are three ways they can get buried:

1. BURIED ON PURPOSE

Long ago, people buried all sorts of objects with the dead. Things like bowls and tools and weapons were often buried in graves because people thought that the dead could use these things.

2. BURIED BY EARTHQUAKE AND VOLCANOS

It doesn't happen very often but sometimes things get buried by a volcano or earthquake. Whole towns and villages have been suddenly buried this way.

3. BURIED AS TIME PASSED

If something is just left, as time passes, it can get buried. Imagine a campsite or village that people have left. Roofs cave in, walls fall down, dirt settles on things, plants grow up. In thousands and thousands of years, a deserted campsite or village could be completely buried.

Suggested Exercise. Put "X" by the right answer.

1. If you lose a penny in the woods and nobody finds it, after a while it will get covered over. The penny was

____ buried on purpose

____ buried as time passed

artifacts made long ago. Prehistoric man could have made many artifacts out of organic material that have rotted away.

This is one reason we do not know everything about ancient people: some of their artifacts were made of organic material. These artifacts did not last.

Another reason why we do not know all about prehistoric people is because they did not keep written records. All that we know about them is what we can learn from their artifacts, the things they made. We do not know much about their language, their games, and their songs because they did not write. They did not keep records of these things. The only parts of their culture that we know about are their artifacts that we have found.

Suggested Exercise. Put "X" by the right answer.

1. A word which means "way of life" is

_____ archeology

_____ culture

2. Material that is made from something that was living is

_____ organic material

_____ inorganic material

3. Which of these is an artifact?

_____ basket

_____ river

4. Material that will not or decay is

_____ organic material

_____ inorganic material

2. An archeologist digs up a skeleton. Near the skeleton are several stone arrowheads and a metal necklace. The arrowheads and necklace were probably

_____ buried on purpose

_____ buried as time passed

Artifacts that stay buried are not useful to an archeologist. Archeologists cannot study artifacts that are covered with dirt. The first thing the archeologist has to do is dig the artifact out of the ground.

The places where archeologists dig to find the artifacts are called the sites.

How do archeologists choose the sites they will dig? They do not go out and dig any old place. They would not go out and dig up your back yard or the basement of your school. They would have to have some clue that they might find artifacts before they would dig a site.

What sort of clues do archeologists use to find sites?

Some clues turn up by chance. Someone on a picnic might find an old Indian artifact. Maybe workmen digging a swimming pool might find pieces of an ancient pottery bowl. These are examples of finding a site by chance.

Another way that archeologists get clues about sites is by means of erosion. Erosion is the slow wearing away of soil by wind or water. After a real hard rain, have you ever seen places where the soil is washed away? This is erosion. Erosion will sometimes uncover a site.

Written records sometimes give clues about sites. Archeologists study written records. Then they ask questions, and they look at maps. These things give clues about sites.

Archeologists can get clues from aerial photography. This means that they go up in airplanes and take pictures of the ground below. Sometimes these pictures give clues about sites.

Thus some of the things that archeologists use to find sites are:

1) chance discoveries
2) erosions
3) written records
4) aerial photography

The places where archeologists dig for artifacts are called sites. Sites are named by their locations. For example, a site which is found in a desert is called a desert site. The names of some sites are: desert sites, cave sites, frozen sites, and jungle sites.

If we know the location of a site, we can tell something about how well the objects in a site will last. Usually things last better where it is dry.

Cave sites and desert sites are good places for preservation. The reason that cave sites are good is because they protect things inside them from the weather. Objects that are not in the rain and snow last longer than objects that are out in the weather.

So both cave sites and desert sites preserve or protect objects very well.

A frozen site is a place where the temperature is always below freezing. Preservation is even better at frozen sites than it is at cave and desert sites. In fact, frozen sites preserve artifacts best of all.

There are not many frozen sites. In the first place very cold

parts of the earth have never had many people living in them. In the second place, there are not many places on earth where the weather is so cold that the temperature is always below freezing, winter and summer.

A frozen burial site was found high on a mountain in Russia. The bodies in the burial site were so well preserved that tattoos on the skin were still clearly seen. When the site was found, everything in it was so well preserved it seemed that it had just been frozen yesterday.

Sites are named by the places where they are found. There are desert sites, cave sites, frozen sites, and jungle sites.

Sites are also classified by their use. For example, a burial site is where the dead have been buried. The names of some sites by their uses are: burial sites, habitation sites, ceremonial sites, and animal kill sites.

The name of the site tells what the people used it for. An animal kill site is a place where people killed animals for food. You may be wondering how archeologists today know what a site was used for thousands of years ago. Here is how they know: the artifacts and other things at the site gave them clues. At an animal kill site, an archeologist might find bones of animals and tools or pieces of tools that were used to kill the animals.

