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The effects the new curriculum in mathematics has upon negro teachers in Chickasaw County, Mississippi

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THE EFFECTS THE NEW CURRICULUM IN MATHEMATICS HAS UPON NEGRO TEACHERS IN CHICKASAW COUNTY MISSISSIPPI

A THESIS SUBMITTED TO THE FACULTY OF ATLANTA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

BY
JULIA BOWEN WILLIAMS

SCHOOL OF EDUCATION

ATLANTA, GEORGIA
AUGUST 1964
DEDICATION

To my late husband Earl Williams, Sr., whose faith and encouragement sustained me; to my three sons, Earl, Jr., Lancelot Othello and "Bunny" whose constant encouragement has been a real inspiration; to my only daughter "Terry" for her assistance in many small ways; and to my beloved sisters, Frances, Berniece and Terusia who played the parental role to the children and kept the home fires burning while I tarried there.

J.B.W.
ACKNOWLEDGMENTS

The writer wishes to express her sincere and most profound thanks and appreciation to the mathematics teachers, the education teachers and to all others who have contributed to the successful completion of this study. She wishes to express special thanks to Dr. Edward K. Weaver, advisor; Dr. Lawrence E. Boyd, co-advisor; and to Dr. Horace M. Bond, Dean, School of Education.

J.B.W.
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CHAPTER I

INTRODUCTION

Rationale.--The challenge to American education is greater than the impact of the remarkable scientific and technological upsurge evident in Russia. The real challenge is in the revolutionary stride man has made in extending control over his environment.¹ This advancement is essentially due to the application of science to technology and the consequent organization and industrialization of the American society. Mathematics has had an important role to play in this process. The twentieth century has been the golden age of mathematics; far more theoretical mathematics and applied mathematics have been created in this time than in any previous period in history.

Probability and statistical inference have important applications to all phases of the physical and biological sciences, the behavioral sciences, and engineering. Linear programming, dating from 1948, aids in large-scale industrial

and governmental operations. Operations research and quality control employ statistical techniques which are important to many industries.

Automation has necessitated the use of many mathematical and analytical procedures necessary to solve design and development problems. Computers now solve in seconds or minutes problems which once would have taken days, weeks, or months. These automatic digital computing machines make it possible, when teamed with mathematical theory, to solve many problems required by physicists and other scientists.¹ Though the end is not predictable, it is obvious that many changes are yet to be made to meet the needs of the society which has emerged.

To meet the many challenges of this age, we need more and better trained teachers - teachers of mathematics and science if young people are to be inspired with the magnificent sense of adventure and the increasing opportunities which should encourage them to explore the ever-widening vista of knowledge and discovery open to them.

How well are curriculums of our schools meeting the demands of today? The Rockefeller Report on Education answers as follows:

The fateful question is not whether we have done well or whether we are doing better than we have done in the past, but whether we are meeting the stern demands and unparalleled opportunities of the times, and the answer is we are not.¹

With these changes in and contributions of mathematics, it has become essential that the mathematical curriculum in our schools be well planned and the mathematical knowledges and skills well taught. Because of this, the various mathematical organizations in the United States formulated the School Mathematics Study Group, out of which grew the new mathematics program. Some of these new programs were:

1. The University of Illinois Committee on School Mathematics (U.I.C.S.M.)
2. The University of Maryland Mathematics Project (U.M.M.P.)
3. The Ball State Teachers Experimental Program
4. The Greater Cleveland Mathematics Program

One of the prerequisites for the improvement of the teaching of mathematics, is an improved curriculum in science, technology and other areas of knowledge, and at the same time, one which reflects new advances in mathematics itself.² Such

a curriculum allows the content of much of the "new" mathematics work to remain the same as in the traditional curriculum, but it also requires some modification. What has been changed is, first, the area of emphasis, and second, some of the language of mathematics. This change should be reflected, also, in the attitude and philosophy on the part of the teacher and in the behaviors on the part of the children.¹

The traditional requirements for teaching mathematics was some college work, or a bachelor's degree, not necessarily in mathematics. Methods of teaching were characterized by a "tell and do" approach based on what books and teachers told with students doing as they were told. This methodology did as much an anything to stultify interest in mathematics. Now, however, the old method is being replaced by methods in which the spirit of question, exploration, and discovery becomes the process of learning rather than of memorization.²

The focal point of successful education in the teaching methodology in the "new mathematics" is the teacher.³

² Mathematics and Science Education in U. S. Public Schools, op. cit.
greatest factor in the successful use of this methodology is mathematical knowledge on the part of teachers. But in many classrooms, because teachers are lacking in this knowledge, one can see instances of meaningless teaching which results in a meaningless rate of learning by students.

