A COMPARATIVE STUDY OF THE WAYS OF CREATING INTEREST IN SPECIFIC TOPICS OF FIRST YEAR HIGH SCHOOL ALGEBRA

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Master of Arts in Education

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by

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CHAPTER I

INTRODUCTION

> The average pupil beginning the study of mathematics by the traditional method follows directions blindly for a while. He works at the problems which apparently become more and more complex. To him each problem seems different from the one before and has to be attacked in a different way. He does not feel that his skill is increasing with any definite method or objective in view.[1]

The above paragraph expresses the method which has been used by a number of teachers of mathematics in the past. For many years it has been apparent in our high schools that the students do not have enough interest in algebra. The students say that the subject is not worthwhile for them to spend their time studying it. But too often the teachers do not try to do anything to help change this attitude or to make the subject interesting.

Much has been written on the need for arousing more interest in the field of mathematics, but only a little of it has dealt with the particular field of algebra on the ninth grade level.

In order to improve the techniques of presenting algebra to the ninth grade students it will be necessary to analyze what is now being done and determine from that how to make improvement.

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[1] Paul Ligda, The Teaching of Elementary Algebra (Boston: Houghton Mifflin Company, 1925), p. 106.

I. THE PROBLEM

Statement of the problem. Why are high school students not interested in algebra? Is it because the teachers are not presenting the material in an interesting manner? How are teachers in North Carolina attempting to create interest in first year algebra? Which of these ways is the most successful when used by a great number of teachers? These questions bring us face to face with one of the greatest problems faced by teachers of mathematics in our schools today.

It was the purpose of this study (1) to evaluate the methods used to create interest in algebra, (2) to discover and compile into one volume new ways of creating interest, and (3) to provide suggestions for other teachers and prospective teachers on how to create interest in first year algebra.

Importance of the study. Algebra has long been recognized as a very important subject for people who are living in a scientific world. Today the world is growing toward a more scientific age than was realized possible a few years ago.

> Mathematical knowledge is indispensable for the understanding of the phenomena of nature, and no one without mathematical scholarship can hope to advance

far as an investigator in most of the exact sciences.[2]

In order to prepare the youth of today to live in such an age, teachers of mathematics must be able to stimulate a greater interest in algebra during the early stages of a child's education so he will be able to attain the level of learning in mathematics necessary to continue to strive forward in scientific research. The prospective teachers of tomorrow need all the information they can possibly obtain to use in this process.

II. DEFINITIONS OF TERMS USED

Creating interest. Creating interest was interpreted as meaning the bringing into being of an interest which was not present because the student had not been exposed to algebra before entering high school.

High school. Throughout the report the term "high school" was interpreted as meaning grades nine through twelve.

Average rating. The average rating was interpreted as meaning the rating obtained when the number of times it was rated first was multiplied by one, the number of times it was rated second multiplied by two, etc., and the sum of

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[2]Arthur Schultze, The Teaching of Mathematics in Secondary Schools (New York: The Macmillan Company, 1924), p. 16.

these products divided by the total number of times the method was rated.

III. METHOD OF PROCEDURE

The material used in solving this problem came from two sources: (1) from books, periodical articles, and pamphlets located in the library at Appalachian State Teachers College, and (2) from a questionnaire sent to teachers of mathematics located in thirty counties in North Carolina. These counties were located as follows: ten in the Mountain section, ten in the Piedmont section, and ten in the Coastal section of North Carolina.

IV. ORGANIZATION OF THE REMAINDER OF THE THESIS

The results of the information from the first source were compiled and organized into the second chapter so that it could be easily used by other teachers of algebra. The results of the questionnaire were compiled in the fourth chapter in the same manner. The third chapter was devoted to a description of the materials used and the groups studied. The last chapter gave a conclusion and summary of the report.

CHAPTER II

REVIEW OF THE LITERATURE

Creating interest in every subject has been a topic of discussion for many years. Many articles have been written on how to motivate students and how to hold their interest in all subjects. A brief summary of the articles and materials pertaining to algebra will be discussed in this chapter.

I. GENERALIZED MATERIALS ON HOW TO CREATE INTEREST IN ALGEBRA

Carnahan,[1] in a report to a committee of the National Council of Teachers of Mathematics, pointed out several means which might be used to create interest in mathematics. Many of these pertained to algebra. The first mentioned was to provide a few well-selected books on mathematics other than textbooks so that each student could go to the library and find some material on algebra whenever his curiosity was aroused.

In connection with his suggestion a list of books has been prepared[2] which may be used as suggestions for

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[1] Walter H. Carnahan, "Maintenance of Interest in Mathematics," The Bulletin of the National Association of Secondary School Principals, 38:111-112, May, 1954.

[2] See Appendix A.

fulfilling this need. These books should be used in connection with the class work and also by the student during his free period.

Social learning, as defined by Carnahan, is "when one person with more than casual interest in mathematics comes in contact with another person with like interest."[3] It can be used to create interest in others who do not have the same interest. Democratic algebra, as described by Wright,[4] illustrates this principle. On Monday and Wednesday the pupils arrived and began to work as they entered the classroom. The students could choose their own text and path, route and rate to travel. The teacher only acted as a guide. On Tuesday new fields of adventure were opened and the students were inspired to greater heights than they had reached before. Thursday and Friday were the days set aside for the pupils to demonstrate their achievements or to discuss the problems which had held them at a standstill.

Another illustration of social learning was given by Geil in what she called "Cooperative Class Work in Ninth Grade Algebra."

> Cooperative class work in ninth grade algebra is designed to make high school freshmen serious, and at the same time, happy in their work. The technique

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[3] Carnahan, loc. cit.

[4] L. C. Wright, "Democratic Algebra," Clearing House, 16:19-21, September, 1941.

> employed is a modification of the socialized recitation; it is called Cooperative Class Work. It is designed to increase the amount of cooperation between the pupils and to train them in courtesy; it is found to be a time saver, a thought provoker and a means of developing and holding interest.[5]

The aim, as described by Geil, was to secure full participation of all pupils in the class, to have each pupil feel that he must be responsible for his own learning, and to have the pupil not only know how to work a problem, but why to work it in some particular way.

In her algebra classes the periods were devoted to several of the following types of activity:

> (a) Supplementary practice work, including the checking of papers and assigning of the next lesson, (b) maintenance drill, (c) blackboard drill, and (d) problem analysis and solution, or presentation of new subject matter.[6]

The supplementary practice assignment consisted of review practice work, including a variety of examples. No type of example was assigned until the majority of the pupils had learned how to do it in class. The pupils kept their books open while the assignment was being made, and the teacher pointed out some of the difficulties which she anticipated the students would have. The students were free to ask any question which might give them confidence when they began

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[5]Johanna Geil, "Cooperative Class Work in Ninth Grade Algebra," School Science and Mathematics, 36:643, June, 1936.

[6]Ibid.

working outside the classroom.

The next day the study assignment was checked by the pupils, each person checking his own paper from the answers which were written on the board. If the pupil could find his own errors, he would draw a circle around them and then pass his paper to the teacher. No grade was given for this outside work. The teacher studied the problems missed and determined the cause, then used this data in determining the type problems to be used in the period devoted to blackboard work.

In the period called maintenance drill, an example was written on the board and the pupils were given a chance to ask questions about its solution. These questions were answered by the pupils in the class. After all questions were answered, the problem was changed and all students worked the new problem. The papers were collected, and a pupil worked the problem on the board so that each student could see the correct way to work that type of problem.

For the period devoted to board work, the class was divided into three groups with each person assigned to a special place at the board. The students in the two groups who remained in their seats were assigned to watch a particular pupil at the board. If the person found an error, he was to stand and address the person at the board and ask him questions which would enable the student working the

problem to find his own mistake.[7] Her objectives for this blackboard drill were:

> to relate new work to old, to eliminate errors which the teacher has observed in the supplementary practice assignment, and to recall subject matter which has been taught previously.[8]

The last type of activity was devoted to the analysis and solution of problems or to the presentation of new material. If a word problem were to be analyzed, one pupil would read the problem and tell the facts which were given and the facts to be found, while another student wrote these facts on the board. In the meantime, questions and corrections from others in the class were in order. When new material was presented, the necessary preparatory materials were reviewed during the blackboard drill at the beginning of the period.[9]

"Making algebra real to the pupil," says Wanenmacher,[10] "is bound closely with understanding." Breslich[11] suggested

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[7] Ibid., p. 644.

[8] Ibid., p. 645.

[9] Ibid., p. 646.

[10] Alberta S. Wanenmacher, "How Is It Possible to Make Elementary Algebra More Real to the Pupil? The Mathematics Teacher, 27:138, March, 1934.

[11] E. R. Breslich, "Understanding and Mechanical Performance in Algebra," The Mathematics Teacher, 25:57-65, February, 1932.

three helpful facts to be kept in mind in order to secure this understanding. They were as follows: (1) by teaching and reteaching the meaning of the fundamental concepts of algebra employed in manipulative processes which must be thoroughly known; (2) the pupil should constantly receive training in analyzing the relationships expressed by algebraic symbols; and (3) pupils should be led to discover independently the laws of algebra.

An illustration of how one teacher overcame the problem of getting the students to understand algebra was given by Duke.[12] She found that her students were having trouble understanding words and terms used in algebra. In order for them to have a complete understanding of these words, she required them to keep a notebook with every word defined. Each definition was given in the simplest possible way. The students were required to write their interpretation of the words on the day following their introduction. By being certain that each student had an understanding of the terms, she found that they became more interested in algebra.