A burial site is where a person or people have been buried. Often all sorts of artifacts were buried with a person. It was believed that he would be able to continue to use them after death. Archeologists can find out a great deal about ancient man from the artifacts he finds at burial sites.

A habitation site is a place where people live. A habitation can be a house, a hut, a tent, or a palace. It can also be a town, a

village, or a city. A habitation site is a place where people lived.

A ceremony is a special occasion. Ceremonial sites are places where special religious celebrations or religious festivals took place.

Excavation

You know that archeologists study artifacts in order to learn about man and his culture long ago. You also know that these artifacts are usually buried in the ground. Archeologists uncover or excavate these artifacts.

To excavate or uncover means to dig. To excavate means to dig in a very planned way. When archeologists excavate a site, they first study the site. Then they make a map of it. Then they use wooden pegs to mark the site off into squares. Each peg is numbered. String is tied from peg to peg so that the site is divided into squares. The archeologist can then put a tag on each artifact to show exactly where it was found.

Archeologists keep very careful records of where everything is found at a site. Every object that is found is tagged, and a record is made as to which square it was found in and exactly how deep it was buried. It is very important to keep records of where everything is located. Records are kept of what things are found near each other. The relationship of objects is often more important than the objects themselves.

There are four types of excavations: total excavation, trench excavation, quadrant excavation, and checkerboard of pits excavation.

Archeologists have to decide which excavation method they will use on a particular site.

In "total excavation" the whole site is dug up. Archeologists have the best chance of finding all the artifacts at a site if they use total excavation. If the site is big total excavation takes a lot of time and money.

"Trench excavation" does not take as much money or time as total excavation, but it is a good way of getting an idea of what is located in a site. In a trench excavation a ditch is dug through the site. The archeologist can get an idea of the different layers of the site.

In "quadrant excavation" the site is divided into four parts. One of these four parts is dug up. The word "quadrant" means one quarter.

The "checkerboard of pits" is marked off into squares and then every other square is excavated. From an airplane the site really looks like a checkerboard. The checkerboard of pits excavation is used at sites where it is not necessary to dig very deeply into the earth.

Archeologists do not excavate a site all alone. At a DIG (a "dig" is slang for excavation) there is always at least one archeologist, usually a few college students who are studying archeology, and some labourers. The archeologist uses his skills and knowledge to plan and direct the work. He does some of the hard work of digging, too. The college student gets practical training to be an archeologist. He is given the chance to keep records, and make plans and decisions under the supervision of the archeologist. A lot of his time is spent in doing some of the hard work of digging, too. All of the labourers' time is spent digging, carrying dirt, and doing the manual labour. Labourers who have had experience digging archeological sites are of great help to the archeologist.

At times, excavating is exciting, but it is often just plain hard

work. It might take weeks of work before even one little artifact is found.

Archeology is interesting to both boys and girls. President Johnson's oldest daughter spent a summer helping at a dig when she was in college.

Archeological Tools

If you were an archeologist here are some of the tools you would use:

Pegs and strings to mark off the site.

Shovels and picks to dig out the dirt.

Wheelbarrows and baskets to carry the dirt away from the site to where it can be sifted.

Sieves (or screens) to sift the dirt carefully so that not even a tiny artifact will be overlooked.

Small tools like knives and paint brushes to dig out and clean off small objects.

Tape measures to measure off the site and to keep complete records of where objects were found.

Notebooks and cameras to make records.

These are just some of the tools used. Sometimes at a very large site a bulldozer might be used to scrape off the top layer of earth and do some of the first dirt removal.

Age of Sites and Artifacts

Archeologists want to know the age of sites and artifacts found at sites. The two methods used to find out the age of objects are "absolute dating" and "relative dating."

Absolute dating gives a fixed or exact age or year. For example, the year you were born is an example of absolute dating. Relative dating

compares one object with another. Comparing your age with your mother's is an example of relative dating.

A relative dating method called "stratigraphy" refers to the different layers of the earth. The earth is made up of different strata or layers of rock and soil. Over thousands of years, different layers or strata are built up. The newer layers are near the surface of the earth, and the older strata are deeper. THE DEEPER YOU DIG DOWN THE OLDER THE STRATA.

If artifacts are found in different strata of an excavation, archeologists know something about the age of them. This way of relative dating is called "stratigraphy."

Stratigraphy means study of the strata or layers. By the method of stratigraphy, we know that the artifacts found in deeper layers of the earth are older than the artifacts found in shallow strata of the earth.