Possible ways which may improve teacher qualifications are: in-service training, workshops, attendance at summer school, evening classes, or institutes sponsored by the national government and numerous foundations and industries.

The National Council of Teachers of Mathematics, and the Committee on the Undergraduate Program (C.U.P.M.), have proposed a minimum program for the updating of teacher certification. This program includes both college and high school preparation in mathematics. The proposed program is as follows: Three years of high school mathematics, followed by one year of college algebra, a year of trigonometry and analytical geometry, and, if possible, a year of logic. In the second year, differential and integral calculus should be studied. In the third year, one course in modern geometry and courses in probability, statistics and modern algebra are suggested.¹

With this background in mathematics, a prospective or

experienced teacher should be able to make his teaching more meaningful and productive, both in the classroom situation and in his profession. Furthermore, it should enable the teacher to contribute significantly to the changing society of which he is a part.

Evolution of the problem.--Many high schools have re-organized their curriculum so as to place emphasis on science and mathematics. This reorganization has sometimes resulted in placing of unqualified teachers in these areas. Among the influences leading to the resurge of interest in the "new mathematics" program was an abundant evidence of public dissatisfaction with the traditional mathematics program. The writer became interested in this problem while being in attendance, an academic year and a summer, in The National Science Foundation Institute at Atlanta University, Atlanta, Georgia. After completing this tenure and evaluating the outcome, the writer thought of ways by which a sequence of courses in mathematics could be secured that would accelerate the progress in the field of mathematics. A second factor which caused the writer to become interested in this area, was the fast growing National need for people skilled in the various branches of mathematics. Also, it had been observed by the writer that the level of mathematics competence of a large number of American high school graduates is low.
Colleges complain that the entering freshmen are poorly prepared in mathematics. The requirements in many high school graduation in many states are exceedingly limited. On the basis of these complaints, the writer assumed that too large a percentage of high school students are enrolled in an outmoded mathematics program since they appear to have difficulty when they enter college.

If the nation is indeed faced with, according to the research worker, a low level of mathematical competence, it was the writer's belief that a partial solution to our present shortage of manpower in areas of mathematics, may be found by making improvement in the appropriateness of course content for those who will go beyond the high school level. To achieve this end, it therefore seemed important to first examine the opinions of the teachers of Chickasaw County as to their present agreement or disagreement with opinions in the literature as to contemporary mathematics education.

Contribution to educational knowledge.--It is hoped that the findings of this study will achieve two things, namely:

1. To determine whether or not the concept of "New
Mathematics is taking effect in the state of Mississippi.

2. To encourage further research into philosophy, curriculum, and methodology of the "New Mathematics" approach.

Statement of the problem.--The primary problem and major purposes of this study were to ascertain the level of selected factors of teacher-personnel status together with the extent of agreement and disagreement of opinions on "traditional" and "New" mathematics as held by teachers in Chickasaw County, Mississippi as compared to the criteria principles of curriculum experts.

The purposes of the study.--The major purpose of this study was to determine the extent to which teachers of mathematics agree with or respect the findings of research and the formulations of mathematics educators as to the teaching and learning of modern mathematics. More specifically, the purposes of this research were to:

1. Determine selected factors on the educational status of mathematics teachers in the Chickasaw County, Mississippi, schools.

2. Determine the organization and placement of content of the mathematics program in the Chickasaw County, Mississippi, schools.

3. Determine the extent of agreement and disagreement for the selected teachers on the concept of: General Objectives and Specific Objectives.

4. Determine the extent of agreement and disagreement for the selected teachers on the content of the mathematics program according to grade level: (a) Grade nine, (b) Grade ten, (c) Grade eleven, and (d) Grade twelve.
5. Determine the agreement and disagreement of opinions on the methods of teaching and the process of learning as expressed by the teachers who were subjects of the study.