Other than the notebook mentioned above, she used the following method of teaching word problems with success. Her method was divided into five steps as follows: (1) drill

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[12]Mary White Duke, "How I Teach Algebra," The Mathematics Teacher, 47:131-134, February, 1954.

on such algebraic expressions as N decreased by 5; (2) set up patterns for each type of problem and have the students learn each pattern; (3) take the first part of a problem and drill on how to set up that part; (4) increase the amount of the problem until all of it is on the board; and (5) have them learn completely how to set up a problem before studying the mechanics of solving the problem.

Sims and Oliver[13] suggested the use of a mathematical laboratory as a means of stimulating interest. The laboratory described in the article was not a special room with a demonstration table, work benches and charts, but the class room used in such a way that it had the atmosphere of a laboratory. It would have to include such equipment as models, visual aids, library materials, wallboards, blackboard tools, instruments of applied mathematics, construction materials, and teacher aids.

The unit plan of teaching was used to illustrate the laboratory method. The teacher introduced the unit, giving the important outcomes expected and working out ways by which contributing problems could be set up and worked out. After the introduction the laboratory period began. The activities were organized to make use of the many materials at hand.

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[13] Weldon Sims and Albert Oliver, "The Laboratory Approach to Mathematics," School Science and Mathematics, 50:621-627, November, 1950.

For it to be a success the activities had to make use of a variety of senses and be on various levels of complexity to challenge each learner.

Grubbs[14] suggested the use of the following methods to create interest in solving motion problems involving wind and water. The effect of wind on the speed of an airplane could be illustrated by attaching a toy airplane to a string and placing it in front of an electric fan. The students could see the effect of the wind on the speed of the airplane if they moved the airplane toward and away from the fan.

He also used a similar method to demonstrate the effect of the flow of water on the speed of a boat. A large pan was placed under a faucet so the water would flow from one end to the other. A small boat was placed in the water attached to a string. It was then very easy to see that a boat could go faster down stream than it could up stream with the same amount of power.

Grubbs gave the following account of how a teacher stimulated some interest in the review of factoring and special products. She likened her pupils to detectives who must find the clues or recognize the type of factoring

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[14] Ethel Harris Grubbs, "Stimulating Interest in Junior High School Mathematics," The Mathematics Teacher, 48:151, March, 1955.

or special products and then use the clues to solve the particular situation according to the accepted method.

II. SPECIFIC MATERIALS AND METHODS WHICH HAVE BEEN USED TO CREATE INTEREST IN ALGEBRA

Breslich[15] suggested the following motives which appeal strongly to high school students: the social uses, the practical uses, its use in other school subjects, its history of development, the power gained through its study, and its cultural values. Recreations, puzzles, programs, clubs, and plays were also mentioned as excellent devices to arouse interest in algebra.

The way these devices and others have been used is discussed in the following paragraphs.

Bulletin boards. McKown and Roberts gave the following three objectives which the bulletin board will accomplish if it is intelligently used. A bulletin board will:

> (1) motivate, supplement, and enrich learning; (2) provide intriguing educative opportunities for pupil participation and cooperation; and (3) serve as an advertising and promotional medium for all school interest, causes, and activities.[16]

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[15] Ernst R. Breslich, The Technique of Teaching Secondary School Mathematics (Chicago: The University of Chicago Press, 1930), pp. 83-84.

[16] Harry C. McKown and Alvin B. Roberts, Audio-Visual Aids to Instruction (New York: McGraw-Hill Book Company, Inc., 1940), p. 99.

Carnahan[17] said that it is possible to reach these objectives in the algebra class by using clippings from newspapers, magazines, trade publications, annual reports, advertisements, and other media of information and propaganda. A book open to a page of special interest, models made by students, and unusual problems make bulletin boards which will stimulate interest. He gave an example of a teacher who put a new trick problem on the board every day and found her students trying to solve the different problems each day. For many of these students the interest in algebra was only temporary, but for some it must have had some permanent effect.

Reynaud[18] used the bulletin board and other space in the classroom to display the projects which had been completed by her students. The entire school was then invited to see the display and to her surprise almost all of the student body turned out, and many of them became interested in the background of the projects and asked so many questions that students from the mathematics department had to be assigned at different places to answer the questions. Later the parents were invited to see the display and the interest spread throughout the community.

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[17]Carnahan, op. cit., pp. 112-113.

[18]Lurnice Reynaud, "A Mathematical Exhibit," The Mathematics Teacher, 46:196-7, March, 1953.

Mathematics clubs. Breslich[19] advised the organization of a club after a few have become interested in algebra so that they might carry on lengthy or detailed discussions which could not be conducted in the classroom. The program could be arranged around some problem which arose in the classroom or from many other sources.

Sommer[20] divided the activities of his club into two groups: recreational and constructive. Some of the recreational activities were mathematical charades, baseball, twenty questions, concentration, and buss. For one of the constructive activities the club constructed a magic square eleven feet by eleven feet and hung it on one wall of the classroom for the enjoyment of everyone in the school. Also they helped the school and the community by laying out some softball and baseball diamonds on the school grounds. This work created much interest among the students and also showed them some of the many practical uses of mathematics.

MacKenzie[21] suggested that the club spend time on special topics which could only be mentioned in the classroom. Material to be used in the club could be found in

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[19]Breslich, op. cit., p. 83.

[20]J. W. Sommer, "Mathematics Club Is Interesting!" School Activities, 27:95-7, November, 1955.

[21]E. G. MacKenzie, "Builder of an Enquiring Mind," The Mathematics Teacher, 48:109-111, February, 1955.

high school or college texts on physics, in slide rule manuals, and in The Mathematics Teacher, etc.

He also suggested that a well-planned program would produce an enquiring mind among students.

Kelly[22] organized a club to help the gifted student have more time to work on topics in mathematics in which he was interested. Programs were varied: reports by club members, talks by students and teachers from colleges and by industrial leaders, practice in using the slide rule, and mathematical puzzles and recreations. Each year more and more students came into the club, and a greater interest was shown in the classroom by those taking part in the club.

Contest. Contest may be used within the classroom as illustrated by Wanenmacher.[23] His class was divided into two groups, designated as groups A and B. The first pupil of group A went to the board and was given a formula and told the letter for which it was to be solved. The pupil explained the first step and wrote it on the board. If his work was correct, the second pupil from the group went to the board and explained the second step and wrote it on the board. This continued until the problem was completed or

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[22]I. Kelly, "Challenging the Gifted Student," School Life, 35:27-8, November, 1952.

[23]Wanenmacher, op. cit., pp. 138-150.

until a mistake was made. If a pupil made a mistake, the other group took over the problem and the group that completed the last step was given credit for the problem. Each group started the same number of problems; therefore, the one making the least number of mistakes won the contest. The pupils who missed their problems worked hard to avoid the same mistake the following day.

Contests were also effective on a larger scale than described in the previous paragraph. Weiner[24] and Carnahan[25] discussed interscholastic contests which they believed to create and hold interest in the various sections of the country.

Home-made problems. Butler told of a class of college juniors and seniors who were discussing the difficulty ninth grade students had in connection with verbal problems. They expressed the opinion "that many of the verbal problems found in textbooks are such that ninth grade students look upon them as being neither useful nor very interesting."[26] He suggested that if the students made their own verbal problems they would be more interested in solving them.

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[24]M. Weiner, "From Interest to Interest," The Mathematics Teacher, 30:23-26, January, 1937.

[25]Carnahan, op. cit., pp. 114-116.

[26]Charles H. Butler, "Home-Made Problems for Algebra," The Mathematics Teacher, 45:584-6, December, 1952.

Puzzles. According to Butler and Wren,[27] motivation has sometimes been associated with the idea of games and puzzles. This is unfortunate because motivation implies a much broader meaning than this. Puzzles are valuable and legitimate in relieving the tediousness of the regular classroom routine and in bringing out the enjoyment which can be found in working with algebra. There is much evidence that the proper use of such devices adds interest to a course in first year algebra.

Brandes[28] made a questionnaire study on the use of recreational mathematics in the classroom. From the study he found that the use of recreational mathematics material improved the classes and resulted in the pupils showing a greater interest in mathematics.

Henry[29] used the control-group technique to determine whether spending one class period a week on mathematical recreations had an advantage over the traditional method of teaching in connection with achievement and attitude. The experimental group exceeded the control group in both

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[27]Charles H. Butler and F. Lynwood Wren, The Teaching of Secondary Mathematics (first edition; New York: McGraw-Hill Book Company, Inc., 1941), p. 117.

[28]Louis Grant Brandes, "Using Recreational Mathematics Materials in the Classroom," The Mathematics Teacher, 46: 326-329, May, 1953.

[29]R. B. Porter, "The Effect of Recreation in the Teaching of Mathematics," School Review, 46:423-27, June, 1938.

achievement and in the improvement of its attitude toward the subject.

Parker[30] believed that puzzles could be made to serve the following purposes: (1) to secure interest and attention of the group; (2) to teach algebra by illustrating and clarifying certain concepts and techniques, by securing a high mastery of the subject matter, by developing skill in manipulation, by making algebraic learning more permanent, and by developing an appreciation for the systematic approach to algebraic methods.

Films and film strips. In a bulletin published by the Texas Education Agency, the following statement gave the many ways and uses of films and film strips.

> Films and film strips are useful in implementing mathematics. Some of the specific uses for films and film strips are: to show applications of mathematical principles; to add meaning and understanding to abstract mathematical principles; to illustrate mathematical concepts which depend on motion; to supplement classroom instruction; to introduce a new topic; to review or to summarize; to illustrate three-dimensional effects; to discover mathematical relationships; to provide a background for field trips; to relate mathematics to other phases of the curriculum; to present specific classroom illustrations; and to foster appreciation of the significance of mathematics. A definite objective can be accomplished more effectively when the teacher previews the film or film strip and prepares the class for its showing.[31]

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[30]Jean Parker, "The Use of Puzzles in Teaching Mathematics," The Mathematics Teacher, 48:219-27, April, 1955.