Another type of relative dating is called seriation. In this dating, the type or style of an object gives clues as to its relative age. For instance, if I were to show you a picture of a new Ford car fifteen years ago, and a picture of a new Ford car, you can tell me which one is newer, couldn't you? You would probably use shape and style of the cars to decide on your answer.

The same method is used on a lot of artifacts. Pottery, tools, and arrowheads have improved and changed through the years. Archeologists can compare two pieces of pottery made by the same group of people, or two difference styles of arrowheads. They can decide which is older than which.

Archeologists study the changes and can tell the relative age

of objects by the improvements and changes that are made in styles. This relative dating method is called seriation.

Absolute Dating

You have learned that absolute dating gives a more or less exact year. Archeologists have several methods of absolute dating. The four methods we will study are:

Calendrical Dating

Dendrochronology

Carbon-14 Dating

Potassium-Argon Dating

The word "calendrical" is in the same word family as "calendar." Their meanings are similar, too.

Our calendar system is not the only calendar system in the world. Man has used many different calendar systems. Our year, 1976, might be the year 10,000 in another calendar system. The 10,000 in another calendar system does not tell us anything unless we put it into our own calendar system. If we know that the year 10,000 in a different system means 1976 in our system then we are using the "calendrical dating" method.

Calendrical dating is a dating method that uses different calendar systems developed by man. In calendrical dating we can translate or change one calendar system into another calendar system.

Dendrochronology

Another absolute dating method is dendrochronology. This method is sometimes called "tree ring dating." When a tree is cut we can see a number of rings inside the trunk. Every year the tree grows another

ring. By counting the rings, we can tell how old the tree is.

Dendrochronology is a method of finding out the age of something made out of wood by counting the rings in it.

Archeologists use dendrochronology on trees and wooden objects found at sites.

The other two absolute dating methods that are important are carbon-14 dating and potassium-argon dating.

Carbon 14 and potassium-argon are alike because they both study the chemical changes that take place in material. They are also different.

Carbon-14 Dating

This method of dating measures the amount of carbon-14, a chemical, left in a once living object. The longer the object has been dead, the less carbon-14 it contains. Carbon-14 dating is used on organic material.

Potassium-Argon Dating

This method of dating measures the amount of potassium, a chemical, in rocks. Potassium changes into argon, another chemical, at a certain rate. The older the rock, the less potassium and the more argon. Potassium-argon dating is used on rocks which contain potassium.

Locating sites and excavating them is not all there is to archeology. Once the site is excavated, there is still much work to be done.

A lot of archeological work is done in a laboratory. Sometimes a laboratory is set up at the excavation site. Sometimes the artifacts

are sent to a university or museum laboratory. These kinds of work are done in a laboratory: cleaning, dating, restoration, preservation, description.

Cleaning is just getting the dirt off. Some artifacts can be cleaned with water. Water may hurt other artifacts so they are cleaned with other things.

Most dating is done in a laboratory.

Restoration is putting broken things, or things that have come apart, back together. Many artifacts are broken when they are found. They are restored or put back together in the laboratory.

Not only do artifacts need to be restored, they must be preserved, too. Preservation is needed to keep the artifacts from falling to pieces once they have been dug up. Objects are preserved by being treated with lacquer or other chemicals that will keep them from harm.

In description, a detailed record is made of such things as the weight of an artifact, its exact size, and the material of which it is made.

After the excavation and the cleaning are done, the archeologist still has a lot to do. Two of the most important things archeologists do are "interpretation" and "publication."

Interpretation

Archeologists keep very careful records and make pictures of everything they find at a site. They know exactly where artifacts are found, how deep they are buried, and what was near them.

Archeologists use all the records they have kept to make an interpretation. They must explain what they have found. An interpre-

tation is an explanation. Archeologists use all the information they have to try to explain the culture of the people who used the site.

If a lot of broken pottery were excavated the archeologist knows that the people used pottery. If many bones of wild animals were found, the archeologist may interpret that the people were hunters.

Interpretation is a very important part of the work of the archeologist. Interpretation is taking all of the pieces of information that are known and putting them together to explain the culture of a group of people.

Publication

Archeologists write their interpretations and publish them. To "publish" means to have articles or books printed so that other people can read them. It is important that archeologists tell other archeologists what they have found. Most of the articles are published in special journals which archeologists read. Your library may have some good archeological books.

Someday you might find an old artifact or site. If you do, don't try to be an archeologist and dig a site. Instead, you should contact the museum or university nearest you. Archeology takes years of training, and if you and I try to excavate without this training, we might ruin valuable information. Do not ever try to be an amateur "digger."