6. Determine the agreement and disagreement for the selected teachers on the specific factors of content and specific formulas of the mathematics program according to grade level: (a) Grade nine, (b) Grade ten, (c) Grade eleven, and (d) Grade twelve.

7. Formulate statements of findings, conclusions and recommendations that may be derived from the interpretation of the data.

Limitation of the study.--The essential limitations of the study are as follows:

1. The data for this study were obtained by a questionnaire.

2. The data were gathered from teachers in one area, Chickasaw County, Mississippi.

3. This study does not attempt to measure teacher competency, but was concerned solely with opinions.

Method of research.--The "Descriptive Survey Method" of research, utilizing the technique of the questionnaire, was used in collecting and interpreting the data.

Research procedure.--The procedural steps, used in conducting this study were as follows:

1. Permission to conduct this study was secured from the proper authorities.

2. The findings, conclusions and recommendations stemming from the analysis and interpretation of the data were compiled and presented in the final thesis copy.

Description of the subjects.--The subjects involved in
this study were the 35 or 100.00 per cent of the mathematics teachers of the Fannie Carter High School, Mississippi. Of this number, 10 or 28.99 per cent are male and 25 or 71.42 per cent are female.

Locale of the study.--This study was conducted in Chickasaw County, Mississippi, located in the Northeast section of Mississippi. The principle source of income is dairy farming, crop and row crop farming, and other small businesses provide additional sources for income.

During the year of 1962-1963, the county had an enrollment of 3,500 pupils, in its schools. The population of the county is approximately 15,000.

Definition of terms.--For the purpose of this study, the terms which follow carry the meanings ascribed to them:

1. "Traditional Method" - This method, often referred to as the drill method is one by which the learner practices or repeats a process again and again until it is learned, after an understanding is given by the teacher.\(^1\)

2. "New Method" - A method in which emphasis is placed on relationship, application, term analogy and undefined terms based on the postulates.\(^2\)


3. "Academic Training" - Refers to the courses in mathematics, taken at college level or above, which were pursued by the subjects.¹

Survey of related literature.--The significant aspects of the literature pertinent to the problem of this research which deals with the relative effectiveness of teaching and learning mathematics by the drill and meaning methods are reviewed in the paragraphs which follow.

Most people will agree that mathematics should be taught in a meaningful manner. Nearly everyone accepts the proposition that pupils should understand the concepts and language of mathematics, which appears in our lives in so many varied ways, that it may seem difficult to describe as a whole. Through the rote method, the child first meets what he considers to be mathematics when he begins to count and to do simple arithmetic. He thinks of mathematics as having to do with calculations which become more complicated as he advances in school. Hence, if given two instructional methods, and if one of them makes mathematics more meaningful to the pupil or produces greater understanding, many would prefer that one.² In a study of the meaning method, as it

¹Ibid., p. 14.
relates to a better understanding of mathematical concepts, Brownell and Moser compared the relative effectiveness of the decomposition method with other methods. When each group was taught in two ways, meaningfully and mechanically, the researchers, using a variety of data, found that the decomposition method when taught as meaningfully, was the most successful method.¹

Miller asserts that "the meaning method" offers the student an integration of the concepts and principles of arithmetic as well as computation of problems. The approach includes explanation of why the processes and work are given to the students. Rules are explained, not in isolated segments, but as conclusions based upon arithmetical definitions and principles.²

The problem of improving teacher-learning process is not a new one. It has existed for many years and can be traced back to the traditional schools of previous generations. Although the problem was found there, its intensity then cannot be equally compared with the grave need to improve mathematics teaching in the modern schools.


²G. H. Miller, "How Effective is the Meaning Method?" The Arithmetic Teacher, IV (1957), p. 46.
The drill theory as designated, by educators, was largely conceived of as mental gymnastics since previously the study of arithmetic involved merely the commitment to memory a succession of rules for performing processes, unconnected with each other, or with any rational principles.¹ It is evident, then, that no great demand for understanding and generalization were present and no great changes or improvements were really deemed necessary. The main idea was the achievement of memorization through repeated, oftimes meaningless, exposure to the idea, principle, or process to be learned. This is at the heart of the "drill theory."²

Today, the trend has changed in the teaching of mathematics from meaningless competitive exercises in computations to an understanding of the principles upon which the particular computation is based.