[31]Texas Education Agency, Suggestions for Teachers of Mathematics (Bulletin No. 548; Austin: Texas Education Agency, 1954), p. 110.

In view of the above uses of films and film strips Dale[32] suggested the use of motion pictures as a means of motivation because it compels attention. In clarifying this, he mentioned that the movement of the picture along with the darkness of the room cutting off the other attractions made it one of the most compelling devices for holding the interest of the students that can be used in the classroom.

McKown and Roberts said that "audio-visual aids, wisely selected and intelligently used, arouse and develop intense and beneficial interest and so motivate the pupil's learning."[33]

Summary. Butler and Wren gave the following paragraph, which summarizes the methods of creating interest in algebra:

> In the last analysis the first and greatest factor in creating interest is a sympathetic, well-informed, competent, and inspiring teacher. Not all the devices in the world can bear the fruit of a continuing and enthusiastic student interest if they are grafted upon the dead stump of instruction in the hands of an incompetent or uninterested teacher. The truly inspiring teacher must first of all be thoroughly grounded in the subject matter of mathematics, well beyond the level of any material which he is expected to teach, in order that he may inspire the confidence and respect of his students. He must have a sympathetic understanding of

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[32]Edgar Dale, Audio-Visual Methods in Teaching (New York: The Dryden Press, 1946), p. 184.

[33]McKown and Roberts, op. cit., p. 26.

> their difficulties and must be always ready and willing to offer proper guidance and stimulation. Finally he must have an enthusiastic interest in his subject and in teaching it. He must believe in its values and its contributions to the educational well-being of the students. Enthusiasm is contagious, and sane enthusiasm backed by sympathetic and enlightened competence is the only real guarantee of the effective maintenance of student interest. Devices are helpful but they are not sufficient unto the task. The inspiring teacher is the real sine qua non.[34]

III. SUMMARY AND CONCLUSIONS ABOUT PREVIOUS STUDIES

In the previous studies along the line of ways of creating interest in algebra, more time has been spent on the broad field of mathematics than on algebra. Much has been written concerning a few methods, but little is said about how teachers in the field rate them according to their usefulness in the classroom.

This study was concerned mainly with the comparison of the ratings of the teachers from the three different sections of North Carolina.

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[34] Butler and Wren, op. cit., pp. 128-129.

CHAPTER III

THE MATERIALS USED AND GROUPS STUDIED

Structure of the questionnaire. The questionnaire on the ways of creating interest in specific areas in first year high school algebra was designed to survey the ways and devices used by a selected group of algebra teachers in the three sections of North Carolina.

A careful study of textbooks and magazine articles was made to determine the possible ways which could be used in first year algebra to create interest. With these findings in mind the questionnaire was constructed with the following purposes for the different parts.

The first two parts of the questionnaire, which dealt with the educational status and the teaching experience of the teacher, were to help determine the reliability of the information given in the remaining parts of the questionnaire. The third and fourth parts, which dealt with general ways of creating interest in algebra and ways and devices to create interest in the specific topics of algebra, were constructed so that the different ways could be evaluated and rated by each of the teachers returning the questionnaire.

The questionnaire was submitted to two college professors in the field of mathematics before its final revision and mailing.

Groups studied. In October, 1955, the questionnaire, accompanied by the letter, found in Appendix A, was mailed to the principals of 221 schools in North Carolina. It was necessary to address the letter to the principals, with attention called to the mathematics department because the names and addresses of the mathematics teachers were not available. The names and addresses of the principals were obtained from a 1954 copy of the Educational Directory of North Carolina.

A group of ten counties from each of the Mountain, Piedmont, and Coastal sections of North Carolina was selected at random. There were sixty-six white high schools in the ten counties in the Mountain section, eighty-two in the Piedmont, and seventy-three in the Coastal section.

The counties and the number of schools in each county are shown in Figure 1. A list of the principals, their addresses, and the name of the school is shown in Appendix B.

One hundred questionnaires or 45 per cent were returned. The number returned from each county is shown in Figure 2. Of these one hundred teachers returning the questionnaires, fifty had taught ten years or more, and fifty had fewer than ten years' experience. All except sixteen had either a major or minor in mathematics in undergraduate work, with thirty-six having completed their graduate work. Only two of the teachers held a "B" certificate. With such a

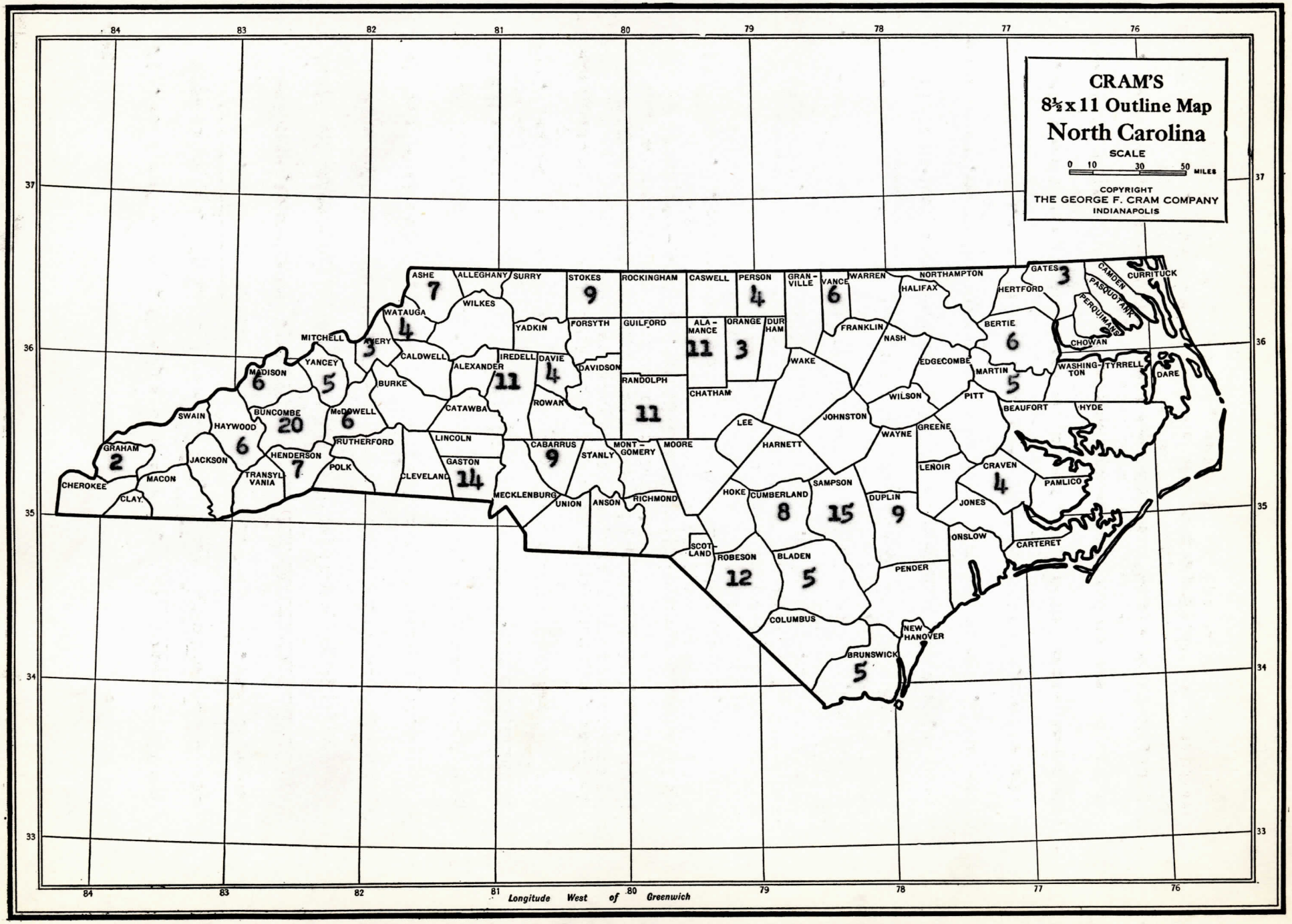

Figure 1. Number of Schools in Each County to Which Questionnaires Were Sent.