Classroom Procedures

Conventional teaching refers to the efficacy of presenting material in lecture and discussion format. Some suggested procedures are presented below. It is not necessary that these be followed but merely that they serve as a type of guideline. The researcher will set a date with the teacher to discuss techniques employed.

Lesson one: Data on "Archeology" presented

Lesson two: Discussion on data

Lesson three: Performance of the suggested exercises

Lesson four: Data on "Materials" presented

Lesson five: Discussion on data

Lesson six: Data on "Sites and Locations" presented

APPENDIX E

HANDBOOK FOR A STUDY OF THE EFFECTS OF A SOCIAL STUDIES PROGRAMMED TEXT ON THE ACHIEVEMENT AND RETENTION OF LOW READING ABILITY STUDENTS

HANDBOOK FOR A STUDY OF THE EFFECTS OF A SOCIAL STUDIES PROGRAMMED TEXT ON THE ACHIEVEMENT AND RETENTION OF LOW READING ABILITY STUDENTS

Rationale for the Study

"Curricula are designed so that students may learn" (Taba, 1962). Thus, curriculum models indicate a directed plan for student learning. The deficient structure of learning materials is frequently the source of students' inability to conceptualize. This problem is prevalent with students of low reading ability who find it difficult to learn and retain knowledge when learning structures lack information. Because reading disorders retard a high percentage of the school population (Cooper, 1969), learning should be facilitated through a sequential arrangement of the materials.

The application of these principles of learning is inherent in programmed instruction. Detailed analysis and carefully arranged sequences are the very essence of programming; thus, knowledge is transmitted through the utilization of small steps, careful sequencing, immediate confirmation, and low error rate. The correct response is critical in providing motivation. Sentences are structured so that the correct response is obvious and reinforcement follows. This immediate feedback, an important feature of Skinner's linear programming, is based on Thorndike's "law of effect" (Leith, 1964). It is implied from this that a response is more likely to recur, the more positive and satisfying are its after-effects. Theories of learning suggest that activity in learning is apt to be more effective than merely being told (Leith, 1964).

Understanding and retention--two other traits of learning--

are also distinctive in the structure of the programmed text. Biggs (1971) states that no other text enhances understanding and the retaining of this content as does a programmed text.

Understanding for the low reading ability students is facilitated through the self-pacing concept of programming. While encouraged to work at their optimum rate, wide variations in the speed in which a programme is completed is characteristic of a homogeneous group. Students are thus enabled in a programmed text to proceed without distraction. Because of the hierarchical structure of the content students can proceed easily from one concept to another.

Specifically, the researcher in this study will try to answer the following questions:

(1) Will a programmed text in social studies plus teacher interaction improve the posttest results of grade six low reading ability students?

(2) Will a social studies programmed text plus teacher interaction facilitate retention for grade six low reading ability students?

Outline of the Study

1. Nine classes of grade six students will be given the Vocabulary Test in the Canadian Tests of Basic Skills.

2. Six of the nine classes will be given Archeological Methods, a programmed text.

3. The other three classes will receive Archeology, a pamphlet containing the same data. The teachers will discuss this in class and lecture on it.

4. When the unit has been completed by all students a multiple

choice exam will be administered.

5. One month later all classes will receive the same exam again to test retention of the material.

Description of the Materials

Canadian Tests of Basic Skills

The Vocabulary Test in this book will be administered to all students. This test requires seventeen minutes of actual working time. It should be administered immediately after giving instructions to pupils for marking the answer sheet.

Begin by saying:

"We are now ready to begin work on the Vocabulary Test. In each exercise you are to decide which of the four answers has most nearly the same meaning as the word that is underlined above it. Put your answer on the sheet that was given to you. The sample exercise has already been answered for you.

"You will have seventeen minutes for this test. If you finish early you can recheck your answers. Are there any questions?"

Archeological Methods

This is a self-instructional booklet. It presents the data in small sequential steps and provides immediate reinforcement through the restructuring of these simple steps into more complex ones.

The students are to work on this book at their own pace. Three of the classes will use Archeology, a booklet which contains essentially the same information, yet will be utilized differently. Following is an explanation of the use of the booklets.

1. Programmed instruction group. This group will be given the programmed booklet, Archeological Methods. All work in this book is to be done by the student alone. The teacher will not influence a student in any way. It should be explained to the students that the teacher will not be helping them in any of the concepts. Each student works at his own pace--there is no time limit.

2. Programmed instruction plus teacher interaction group. The teacher's role is crucial in this, the experimental group. Any questions the student may have regarding the various concepts involved are to be answered. The teacher will also act as a motivational force to the student. The teacher will reprimand the student for wasting time and will motivate him to continue with his work.