Further, the new mathematics is taught in a so-called life-activated experience which provides meaning and understanding to mathematical processes. It has to do with need, interests, responses and also the life outside of the school. The theory associated with this type of learning is called


the "meaning theory." Another theory called the "incidental learning" which emphasizes the principles that learning can and does take place within and because of the situational stimulation although the specific learning is not directly planned or sought for as a goal. It is based on the idea of arithmetical experiences which can be used as mathematical experiences integrated and related to real life situations.

The trend in methods is greatly influenced by the objectives of mathematics. When the aim is for computational skills, then, teaching follows mechanical methods, but when the aim is quantitative thinking along with computational skills, then, teaching follows rational methods. The drill method is being attacked today in terms of its worthiness to the process of learning. Some argue to abandon it, others say that its role needs clarifying. Caswell and Foshay states the role thusly:

While old-fashioned drills, neither assumes proficiency in a skill nor foster interest on the part of the learner, nevertheless, recurring opportunities to engage in the activity in which skill is sought are absolutely necessary to attain high levels of performance. Skill cannot be attained by the 'laying on the hand' or by wishful thinking.

Much new mathematics has come about as the result of scientific and technological changes and so does change occur

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in curriculum. As changes in a curriculum occur, the training of teachers in secondary and elementary schools must experience changes in their academic preparation if necessary, to develop competency in content and methodology. To meet these changes, departments of mathematics and education must work cooperatively to ensure that teachers of mathematics know "what" to teach and "how" to teach it. So that the change in the mathematics curriculum will be effective in developing new concepts and understandings over the traditional ones.¹

There have been many controversial issues over the "new" versus the "old" curriculum. Authorities in education agree that the issue is not whether the "new mathematics" or the "old mathematics" but whether the proper applications in mathematics are made to induce learning and understanding of these concepts. The broad general objectives of mathematical instruction have been classified by several educators, but their statements represent little more than differences in emphasis on various aspects of the practical disciplinary and cultural objectives as advocated by the National Committee on

Mathematical requirements. ¹ For example, Young wrote on the practical value of mathematics. He stated:

There is no subject except the use of mother tongue which is so intimately connected with everyday life, and so necessary to the successful conduct of affairs as mathematics.²

Of the disciplinary value, Young said:

The facts of mathematics, important and valuable as they are, are not the strongest justification for the study of the subject by all pupils. Still more important is the subject matter is the fact that it exemplifies most typically, clearly, and simply certain modes of thought which are the utmost importance to everyone.³

Klapper supported the stand taken by the National Committee on Mathematical Requirements when he expressed the objectives of mathematical instruction in terms of cultural values. Of the cultural value, Klapper said:

Mathematics like most subjects in the curriculum must be taught because society demands a set stock of knowledge before it will approve the cultural standing of any individual. It insist that he knows the meaning of mathematical terms and expressions found in daily newspapers, such as: 'the larger the divisor, the smaller the quotient.' 'A changing ratio,' 'the means and the extremes' and the like.⁴


³ Ibid., p. 41.

Bronell said:

Mathematics is a broad occupational field that affords many opportunities for employment. One of the most important scientific activity overlooked by girls and boys is the career in science and mathematics teaching.¹

Singleton said:

Mathematics is extending itself into many fields in which until recently it had not been used. Whether the student plans on entering college or not, he should be prepared to: understand and have competence in the process of arithmetic and mathematics in general, understand the deductive method of thought; see mathematics as a living subject.²

There are two principles which seem generally to be accepted in mathematics education which are also thoroughly related to general teaching and curriculum planning as stated by Phillip S. Jones.³

1. Mathematics should be taught with an emphasis on meaning and understanding that should in general precede practice and largely replace rote learning.

2. Meaning and understanding are not acquired instantaneously or completely at any one time but grow, develop, and extend within the student as he


has spiraled experiences with ideas and their applications.

In discussing a justification for the study of mathematics, Young states:

The facts of mathematics, important as they are, are not the strongest justification for the study of the subjects by all pupils. Still more important than the subject matter, mathematics is the fact that it exemplifies most typically, clearly and simply, certain modes of thought which are of the utmost importance to everyone.