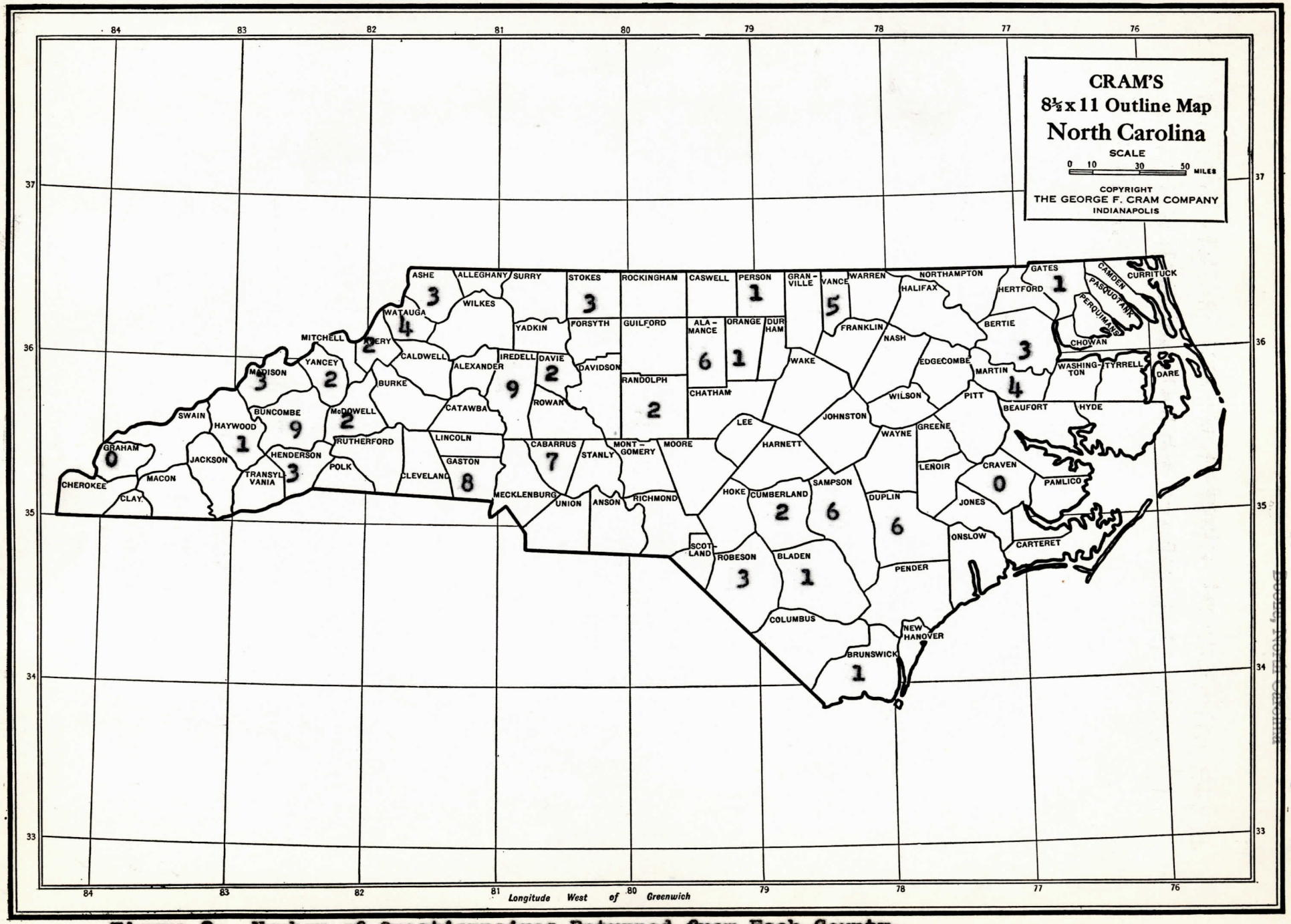

Figure 2. Number of Questionnaires Returned from Each County.

qualified group of teachers answering the questionnaire, it seemed safe to assume that the results of the study should be reliable.

CHAPTER IV

THE QUESTIONNAIRE RESULTS

The purpose of this chapter was to present findings concerning the ways used to create interest in first year algebra by teachers of mathematics in a selected group of schools. The questionnaire results were tabulated and presented in the following ways: (1) a total response; (2) a comparison of the results from the three sections of North Carolina; (3) a comparison of the responses from those who had taught fewer than ten years with those who had taught more than ten years; and (4) a summary of the special comments given by the teachers returning the questionnaires on how to create interest in first year algebra.

I. RESPONSE TO QUESTIONNAIRE

The number of questionnaires sent to each county, the number returned from each county, and the per cent of returns from each county are shown in Table I. The totals and the per cent returned from each section are also given. A total of 221 questionnaires was sent out, with one hundred, or 45 per cent, being returned. The questionnaire was sent to the principals of all white high schools in ten counties, selected at random, from each of the three sections of North Carolina. Sixty-six were sent to the Mountain section, with

TABLE I

DISTRIBUTION OF QUESTIONNAIRE RETURNS

Section and Counties	Number sent	Number returned	Per cent returned
MOUNTAIN	66	29	44
Ashe	7	3	43
Avery	3	2	67
Buncombe	20	9	45
Graham	2	0	0
Haywood	6	1	17
Henderson	7	3	43
Madison	6	3	50
McDowell	6	2	33
Watauga	4	4	100
Yancey	5	2	40
PIEDMONT	82	44	54
Alamance	11	6	55
Cabarrus	9	7	78
Davie	4	2	50
Gaston	14	8	57
Iredell	11	9	82
Orange	3	1	33
Person	4	1	25
Randolph	11	2	18
Stokes	9	3	33
Vance	6	5	83
COASTAL	73	27	31
Bertie	6	3	50
Bladen	5	1	20
Brunswick	5	1	20
Craven	4	0	0
Cumberland	8	2	25
Duplin	10	6	60
Gates	3	1	33
Martin	5	4	80
Robeson	12	3	25
Sampson	15	6	40
Totals	221	100	45

twenty-nine, or 44 per cent, returned; seventy-three were sent to the Coastal section, with twenty-seven, or 31 per cent returned; and eighty-four were sent to the Piedmont section, with forty-four, or 54 per cent returned.

The Piedmont section responded better than the other sections, with the Coastal section giving the least response. Watauga County was the only county which returned 100 per cent of the questionnaires, while Craven and Graham Counties had no returns. The response showed that teachers of mathematics are interested in a study of the different ways used to create interest in first year algebra.

The ratings of the eight general ways used to create interest, which were listed on the questionnaire, are shown in Table II. The average rating was determined by giving the first place ratings one, the second two, and the third three, etc.; then the total was divided by the number rating that particular way. The numbers in the last column show the number of teachers returning questionnaires who did not rate each of the ways.

Findings. (1) Forty-five out of ninety teachers said they had the best results in creating interest in first year algebra by stressing the usefulness of algebra after high school graduation. Ten teachers did not rate this method, while only two rated it in the lower half of the list of

TABLE II

RATINGS OF THE GENERAL WAYS USED TO CREATE INTEREST IN ALGEBRA

General way used	Ratings											
	Average	1	2	3	4	5	6	7	8	9	10	Not rated
1. By stressing the usefulness of algebra after high school graduation	1.83	45	26	12	5	0	2	0	0	0	0	10
2. By stressing the necessity of algebra in order to study higher mathematics	2.19	41	24	15	11	3	2	1	0	0	0	3
3. By constructing mathematical instruments which illustrate different aspects of algebra	3.28	11	21	15	2	9	4	3	1	1	1	32
4. By stressing the disciplinary value of algebra	4.11	8	18	9	11	7	8	8	5	2	0	24
5. Film strips	4.33	1	8	3	14	9	6	8	1	2	0	48
6. By giving rewards to the ones who show the most improvement	4.62	5	9	9	9	6	3	11	6	2	0	40
7. Motion pictures	4.82	2	8	5	7	8	9	5	7	0	0	49
8. By stressing grades	4.98	5	6	10	6	9	5	1	16	2	0	40

eight. The average rating was 1.83, or the highest average given by this group of teachers in the general ways used to create interest.

(2) Stressing the necessity of algebra in order to study higher mathematics was rated second on the average, with forty-one giving it first place and only six rating it in the lower half.

(3) According to the average ratings the teachers had some success by constructing mathematical instruments which illustrated different aspects of algebra. Eleven said they were most successful in creating interest with this method, while nineteen rated it in the lower half.

(4) The other five ways were given about the same average rating, with eight or fewer giving each first place rating. The average rating put them in the following order: (a) by stressing the disciplinary value of algebra; (b) film strips; (c) by giving rewards to the ones who show the most improvement; (d) motion pictures; and (e) by stressing grades.

Table III shows the ratings of the ways used to create interest in the different topics in algebra. This will give some idea of how teachers of algebra attempt to stimulate their students in learning the various topics of first year algebra.

TABLE III

RATINGS OF THE WAYS USED TO CREATE INTEREST IN THE DIFFERENT TOPICS IN FIRST YEAR HIGH SCHOOL ALGEBRA

Topic	Ratings								
	Average	1	2	3	4	5	6	7	Not rated
SIMPLE EQUATIONS									
1. Demonstration by use of the balance scales	1.86	49	21	9	12	1	0	0	8
2. By explaining their use in solving many problems of everyday life	2.02	33	37	19	7	1	0	0	10
3. By carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention	2.45	25	18	25	22	1	0	0	4
4. By explaining that it is necessary in order to work problems later on in algebra	2.85	11	26	28	28	0	2	0	5
SIGNED NUMBERS									
1. By using a number scale to illustrate the fundamentals of signed numbers	1.21	48	28	17	1	0	1	0	5
2. By using a thermometer	2.16	34	24	12	12	4	0	0	14
3. By carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention	2.63	18	29	25	15	6	1	0	6

TABLE III (continued)

Topic	Ratings								
	Average	1	2	3	4	5	6	7	Not rated
SIGNED NUMBERS (continued)									
4. By giving examples that are used in everyday life which can be solved better by the use of signed numbers	2.80	19	17	26	14	8	2	0	14
5. By setting up a mathematical laboratory with exhibits of all the instruments and devices that have been made by the students and purchased by the school	4.12	5	5	1	18	27	0	2	42
WRITTEN PROBLEMS									
1. By beginning with problems they can master and gradually leading into harder problems	1.26	71	20	4	1	0	0	0	4
2. By giving them clear definitions of all terms normally used in the problems	1.99	22	53	19	1	0	0	0	5
3. By using mathematical puzzles	2.64	8	17	41	6	1	0	0	27
FACTORING									
1. By comparing factoring with division	1.69	41	34	12	1	0	0	0	12

TABLE III (continued)

Topic	Ratings								
	Average	1	2	3	4	5	6	7	Not rated
FACTORING (continued)									
2. By stressing that factoring is just a form of grouping	2.02	25	31	25	2	0	0	0	17
3. By stressing the necessity of proper factoring in working problems later on in algebra	2.14	29	24	36	3	0	0	0	8
QUADRATIC EQUATIONS									
1. By using scientific problems which must be solved by the quadratic method and letting them see the many uses of this type of problem in scientific study	1.45	48	37	1	0	0	0	0	14
2. By using problems such as how long it will take a baseball to fall from the top of a building	1.51	41	36	2	0	0	0	0	21

Findings. (1) Four methods of creating interest in solving simple equations were listed on the questionnaire. Demonstration by use of the balance scales was rated highest, with forty-nine rating it as the method which was most successful in their classes. The teachers rated as their second best method explaining the use of simple equations in solving many problems of everyday life. Out of the ninety who rated this method, thirty-three rated it as their best method. The third best method was by carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention. Twenty-five, or one-fourth of the teachers, used this method more than any of the others and rated it as their first choice. Least success was had by explaining that it is necessary to understand simple equations in order to work problems later on in algebra. Only eleven rated this as their best method of creating interest in simple equations.