3. Conventional teaching group. Conventional teaching refers to the efficacy of presenting information through the lecture and discussion format. The students are permitted to ask questions and discuss any concept, as in a regular classroom. Information in this booklet is in a format similar to that of a conventional textbook.

Evaluation

When all students have finished the unit a multiple choice exam will be given. This exam will again be administered at the end of a four-week interval to test retention. All scores can be provided for teacher information if desired.

APPENDIX F

READING TEST

READING TEST (Canadian Tests of Basic Skills)

Choose the word that is most like the underlined one. Put your answer on the sheet provided.

1. Sprang away
   1) broke
   2) walked
   3) jumped
   4) stayed

2. Used a harpoon
   1) rifle
   2) bow
   3) dagger
   4) spear

3. Stalk the prey
   1) sneak up on
   2) run after
   3) hide
   4) protect

4. A wild stallion
   1) active colt
   2) male horse
   3) female horse
   4) bucking bronco

5. The superior plan
   1) escape
   2) daring
   3) better
   4) fateful

6. Bleached in the sun
   1) burned
   2) heated
   3) whitened
   4) evaporated

7. Say something humourous
   1) comical
   2) intelligent
   3) wise
   4) interesting

8. To be melancholy
   1) depressed
   2) inquisitive
   3) jovial
   4) distracted

9. His first offence
   1) good deed
   2) adventure
   3) attempt
   4) wrong act

10. The urgent needs
    1) local
    2) immediate
    3) present
    4) seasonal

11. Generous donation
    1) contribution
    2) definition
    3) appropriation
    4) manifestation

12. Variable winds
    1) steady
    2) violent
    3) shifting
    4) mild

13. A government representative
    1) institution
    2) regulation
    3) building
    4) delegate

14. An important obligation
    1) disagreement
    2) opportunity
    3) principle
    4) duty

15. Dressed appropriately
   1) comfortably
   2) properly
   3) recklessly
   4) elaborately

16. To link the pipes
   1) connect
   2) loosen
   3) straighten
   4) install

17. Conscious of failure
   1) ashamed
   2) accused
   3) aware
   4) assured

18. Tumult of the crowd
   1) excitement
   2) uproar
   3) applause
   4) capacity

19. The blunt edge
   1) broken
   2) dull
   3) soft
   4) uneven

20. Do not offend him
   1) insult
   2) oblige
   3) humour
   4) injure

21. A long ramp
   1) hall
   2) sidewalk
   3) stairway
   4) incline

22. A useful proposal
   1) gadget
   2) instrument
   3) suggestion
   4) explanation

23. To exit quickly
   1) dissolve
   2) depart
   3) move
   4) melt

24. Typical weather
   1) tropical
   2) autumn
   3) familiar
   4) usual

25. To migrate
   1) sleep all winter
   2) live in the forest
   3) make a trail
   4) find a new home

26. The condensed edition
   1) shortened
   2) current
   3) illustrated
   4) best-selling

27. Cultivate the land
   1) colonize
   2) fertilize
   3) till
   4) irrigate

28. Bring good tidings
   1) food
   2) news
   3) results
   4) luck

29. Unceasing opportunity
   1) increasing
   2) unusual
   3) endless
   4) inspiring

30. Exterminate the pests
   1) kill
   2) feed
   3) capture
   4) examine

31. Atmosphere around us
1) sky
2) air
3) clouds
4) weather

32. Reasonable price
1) adjusted
2) reduced
3) unfair
4) moderate

33. A skilled architect
1) designer
2) carpenter
3) builder
4) draftsman

34. To mingle with people
1) argue
2) mix
3) share
4) be friendly

35. Scanty supply
1) abundant
2) insufficient
3) extraordinary
4) ample

36. A severe ordeal
1) mistake
2) fright
3) temptation
4) trial

37. A short preface
1) article
2) outline
3) conclusion
4) introduction

38. Fluctuating temperature
1) constant
2) regular
3) changing
4) common

39. A homely boy
1) plain
2) homesick
3) young
4) lonesome

40. Numerous alterations
1) suggestions
2) changes
3) injuries
4) controversies

41. Dedication to duty
1) indifference
2) assignment
3) memorial
4) devotion

42. Cordial person
1) rude
2) friendly
3) hostile
4) insincere

43. Sudden brawl
1) squabble
2) storm
3) explosion
4) noise

44. Illuminated the room
1) lighted
2) painted
3) cooled
4) darkened

45. Futile effort
1) persistent
2) successful
3) minimum
4) vain

46. Leniency of the court
1) verdict
2) judgment
3) mercy
4) sentence