David has generalized about the aims of mathematics as set forth by the National Committee on Mathematical Requirements, as follows:

1. The cultivation of an understanding of the fundamental concepts and processes of mathematics sufficient to perform efficiently the vocational task required of the individual.

2. The development of the power to think logically, to critically analyze a given situation, to determine relative values, and to reach definite conclusions which can be substantiated.

3. The acquisition of an appreciation of mathematics for its precision, beauty power, systematic organization, clarity of symbolic language, exact logical

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In a study made by Bush, it was found that the above objectives, which were advocated by Butler and Wren, were agreed upon by many educators. The majority of the subjects participating in the study were generally in agreement with the objectives listed below even though some were expressed differently.\footnote{Evelyn L. Bush, "Mathematics Programs in a Selected Group of Secondary Schools" (Unpublished Master's thesis, School of Education, Atlanta University, 1961), p. 109.}

Powell, in discussing the improvement of mathematics instruction, states:

\begin{quote}
The improvement in Mathematics program and teaching will depend upon the extent to which we identify the problem, coordinate our efforts, to solve them, and make the results known to all classroom teachers.\footnote{William Powell, Jr., "Relative Effectiveness of Two Techniques of Teacher Assignment in Algebra" (Unpublished Master's thesis, School of Education, Atlanta University, 1959).}
\end{quote}
CHAPTER II

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

In this chapter are presented the data which were gathered through administration of a questionnaire to thirty-five selected teachers of mathematics in the Chickasaw County School System, Mississippi. The data are presented, analyzed, interpreted and summarized under the following captions:

2. General Objectives.
3. Specific Objectives.
4. Curriculum Content.

Distribution of subjects by marital status.--Marriage is a socially recognized and approved union between two individuals of the opposite sex, made with the expectation of permanence and with the aim of producing offspring. Although many societies permit divorce, marriage is ideally designed for permanence. Of the 35 subjects responding, 23 or 65.14 per cent were married; five or 14.28 per cent were single;
TABLE 1

DISTRIBUTION OF SUBJECTS BY MARITAL STATUS

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
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<tbody>
<tr>
<td>Married</td>
<td>23</td>
<td>65.14</td>
</tr>
<tr>
<td>Single</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Widowed</td>
<td>3</td>
<td>8.57</td>
</tr>
<tr>
<td>Divorced</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>99.51</td>
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three or 8.57 per cent were widowed, and four or 11.42 per cent were divorced. The distribution of subjects by marital status has been opinionated in many ways. Some opinions are that married subjects in Chickasaw County Schools are preferred over the single subjects in that they are more stationary and the problem of re-adjustment with new teachers from year to year has been a major problem. (See Table 1.)

Distribution of subjects by sex.—Of the 35 subjects responding, 10 or 28.99 per cent were male and 25 or 71.42 per cent were females. While it is true, in general, that the percentage of female teachers is considerably higher than that of the male teachers in Chickasaw County, Mississippi, it is also true that the greater portion of male teachers in Chickasaw County chose secondary education. Informal interviews
revealed that male respondents who were in elementary education were there chiefly because at the time of their application for a teaching position in mathematics the elementary school was the area with the most extensive employment needs and this practice of not placing men teachers in the area of their concentration caused weaknesses in the mathematics program. (See Table 2.)

**TABLE 2**

**DISTRIBUTION OF SUBJECTS BY SEX**

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
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<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>28.99</td>
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<tr>
<td>Female</td>
<td>25</td>
<td>71.42</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>100.00</td>
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</table>

**Distribution of subjects by religion**.--The word religion has no one generally accepted definition. Philosophers, sociologists, psychologists, theologians and many others interested in a particular aspect of life have all defined religion in their own way, and for their own particular purposes. Some philosophers have called it the "collective expression of human values." Some scientists have referred to it as a "superstition of incoherent metaphysical unions," and some
psychologists refer to it as the mythical complex surrounding a projected super ego.

### TABLE 3

DISTRIBUTION OF SUBJECTS BY RELIGION

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
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<td>Episcopalian</td>
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<td>Methodist</td>
<td>8</td>
<td>22.85</td>
</tr>
<tr>
<td>Baptist</td>
<td>10</td>
<td>28.54</td>
</tr>
<tr>
<td>Catholic</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Presbyterian</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>No Affiliation</td>
<td>3</td>
<td>8.57</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>100.14</td>
</tr>
</tbody>
</table>

Of the 35 respondents, five or 14.28 per cent were Episcopalian; eight or 22.85 per cent were Methodist; 10 or 28.54 per cent were Baptist; four or 11.42 per cent were Catholic; five or 14.28 per cent were Presbyterian; and three or 8.57 per cent had no affiliation with any church. (See Table 3.)