(2) The five methods of creating interest in signed numbers listed on the questionnaire were rated in the following order by the teachers answering the questionnaire: first, by using a number scale to illustrate the fundamentals of signed numbers was given forty-eight first place votes and an average rating of 1.21; second, by using a thermometer was given thirty-four first place votes and an average of 2.16; third, by carefully explaining the meaning of terms

and using clever definitions to attract the pupils' attention was given eighteen first place votes and an average of 2.63; fourth, by giving examples that are used in everyday life which can be solved better by the use of signed numbers was given nineteen first place votes and an average of 2.80; fifth, by setting up a mathematical laboratory with exhibits of all the instruments and devices that had been made by the students and purchased by the school was given five first place votes for an average of 4.12.

(3) The three methods of creating interest in written problems listed on the questionnaire were rated in the following order on the returned questionnaires: first, by beginning with problems the students can master and gradually leading into harder problems was given seventy-one first place votes for an average of 1.26; second, by giving them clear definitions of all the terms normally used in the problems was given twenty-two first place votes for an average of 1.99; third, by using mathematical puzzles was given eight first place votes for an average of 2.64.

(4) The three methods of creating interest in factoring listed in the questionnaire were rated as follows by the teachers answering the questionnaire: first, by comparing factoring with division was given forty-one first place votes for an average of 1.69; second, by stressing that factoring is just a form of grouping was given twenty-

five first place votes for an average of 2.02; third, by stressing the necessity of proper factoring in working problems later on in algebra was given twenty-nine first place votes for an average of 2.14.

(5) The two methods of creating interest in quadratic equations were rated almost the same. In first place by only six hundredths of a point was the method of using scientific problems which must be solved by the quadratic method and letting the students see the many uses of this type of problem in scientific study. It received forty-eight first place votes for an average of 1.45. In second place, with forty-one first place votes and an average of 1.51, was the use of problems such as how long it will take a baseball to fall from the top of a building.

II. A COMPARISON OF THE RESULTS FROM THE THREE SECTIONS OF NORTH CAROLINA

In the previous two tables and the discussion, an overall look at the results of the questionnaire was given. A better understanding of the methods used in each section of North Carolina is shown by the ratings of each of the ways of creating interest given in Table IV.

TABLE IV

A COMPARISON OF THE RATINGS OF TEACHERS FROM EACH OF THE THREE SECTIONS OF NORTH CAROLINA

Ways of creating interest	MOUNTAIN		PIEDMONT		COASTAL	
	Number rating	Average rating	Number rating	Average rating	Number rating	Average rating
GENERAL						
1. By stressing the usefulness of algebra after high school graduation	25	1.88	42	2.02	24	1.63
2. By stressing the necessity of algebra in order to study higher mathematics	25	1.92	44	2.50	25	2.00
3. By constructing mathematical instruments which illustrate different aspects of algebra	16	3.62	31	3.35	23	2.39
4. By giving rewards to the ones who show the most improvement	19	4.21	26	5.35	15	3.60
5. Motion pictures	15	4.47	23	5.39	12	4.50
6. Film strips	16	4.80	23	4.78	14	4.29
7. By stressing the disciplinary value of algebra	21	4.81	34	4.26	18	3.11
8. By stressing grades	20	5.35	27	5.10	15	4.53

TABLE IV (continued)

Ways of creating interest	MOUNTAIN		PIEDMONT		COASTAL	
	Number rating	Average rating	Number rating	Average rating	Number rating	Average rating
IN SPECIFIC TOPICS						
SIMPLE EQUATIONS						
1. Demonstration by use of the balance scales	23	1.96	43	1.907	26	1.12
2. By explaining their use in solving many problems of everyday life	25	2.20	44	1.909	26	1.85
3. By explaining that it is necessary in order to work problems later on in algebra	25	2.60	42	3.24	27	2.33
4. By carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention	24	2.71	41	2.34	27	2.56
SIGNED NUMBERS						
1. By using a number scale to illustrate the fundamentals of signed numbers	25	1.72	44	1.89	27	1.48
2. By using a thermometer	23	2.18	39	2.08	25	2.32
3. By carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention	25	2.72	42	2.55	25	2.60

TABLE IV (continued)

Ways of creating interest	MOUNTAIN		PIEDMONT		COASTAL	
	Number rating	Average rating	Number rating	Average rating	Number rating	Average rating
SIGNED NUMBERS (continued)						
4. By giving examples that are used in everyday life which can be solved better by the use of signed numbers	24	2.88	38	2.87	25	2.68
5. By setting up a mathematical laboratory with exhibits of all the instruments and devices that have been made by the students and purchased by the school	14	4.36	26	4.08	18	4.06
WRITTEN PROBLEMS						
1. By beginning with problems they can master and gradually leading into harder problems	27	1.26	45	1.33	24	1.37
2. By giving them clear definitions of all terms normally used in the problems	27	2.15	43	1.91	25	1.92
3. By using mathematical puzzles	17	2.82	34	2.67	22	2.45
FACTORING						
1. By comparing factoring with division	23	1.96	41	1.61	25	1.60

TABLE IV (continued)

Ways of creating interest	MOUNTAIN		PIEDMONT		COASTAL	
	Number rating	Average rating	Number rating	Average rating	Number rating	Average rating
FACTORING (continued)						
2. By stressing the necessity of proper factoring in working problems later on in algebra	26	2.00	42	2.19	24	2.08
3. By stressing that factoring is just a form of grouping	24	2.08	36	2.03	22	2.18
QUADRATIC EQUATIONS						
1. By using scientific problems which must be solved by the quadratic method and letting them see the many uses of this type of problem in scientific study	25	1.44	38	1.45	23	1.48
2. By using problems such as how long it will take a baseball to fall from the top of a building	23	1.52	36	1.47	20	1.55

Findings. (1) In the general ways of creating interest the following were rated in the same order by each of the three sections: first, by stressing the usefulness of algebra after high school graduation; second, by stressing the necessity of algebra in order to study higher mathematics; and third, by constructing mathematical instruments which illustrate different aspects of algebra.

(2) Giving rewards to the student who shows the most improvement was rated fourth in the Mountain section, fifth in the Coastal section, and seventh in the Piedmont, showing a great variation in the success of giving rewards to help create interest in algebra.

(3) The use of motion pictures was rated fifth in the Mountain section, seventh in the Coastal, and eighth in the Piedmont section. There were only fifty teachers who rated this as a method of creating interest.

(4) Film strips were rated almost the same in each of the three sections, with the Piedmont section rating it in fifth place, while the Mountain and Coastal sections rated it in sixth place. Again, only fifty-three of the one hundred teachers gave film strips a rating as a method which they used to create interest in algebra.

(5) The Piedmont and Coastal sections rated the stress of the disciplinary value of algebra above the Mountain section. The first two rated it in fourth place, while the

latter placed it in seventh place. A larger number of teachers rated this than rated the previous two on motion pictures and film strips.

(6) The Mountain and Coastal sections rated the stressing of grades as the least used and least successful way of creating interest in algebra. The Piedmont section rated it as their sixth best method, with only twenty-seven out of the forty-four reporting as using this method.

(7) The Mountain and Coastal sections rated the ways of creating interest in simple equations the same. The order of their ratings are as follows: first, demonstration by use of the balance scales; second, by explaining their use in solving many everyday problems; third, by explaining that it is necessary in order to work problems later on in algebra; and fourth, by carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention. The Piedmont section gave the first two almost the same rating with only two thousandths of a point difference. The last two were interchanged from the way the other two sections rated them.

(8) All three sections of North Carolina seemed to agree on the order in which the list of ways to create interest should be arranged in regard to signed numbers, written problems, and quadratic equations. Each of the three sections rated them in the same order as they are listed in Table IV,

page 38.

(9) The average ratings of all three of the ways to create interest in factoring were almost the same. The greatest difference in any section between the first place average and the third place average was only seventy-eight hundredths of a point. This difference was shown by both the Piedmont and the Coastal sections. The Mountain section showed only twelve hundredths of a point difference.

III. A COMPARISON OF THE RESPONSES FROM THOSE WHO HAD TAUGHT FEWER THAN TEN YEARS WITH THOSE WHO HAD TAUGHT MORE THAN TEN YEARS

It has been said that experience is the best teacher. Table V, therefore, has been set up to show the relationships between the ratings of the teachers who had taught more than ten years and those who had taught fewer than ten years.

Findings. (1) The two groups rated a great number of the items in the same order. The ways of creating interest were rated the same in each of the following groups: simple equations, signed numbers, written problems, and factoring. The items are listed in the order in which they were rated in Table V.

(2) The teachers with fewer than ten years' experience rated motion pictures and stressing of disciplinary

TABLE V

A COMPARISON OF THE RATINGS OF TEACHERS WITH MORE THAN TEN YEARS' EXPERIENCE WITH THE RATINGS OF TEACHERS WITH FEWER THAN TEN YEARS' EXPERIENCE

Ways used to create interest	MORE THAN TEN YEARS		FEWER THAN TEN YEARS	
	Number rating	Average rating	Number rating	Average rating
GENERAL				
1. By stressing the usefulness of algebra after high school graduation	48	2.06	44	1.64
2. By stressing the necessity of algebra in order to study higher mathematics	49	2.22	44	1.98
3. By constructing mathematical instruments which illustrate different aspects of algebra	39	3.36	29	3.17
4. By stressing grades	32	4.19	28	4.39
5. By stressing the disciplinary value of algebra	38	4.50	35	3.51
6. By giving rewards to the ones who show the most improvement	32	4.66	28	4.57
7. Film strips	28	4.86	24	4.54
8. Motion pictures	28	5.14	23	4.43

TABLE V (continued)

Ways used to create interest	MORE THAN TEN YEARS		FEWER THAN TEN YEARS	
	Number rating	Average rating	Number rating	Average rating
IN SPECIFIC TOPICS				
SIMPLE EQUATIONS				
1. Demonstration by use of the balance scales	45	1.82	47	1.89
2. By explaining their use in solving many problems of everyday life	49	2.00	46	2.06
3. By carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention	48	2.67	43	2.36
4. By explaining that it is necessary in order to work problems later on in algebra	49	3.06	46	2.63
SIGNED NUMBERS				
1. By using a number scale to illustrate the fundamentals of signed numbers	50	1.82	45	1.64
2. By using a thermometer	45	2.24	41	2.07
3. By carefully explaining the meaning of terms, using clever definitions to attract the pupils' attention	48	2.77	46	2.47

TABLE V (continued)

Ways used to create interest	MORE THAN TEN YEARS		FEWER THAN TEN YEARS	
	Number rating	Average rating	Number rating	Average rating
SIGNED NUMBERS (continued)				
4. By giving examples that are used in everyday life which can be solved better by the use of signed numbers	42	2.86	44	2.70
5. By setting up a mathematical laboratory with exhibits of all the instruments and devices that have been made by the students and purchased by the school	30	4.07	28	4.18
WRITTEN PROBLEMS				
1. By beginning with problems they can master and gradually leading into harder problems	49	1.31	45	1.36
2. By giving them clear definitions of all terms normally used in the problems	48	1.96	47	2.02
3. By using mathematical puzzles	41	2.73	32	2.56
FACTORING				
1. By comparing factoring with division	47	1.77	41	1.69
2. By stressing that factoring is just a form of grouping	45	2.11	38	1.97

TABLE V (continued)

Ways used to create interest	MORE THAN TEN YEARS		FEWER THAN TEN YEARS	
	Number rating	Average rating	Number rating	Average rating
FACTORING (continued)				
3. By stressing the necessity of proper factoring in working problems later on in algebra	49	2.16	43	2.12
QUADRATIC EQUATIONS				
1. By using scientific problems which must be solved by the quadratic method and letting them see the many uses of this type of problem in scientific study	47	1.36	39	1.58
2. By using problems such as how long it will take a baseball to fall from the top of a building	45	1.60	47	1.38

value as better methods of creating interest than did the teachers with more than ten years' experience.

(3) The two groups disagreed completely on which was the best method to use in creating interest in quadratic equations. The group who had taught more than ten years placed the use of scientific problems first, while the group who had taught fewer than ten years placed the use of such problems as how long it would take a baseball to fall from the top of a building in first place.

IV. A SUMMARY OF THE SPECIAL COMMENTS GIVEN BY THE TEACHERS RETURNING THE QUESTIONNAIRES ON HOW TO CREATE INTEREST IN FIRST YEAR ALGEBRA

Many of the teachers listed ways of creating interest other than those mentioned in the questionnaire. The remainder of this chapter will be devoted to the summarization of these comments.

General ways. The following is a list of the ways suggested to create interest in first year high school algebra.

1. By keeping daily records and showing the pupil the importance of daily preparation.
2. By selling the idea that algebra is easy.
3. By concentrating individual help on the lower end of the class.

4. By stressing thorough preparation of every lesson under the supervision of the teacher, with no homework.
5. By having former students and people in industry visit the class and speak of the need for algebra in their lines of work.
6. By stressing the need of algebra as a tool for all sciences.
7. By challenging students to master new material.
8. By showing that it is necessary to understand many things in our modern world.
9. By making the class atmosphere so pleasant they will associate algebra with pleasant things.
10. By grouping the class so they will be able to work at a rate at which they are capable.
11. By stressing the ability to think clearly.
12. By stressing that they must have it to meet college entrance requirements.
13. By stressing personal satisfaction.
14. By having students create their own problems that can be solved by algebra only.
15. By showing the fun in working algebra.
16. By having contest between rows.
17. By stressing the satisfaction of reasoning in a logical way.

18. By effective teaching.

Specific topics. A few ways were given for the specific topics which were listed in the questionnaire. These are listed under each of the topics.

Simple equations

1. By using charts.
2. By using film strips.
3. By using number puzzles.

Signed numbers

1. By using the example of owing debts as minus, and paying debts as plus.
2. By using the example of steps forward as plus, and steps backward as minus.
3. By correlating signed numbers with topics in science and physics.
4. By using charts.
5. By using film strips.
6. By presenting all four fundamentals of signed numbers in one day and then drilling on all at the same time.

Written problems

1. By letting students make up problems of their own.
2. By stressing the importance of reading and thinking

for himself.

3. By following a set pattern for all problems.
4. By having the students read the problem, close the book, and tell what was given and what is to be found.

Factoring

1. By the use of flash cards.
2. By showing that factoring is the reverse of multiplication.

Quadratic equations

1. By using graphs.
2. By using the area of a rectangle.
3. By using problems in which the students will show special interest.
4. By encouraging the desire to master difficult things.

Many of the above ways of creating interest were mentioned by only one person, and some were mentioned by two or more. Since so few mentioned each of these ways, there was no way of rating them.

CHAPTER V

SUMMARY AND CONCLUSIONS

The problem of this investigation was to determine the ways of creating interest in specific topics of first year high school algebra which were being used in the white high schools of North Carolina, and also to determine which of these ways was most successful when used by a large group of teachers throughout North Carolina. In this final chapter are presented a brief summary of the problem and statements of the conclusions reached.

A statement of the problem and the importance of the study were presented in Chapter I. The purposes of the study, also presented in the first chapter, were to evaluate the methods used to create interest in algebra, to discover and compile into one volume new ways of creating interest, and to provide suggestions for other teachers and prospective teachers on how to create interest in first year algebra.

The method of procedure, which was also described in Chapter I, involved the collection of data from the library at Appalachian State Teachers College and from a questionnaire sent to teachers of mathematics in thirty counties of North Carolina. The findings of this study were based upon the analyses of the data gathered from

the questionnaire.

In Chapter II a brief summary of the previous studies was given. Very little had been written on how to create interest in the specific topics of algebra; therefore, much of this chapter dealt with methods of creating interest in algebra in general. Many of the ways discussed are methods which can be used in other branches of mathematics as well as in algebra. The major parts of these methods were given with the references to the source from which more details can be obtained.

Chapter III dealt with the material used and presented a brief discussion on how the counties were selected.

In Chapter IV, the ratings of the ways used by the teachers to create interest were presented in three ways. First, they were presented as they were rated by all the teachers returning the questionnaire; second, a comparison of the results from each of the three sections of North Carolina; and third, a comparison of the results from the teachers who had taught more than ten years with those who had taught fewer than ten years.

Based on the analyses of the data presented in Chapter IV, the major findings of this study are as follows:

1. The average ratings of the teachers showed that they had more success creating interest by stressing the usefulness of algebra after high school

graduation than with any one of the others listed. Rated as of second greatest importance was stressing the necessity of algebra in order to study higher mathematics.

2. The use of the balance scales was rated as the best method to use in creating interest in solving simple equations.
3. The number scale was given as the best method to create interest in the use of signed numbers.
4. More interest could be created in the solving of written problems by beginning with problems the students could master and gradually leading into harder problems than with the other methods.
5. A greater amount of interest could be created in working with factoring by comparing it with division than with the other methods.
6. There was very little difference in the ratings from each of the three sections of North Carolina on all the ways to create interest given on the questionnaire.
7. The number of years' experience had very little effect on the order in which they rated the methods.

I. CONCLUSIONS

In consideration to the present study, the following

conclusions appear to be most justifiable:

1. A large number of teachers of mathematics are interested in how to create more interest in first year high school algebra (Table I).
2. Teachers of mathematics are not making use of the many valuable films and film strips on algebra to help create interest (Table II).
3. There are many methods of creating interest that all teachers do not know about. The number of ways listed by the teachers on the questionnaire compared with the number listed by more than one teacher indicated that each teacher has his own method.

II. SUGGESTIONS FOR FURTHER STUDY

1. An evaluation of the preparation given to prospective teachers of mathematics in connection with how to stimulate interest in the different topics of algebra.
2. An evaluation of all methods of creating interest in first year high school algebra.
3. A study of why students do not show more interest in first year high school algebra.
4. An evaluation of why more films and film strips are not used to create interest in algebra.