Distribution of subjects by undergraduate and graduate degrees.--The undergraduate school is primarily used for generalized rather than specific study in a field. In order for a person to become a part of a field as a specialist, it
is necessary for him to pursue study on a higher level. Although the teachers college is more orientated towards education than the liberal arts college, both tend to lean toward specialization in a field rather than towards education, which includes an orientation course in natural science; greater specialization in one or more areas of science or mathematics and less in others. It may also be noted that since the trends of science are constantly changing, the degrees which were awarded whether from the teachers college or liberal arts college prior to 1950 are invalid in the new scientific age of today. More courses in mathematics and particularly the new mathematics are being taught on a higher and more specialized level.

The simple basic concepts of mathematics teaching have changed to an alarming degree within recent years. Even though teachers in Chickasaw County School System were mathematically trained from good colleges prior to the new mathematics program, they should participate in, and be in attendance at the various basic scientific institutes or organizations of the new mathematics program or their training will become extinct in teaching, and their understanding in the new mathematics will be limited. (See Table 4.)

Of the 35 subjects responding, 14 or 40.00 per cent had B.S. degrees from teachers colleges; nine or 25.72 per cent
had A.B. degrees from Liberal Arts colleges; five or 14.28 per cent had M.A. degrees and seven or 20.00 per cent had M.S. degrees. Although there were only 12 respondents with Master's degrees, there is a strong indication that this number will be doubled within a short period of time. This difference in degrees, and the college attended, account for the retraining of some of the teachers in teachers' colleges.

### TABLE 4

**DISTRIBUTION OF SUBJECTS BY UNDERGRADUATE AND GRADUATE DEGREES**

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.S.</td>
<td>14</td>
<td>40.00</td>
</tr>
<tr>
<td>A.B.</td>
<td>9</td>
<td>25.72</td>
</tr>
<tr>
<td>M.S.</td>
<td>7</td>
<td>20.00</td>
</tr>
<tr>
<td>M.A.</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Distribution of subjects by undergraduate schools attended. -- The distribution of subjects by undergraduate schools attended were: 14 or 40.00 per cent attended Rust College, Holly Springs, Mississippi; five or 14.28 per cent attended Jackson State College, Jackson, Mississippi, two or 5.72 per cent attended Mississippi Vocational College, Itta
Bena, Mississippi; four or 11.42 per cent attended Alcorn College, Alcorn, Mississippi; five or 14.28 per cent attended Tougaloo Southern Christian College, Tougaloo College, Jackson, Mississippi; and two or 5.72 per cent attended Mississippi Industrial College, Holly Springs, Mississippi. (See Table 5.)

**TABLE 5**

DISTRIBUTION OF SUBJECTS BY UNDERGRADUATE AND GRADUATE SCHOOLS ATTENDED

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rust College</td>
<td>14</td>
<td>40.00</td>
</tr>
<tr>
<td>Jackson State College</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Mississippi Vocational College</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Alcorn College</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Tougaloo College</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Mississippi Industrial College</td>
<td>2</td>
<td>5.71</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Most of these colleges are public sponsored by state or city in Mississippi. Rust, Tougaloo, and Mississippi Industrial Colleges are private owned. All are re-organizing their curriculums and setting up standards by which their program of mathematics and the teaching-learning situation
in Chickasaw may be in keeping with the newer trends in mathematics.

Distribution of subjects by graduate school attended.-- The requirements of education are gradually increasing to higher standards. The requirements during the period between 1920 and 1939 were seemingly unconceivably lower than between 1940 and 1958. There were more people in school during the twenties and thirties than at any other time in the history of education except at the present time. At this time, there are 21 or 60.00 per cent of the teachers in Chickasaw County schools seeking Master's degrees. However, among the persons seeking the doctoral degree, there were three or 8.57 per cent. This of course is understandable because many people who are in mathematics education retrained in successive years to extend their training in mathematics to a higher degree of certification in mathematics in general and the new mathematics. The data on the subjects by graduate school attended were: Fisk University, two or 5.71 per cent; Atlanta University, two or 5.71 per cent; Indiana University, four or 11.42 per cent; Northwestern University, two or 5.71 per cent; Tuskegee Institute, four or 11.42 per cent; Jackson State College, five or 14.28 per cent; Bradley University, three or 8.57 per cent; and Tennessee State University, seven or 20.00 per cent. (See Table 6.)
TABLE 6
DISTRIBUTION OF SUBJECTS BY GRADUATE SCHOOLS ATTENDED

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fisk University</td>
<td>2</td>
<td>5.71</td>
</tr>
<tr>
<td>Atlanta University</td>
<td>2</td>
<td>5.71</td>
</tr>
<tr>
<td>Indiana University</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Northwestern University</td>
<td>2</td>
<td>5.71</td>
</tr>
<tr>
<td>Tuskegee Institute</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Jackson State College</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Syracuse University</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Bradley University</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>Tennessee State University</td>
<td>7</td>
<td>20.00</td>
</tr>
<tr>
<td>No Graduate Work</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>99.94</td>
</tr>
</tbody>
</table>

The data indicates that the mathematics personnel of this study are aware of the need for more training in mathematics, hence, they are making efforts to improve their academic standing.

Distribution of subjects by minor field of study.--This study indicates that the largest number of teachers in the Chickasaw County Schools, Mississippi had minors in education. From statistics, the education minors received their degrees
before specialization in various fields of teaching in the new mathematics, therefore, there is a gap in his academic preparation.

**TABLE 7**

**DISTRIBUTION OF SUBJECTS BY MINOR FIELD OF STUDY**

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>11</td>
<td>31.42</td>
</tr>
<tr>
<td>Biology</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Chemistry</td>
<td>2</td>
<td>5.72</td>
</tr>
<tr>
<td>English</td>
<td>2</td>
<td>5.72</td>
</tr>
<tr>
<td>Social Studies</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Music</td>
<td>3</td>
<td>8.57</td>
</tr>
<tr>
<td>Mathematics</td>
<td>8</td>
<td>22.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The data on the distribution of the subjects by minor field of study were: of the 35 respondents, 11 or 31.42 percent had minors in elementary education; four or 11.42 percent had minors in biology; two or 5.72 percent had minors in English; five or 14.28 percent in social studies; eight or 22.22 percent, mathematics; and three or 8.57 percent, music. (See Table 7.)
The 35 summaries of academic preparation indicated that this was a moderately skilled and professionally trained group of participants in the study, despite the deficit who had not had any professional work.

As you will note from the chart appertaining to major and minor preparation studies, most of the teachers had majors in elementary education as their undergraduate work, hence, in theory, they should have had adequate professionalized understanding of the role and function of new mathematics in secondary schools teaching and learning situations. One may conclude then, that this was a well selected group of teachers to identify in the field of mathematics with a moderate concentration of professional training. Since it is generally held by professional educators, five years should be regarded as a necessity for properly trained teachers. One might be led to predict that the responses of the teachers would not reflect a very high level of sophistication in the various areas dealt with in this subject.

Distribution of subjects by major field of study.--The purpose of a college is to prepare students for a more enriching and rewarding future. There are two types of institutions which are attended primarily by those persons who are interested in becoming professional educators. They are the liberal arts colleges and the teachers colleges which were
designed for those persons interested in teaching, which allows more time for the methodical and procedural aspects of education.

TABLE 8
DISTRIBUTION OF SUBJECTS BY MAJOR FIELD OF STUDY

<table>
<thead>
<tr>
<th>Item</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>10</td>
<td>28.99</td>
</tr>
<tr>
<td>English</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>Education</td>
<td>16</td>
<td>48.57</td>
</tr>
<tr>
<td>Chemistry</td>
<td>3</td>
<td>8.57</td>
</tr>
<tr>
<td>Biology</td>
<td>2</td>
<td>5.71</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Of the 35 subjects, ten or 28.54 per cent had majors in mathematics; four or 11.42 per cent had majors in English; 16 or 45.71 per cent had majors in education; three or 8.57 per cent had majors in chemistry and two or 5.72 per cent in biology. This indicates that the respondents in major fields of study, specialized in one or more fields. (See Table 8.)