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APPENDIX A

SUGGESTED LIST OF MATHEMATICS BOOKS

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*Inserted by writer.

APPENDIX B

Box 16
Boone, North Carolina
November 7, 1955

Dear Math Teachers:

Your help is needed! Your cooperation will be greatly appreciated.

The aim and purpose of this questionnaire is to compile a thesis stating ways of creating interest in first year high school algebra. This will be placed in the Appalachian State Teachers College Library in hopes that it will be of great benefit to mathematics teachers in the future.

The questionnaire is being sent to some 220 schools all over the state. Please make your contribution by answering promptly. Thank you for your cooperation.

Sincerely,

Paul W. Jolley

QUESTIONNAIRE ON WAYS OF CREATING INTEREST IN SPECIFIC AREAS IN FIRST YEAR HIGH SCHOOL ALGEBRA

Please fill in each of the questions as it pertains to your situation. In parts III and IV you are to rate each of the ways listed according to the effectiveness of their use in your particular situation. If you are using other methods that are not listed, please list and rate along with the ones listed.

I. EDUCATIONAL STATUS OF TEACHER

MAJOR_____ MINOR_____

KIND OF CERTIFICATE_____

II. TEACHING EXPERIENCE

NUMBER OF YEARS TEACHING IN HIGH SCHOOL_____

NUMBER OF YEARS TEACHING ALGEBRA I_____

NUMBER OF CLASSES YOU NOW TEACH OF EACH OF THE FOLLOWING:

GENERAL MATHEMATICS_____

ALGEBRA I _____

ALGEBRA II _____

PLANE GEOMETRY _____

OTHERS (LIST) _____

III. GENERAL WAYS USED TO CREATE INTEREST IN ALGEBRA.

DIRECTIONS: Rate these according to the effectiveness of their use in <u>your</u> class. Place a (1) in front of the best way, a (2) in front of the second best, etc.

_____ BY STRESSING THE USEFULNESS OF ALGEBRA AFTER HIGH SCHOOL GRADUATION

_____ BY STRESSING THE NECESSITY OF ALGEBRA IN ORDER TO STUDY HIGHER MATHEMATICS

_____ BY CONSTRUCTING MATHEMATICAL INSTRUMENTS WHICH ILLUSTRATE DIFFERENT ASPECTS OF ALGEBRA

_____ MOTION PICTURES

_____ FILM STRIPS

_____ BY STRESSING THE DISCIPLINARY VALUE OF ALGEBRA

_____ BY GIVING REWARDS TO THE ONES WHO SHOW THE MOST IMPROVEMENT

_____ BY STRESSING GRADES

_____ OTHERS (LIST)_____

_____ _____

IV. WAYS USED TO CREATE INTEREST IN THE DIFFERENT TOPICS IN ALGEBRA.

(Follow same directions as in part III for each part of part IV)

A. SIMPLE EQUATIONS

_____ DEMONSTRATION BY USE OF THE BALANCE SCALES

_____ BY CAREFULLY EXPLAINING THE MEANING OF TERMS, USING CLEVER DEFINITIONS TO ATTRACT THE PUPILS' ATTENTION

_____ BY EXPLAINING THEIR USE IN SOLVING MANY PROBLEMS OF EVERYDAY LIFE

_____ BY EXPLAINING THAT IT IS NECESSARY IN ORDER TO WORK PROBLEMS LATER ON IN ALGEBRA

_____ OTHERS (LIST) _____

_____ _____

B. SIGNED NUMBERS

_____ BY USING A NUMBER SCALE TO ILLUSTRATE THE FUNDAMENTALS OF SIGNED NUMBERS

_____ BY USING A THERMOMETER

_____ BY CAREFULLY EXPLAINING THE MEANING OF TERMS, USING CLEVER DEFINITIONS TO ATTRACT THE PUPILS' ATTENTION

_____ BY SETTING UP A MATHEMATICAL LABORATORY WITH EXHIBITS OF ALL THE INSTRUMENTS AND DEVICES THAT HAVE BEEN MADE BY THE STUDENTS AND PURCHASED BY THE SCHOOL

_____ BY GIVING EXAMPLES THAT ARE USED IN EVERYDAY LIFE WHICH CAN BE SOLVED BETTER BY THE USE OF SIGNED NUMBERS

_____ OTHERS (LIST) _____

_____ _____

C. WRITTEN PROBLEMS

_____ BY BEGINNING WITH PROBLEMS THEY CAN MASTER AND GRADUALLY LEADING INTO HARDER PROBLEMS

_____ BY GIVING THEM CLEAR DEFINITIONS OF ALL TERMS NORMALLY USED IN THE PROBLEMS

_____ BY USING MATHEMATICAL PUZZLES

_____ OTHERS (LIST) _____

_____ _____

D. FACTORING

_____ BY STRESSING THE NECESSITY OF PROPER FACTORING IN WORKING PROBLEMS LATER ON IN ALGEBRA

_____ BY COMPARING FACTORING WITH DIVISION

_____ BY STRESSING THAT FACTORING IS JUST A FORM OF GROUPING

_____ OTHERS (LIST) _____

_____ _____

E. QUADRATIC EQUATIONS

_____ BY USING PROBLEMS SUCH AS HOW LONG IT WILL TAKE A BASEBALL TO FALL FROM THE TOP OF A BUILDING

_____ BY USING SCIENTIFIC PROBLEMS WHICH MUST BE SOLVED BY THE QUADRATIC METHOD AND LETTING THEM SEE THE MANY USES OF THIS TYPE OF PROBLEM IN SCIENTIFIC STUDY

_____ OTHERS (LIST) _____

_____ _____

APPENDIX C

LIST OF SCHOOLS TO WHICH QUESTIONNAIRES WERE SENT

MOUNTAIN SECTION

NAME OF SCHOOL	PRINCIPAL	ADDRESS
ASHE COUNTY		
Beaver Creek	Paul Bingham	West Jefferson
Healing Springs	J. Paul Miller	Crumpler
Jefferson	R. O. Jackson	Jefferson
Lansing	Frank James	Lansing
Nathan's Creek	Paul A. Perkins	West Jefferson
Riverview	Herbert Graybeal	Fig
Virginia-Carolina	L. K. Halsey	Grassy Creek
AVERY COUNTY		
Cranberry	J. T. Tanner	Elk Park
Crossnore	Dwight A. Fink	Crossnore
Newland	James C. Beasley	Newland
BUNCOMBE COUNTY		
Barnardsville	S. O. Wilde	Asheville, Route 4
Biltmore	George Jarvis	Fletcher
Black Mountain	N. C. Shuford	Black Mountain
Candler	Dan B. Cooke	Candler
David Millard	G. T. Leonard	Asheville
Emma	L. P. Miller	Asheville, Route 4
Fairview	Wm. W. Goodson	Fairview
Flat Creek	Ed Roberson	Asheville, Route 4
French Broad	Frank B. Mann	Alexander
Hall Fletcher	T. H. Hunt	Asheville
Lee H. Edwards	O. L. Norment	Asheville
Leicester	D. C. McKenzie	Asheville
Oakley	M. L. Nesbitt	Biltmore
Red Oak	Herman C. Morgan	Biltmore
Sand Hill	C. C. Marr	Candler, Route 2
Swannonoa	E. N. Howell	Swannonoa
Valley Springs	L. Guy Ensley	Skyland
Weaverville	Clark Pennell	Weaverville
West Buncombe	Guy W. Bentley	Asheville, Route 4
Woodfin	Charles Shuford	Arden

NAME OF SCHOOL	PRINCIPAL	ADDRESS
GRAHAM COUNTY		
Robbinsville	James A. Stanley	Robbinsville
Stecoah	Glenn Tolliver	Stecoah
HAYWOOD COUNTY		
Bethel	C. C. Poindexter	Canton
Clyde	Stanly Livingston	Clyde
Crabtree-Iron Duff	Fred L. Safford	Clyde, Route 1
Fines Creek	Perry W. Plemmons	Luck
Waynesville	C. E. Weatherby	Waynesville
Canton High	W. L. Rikard	Canton
HENDERSON COUNTY		
Dana	C. F. Jervis	Hendersonville
Edneyville	Wm. J. Nesbitt	Edneyville
Etowah	H. T. Sitton	Hendersonville
Flat Rock	E. L. Justus	Flat Rock
Fletcher	W. Albert Hill	Edneyville
Hendersonville	Hugh D. Randall	Hendersonville
Mills River	A. M. Foster	Horse Shoe
MADISON COUNTY		
Hot Springs	Thomas S. Hood	Hot Springs
Marshall	Bernard Brigman	Marshall
Mars Hill	J. D. Warrick	Mars Hill
Spring Creek	A. E. Harrington	Spring Creek
Walnut	Ralph E. Neill, Jr.	Walnut
White Rock	H. W. Cook	Marshall, Route 3
MCDOWELL COUNTY		
Glenwood	Frank Howell	Glenwood
Nebo	E. L. Brown	Nebo
North Cove	James E. Johnson	North Cove
Old Fort	P. W. Greer	Old Fort
Pleasant Gardens	R. L. Wiggins	Marion, Route 4
Marion	Charles C. Elledge	Marion

NAME OF SCHOOL	PRINCIPAL	ADDRESS
WATAUGA COUNTY		
Appalachian High	A. B. Crew	Boone
Bethel	Clyde S. Greene	Sugar Grove
Blowing Rock	James Storie	Blowing Rock
Cove Creek	John Bingham	Sugar Grove
YANCEY COUNTY		
Bald Creek	Erskine B. Bailey	Toledo
Bee Log	Edgar Hunter, Jr.	Burnsville
Burnsville	Garrett Anglin	Burnsville
Clearmont	E. D. Wilson	Burnsville, Route 1
Micaville	Shelby L. Robertson	Burnsville
PIEDMONT SECTION		
ALAMANCE COUNTY		
Alexander Wilson	G. B. Robbins	Graham, Route 2
Altamahaw-Ossipee	J. Allen Thacker	Altamahaw
Eli-Whitney	Wade Fuquay	Graham, Route 2
Elon College High	James W. Hill	Elon College
E. M. Holt	L. M. Adcock	Burlington, Route 1
Graham	R. L. Hill	Graham
Haw River	H. O. Brannon	Haw River
Mebane	E. M. Yoder	Mebane
Pleasant Grove	E. F. Isley	Burlington, Route 3
Sylvan	A. M. Primm	Snow Camp
Walter Williams	C. C. Linneman	Burlington
CABARRUS COUNTY		
Bethel	S. R. McEachern	Midland, Route 1
Harrisburg	R. M. Peele	Harrisburg
Hartsell	Frank L. Austin	Concord, Route 9
Mt. Pleasant	Luther A. Adams	Mt. Pleasant
Odell	W. B. Thomas	Concord, Route 2
Winecoff	H. L. Hart	Concord, Route 8
Concord High	Ralph A. Glenn	Concord
A. L. Brown	Fred O. Drummond	Kannapolis
Junior High	Lester W. McCarn	Kannapolis

NAME OF SCHOOL	PRINCIPAL	ADDRESS
DAVIE COUNTY		
Cooleemee	V. G. Prim	Cooleemee
Farmington	S. G. Wallace	Farmington
Mocksville	Charles L. Farthing	Mocksville
Shady Grove	J. D. Parker, Jr.	Advance
GASTON COUNTY		
Belmont High	Gerald Cortner	Belmont
Bessemer City Central	L. C. Ward	Bessemer City
Cramerton	W. S. Haynie	Cramerton
Dallas	Mitchell Carr	Dallas
Flint Groves	R. K. Hancock	E. Gastonia
Lowell	H. M. Holbrook	Lowell
Mt. Holly	Laxton Hambrick	Mt. Holly
Orthopedic	Rebecca Neely	Gastonia
Stanley	O. L. Kiser	Stanley
Tryon	H. F. Lovingood	Bessemer City
Cherryville High	Erskine W. Carson	Cherryville
Arlington Jr. High	William B. Hodges	Gastonia
Gastonia High	F. L. Ashley	Gastonia
Joe S. Wray Jr. High		Gastonia
IREDELL COUNTY		
Celeste Henkel	Fred Hollis	Statesville, Route 3
Central	Raymond Modlin, Jr.	Statesville, Route 2
Cool Spring	R. B. Madison	Cleveland, Route 2
Harmony	O. B. Welch	Harmony
Presbyterian Orph	R. G. Calhoun	Barium Springs
Scotts	R. L. Bradford, Jr.	Scotts
Troutman	Ralph Sinclair	Statesville
Union Grove	Robert W. Lancaster	Union Grove
Central	W. J. Scott	Mooresville
Statesville	Asa Watt Deal	Statesville
D. Matt Thompson	J. F. Donnelly	Statesville
ORANGE COUNTY		
Aycock	John T. Smith	Hillsboro, Route 2
Hillsboro	G. A. Brown	Hillsboro
Chapel Hill High	Wesley J. Noble	Chapel Hill

NAME OF SCHOOL	PRINCIPAL	ADDRESS
PERSON COUNTY		
Bethel Hill	W. C. Hopkins	Woodsdale
Helena	Glen N. Titus	Roxboro
Indian	Sidney T. Perkins	Roxboro, Route 2
Roxboro High	Jerry L. Hester	Roxboro
RANDOLPH COUNTY		
Coleridge	E. H. Thompson	Coleridge
Farmer	J. F. Barrier	Farmer
Franklinville	Y. L. Holland	Franklinville
Gray's Chapel	Otis C. Thomas	Franklinville
Liberty	B. U. White	Liberty
Randleman	L. H. Ballard	Randleman
Ramseur	C. A. Cox	Ramseur
Seagrove	J. R. Barker	Asheboro
Staley	Lacy Pressnell, Jr.	Staley
Trinity	T. H. Smith	Trinity
Asheboro	Joseph M. Johnston	Asheboro
STOKES COUNTY		
Francisco	L. E. Collins	Francisco
Germanton	Claude Purgason	Germanton
King	C. M. Felts	King
Lawsonville	Luther S. Dockery	Lawsonville
Pine Hall	E. L. Stoudemayer	Pine Hall
Pinnacle	Tolar Haynes	Pinnacle
Reynolds	C. T. Barbour	Westfield
Sandy Ridge	R. J. Gibson	Sandy Ridge
Walnut Cove	R. G. Thomas	Walnut Cove
VANCE COUNTY		
Aycock	H. E. Rose	Henderson, Route 2
Dabney	Cyrus M. Johnson	Henderson, Route 3
Middleburg	E. O. Young, Jr.	Middleburg
Townsville	Sarah Boyd	Townsville
Zeb Vance	R. C. Young	Kittrell, Route 1
Henderson High	Frederick D. Kesler	Henderson

NAME OF SCHOOL	PRINCIPAL	ADDRESS
	COASTAL PLAIN	
BERTIE COUNTY		
Aulander	P. T. Jones	Aulander
Colerain	Thaddeus L. Lee	Colerain
Mars Hill	F. M. Tucker	Colerain
Merry Hill	J. P. Love	Merry Hill
Windsor	Talmadge O. Page	Windsor
Woodville-Lewiston	Jessie L. McDaniel	Lewiston
BLADEN COUNTY		
Bladenboro	J. W. Black	Bladenboro
Clarkton	W. R. Latham	Clarkton
Elizabethtown	Bruce H. Hill	Elizabethtown
Tar Heel	Thurston Little	Tar Heel
White Oak	C. P. Ashley	White Oak
BRUNSWICK COUNTY		
Bolivia	Frederick McClure	Bolivia
Leland	Holland Manning	Leland
Shallotte		Shallotte
Southport	H. T. Sanders	Southport
Waccamaw	A. G. Green	Ash
CRAVEN COUNTY		
Dover	John G. Long	Dover
Farm Life	E. P. Blair	Vanceboro
Jasper	John W. Hamilton	New Bern, Route 2
New Bern	W. E. Brinkley	New Bern
CUMBERLAND COUNTY		
Central	D. S. McCormick	Fayetteville, Route 1
Gray's Creek	B. M. Harmon	Fayetteville, Route 3
Hope Mills	E. M. Honeycutt	Hope Mills
Linden	C. W. Collier	Linden, Route 1
Massey Hill	V. C. Mason	Fayetteville
Seventy-First	Loyd E. Auman	Fayetteville, Route 3
Stedman	T. M. Johnson	Stedman
Fayetteville High	Sam R. Edwards	Fayetteville

NAME OF SCHOOL	PRINCIPAL	ADDRESS
DUPLIN COUNTY		
Beaulaville	W. Ray Humphrey	Beaulaville
B. F. Grady	H. M. Wells	Albertson
Calypso	H. E. Grubbs	Calypso
Chinquapin	R. L. Pruitt	Chinquapin
Faison	Robert A. Gray	Faison
Kenansville	Z. W. Newkirk	Magnolia
Rose Hill	W. R. Teachey	Rose Hill
Wallace	E. D. Edgerton	Wallace
Warsaw	J. P. Harman	Warsaw
GATES COUNTY		
Gatesville	Ernest E. Askew	Gatesville
Hobbsville	T. J. Jessup	Hobbsville
Sunbury	R. L. Shirlen	Sunbury
MARTIN COUNTY		
Bear Grass	H. V. Parker, Jr.	Williamston, Route 2
Jamesville	W. C. Gray	Jamesville
Oak City	G. P. Cullipher	Oak City
Robersonville	C. B. Martin	Robersonville
Williamston	Burton G. Stewart	Williamston
ROBESON COUNTY		
Allenton	J. C. Hawkins	Lumberton, Route 5
Barnesville	E. P. Lockamy	Barnesville
Barker-Ten Mile	Carlyle Cox	Lumberton, Route 1
Orrum	Harold G. Hulon	Orrum
Parkton	H. E. Rogers	Parkton
Rowland	Young H. Allen	Rowland
Smiths	M. R. Rich	Lumberton
Fairmont High	R. O. McCollum	Fairmont
Lumberton High	Thos. L. White	Lumberton
Maxton	David M. Singley	Maxton
Red Springs High	Albert Irby	Red Springs
St. Pauls High	Carlton T. Fleetwood	St. Pauls

NAME OF SCHOOL	PRINCIPAL	ADDRESS
SAMPSON COUNTY		
Clement	J. B. Mitchell	Autryville, Route 1
Franklin	G. W. Crowley	Harrells
Garland	John L. Johnson	Garland
Halls	John A. Warren	Clinton, Route 5
Herring	Claude H. Moore	Clinton, Route 1
Ingold-Taylor's Bridge	D. B. Oliver	Ingold
Mingo	Thomas C. Webb	Dunn, Route 1
Newton Grove	B. C. Scott	Newton Grove
Piney Grove	John W. King	Faison, Route 1
Plain View	Fred A. Ficquett	Dunn, Route 5
Roseboro	H. P. Naylor	Roseboro
Salemburg	Chas. L. Pearce	Salemburg
Turkey	H. D. Copeland	Turkey
Westbrook	R. F. Autry	Newton Grove, Route 2
Clinton High	M. Ren Hoek	Clinton