This small number of majors in mathematics is evidence that there is a need for more mathematics majors who have had training in the new mathematics program, and encourage more
students to pursue higher mathematics courses in the secondary schools.

**Distribution of subjects by mathematics courses taken.**--

The prerequisite for preparation in teaching the new mathematics is to have certain background courses in mathematics. The teachers in Chickasaw County, Mississippi had varied qualifications in this area of preparation. In analysis of the 35 respondents, 10 or 10.40 per cent had basic functions

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>10</td>
<td>10.40</td>
</tr>
<tr>
<td>Trigonometry</td>
<td>15</td>
<td>15.60</td>
</tr>
<tr>
<td>Plane Geometry</td>
<td>20</td>
<td>20.80</td>
</tr>
<tr>
<td>Calculus</td>
<td>14</td>
<td>14.56</td>
</tr>
<tr>
<td>Solid Geometry</td>
<td>12</td>
<td>12.48</td>
</tr>
<tr>
<td>Advance Calculus</td>
<td>11</td>
<td>11.44</td>
</tr>
<tr>
<td>Differential Geometry</td>
<td>14</td>
<td>14.56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>106</td>
<td>100.00</td>
</tr>
<tr>
<td>Algebra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abstract</td>
<td>15</td>
<td>37.65</td>
</tr>
<tr>
<td>Matrices</td>
<td>10</td>
<td>25.10</td>
</tr>
<tr>
<td>Geometry</td>
<td>10</td>
<td>35.14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>100.00</td>
</tr>
<tr>
<td>Foundations of Mathematics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theory</td>
<td>14</td>
<td>32.63</td>
</tr>
<tr>
<td>Symbolic Logic</td>
<td>14</td>
<td>32.63</td>
</tr>
<tr>
<td>Postulates</td>
<td>7</td>
<td>16.31</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>100.00</td>
</tr>
</tbody>
</table>
of analysis; 15 or 15.60 per cent, trigonometry; 20 or 20.80 per cent, plane geometry; 14 or 14.56 per cent, calculus; 12 or 12.48 per cent, solid geometry; 11 or 11.44 per cent, advanced calculus; 14 or 14.56 per cent, differential geometry. In the area of applications mechanics, 13 or 43.29 per cent; infinite series, 17 or 56.61 per cent. In the area of algebra, 15 or 37.65 per cent, abstract algebra; 10 or 25.10 per cent, matrices; 14 or 35.14 per cent, geometry. In the area of foundation of mathematics, 14 or 32.62 per cent had theory of sets; 14 or 32.62 per cent had symbolic logic; 15 or 34.95 per cent, postulates. (See Table 9.)

Therefore, the majority of the teachers in Chickasaw County, Mississippi had some of the major courses in the preparation of teachers' qualifications.

Distribution of subjects by mathematical journals read.--Of the 35 respondents, it was shown that the most widely read journals were the Mathematics Teacher and the National Education Association Journal which were read by 25 or 71.42 per cent. There were 11 publications of national circulation listed in addition to publications of the many local and regional organizations. The Mathematics Teacher was read by 20 or 57.14 per cent. Eleven or 31.42 per cent of this group read the National Education Association Journal; nine or 25.71 per cent read the Arithmetic Teacher; 35 or
100.00 per cent read local and regional professional organization. One subject indicated no reading of professional literature.

**TABLE 10**

**DISTRIBUTION OF SUBJECTS BY MATHEMATICAL JOURNALS READ**

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Mathematical Monthly</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>The Arithmetic Teacher</td>
<td>9</td>
<td>25.71</td>
</tr>
<tr>
<td>National Education Association Journal</td>
<td>11</td>
<td>31.42</td>
</tr>
<tr>
<td>Science and Mathematics Teacher</td>
<td>2</td>
<td>5.71</td>
</tr>
<tr>
<td>The Mathematics Teacher</td>
<td>20</td>
<td>57.42</td>
</tr>
<tr>
<td>Current Science</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>Science and Mathematics Teacher</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>Science World</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>Mathematical Journal</td>
<td>2</td>
<td>5.71</td>
</tr>
<tr>
<td>Education Digest</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

The listings in the table indicate a concern of the subjects with keeping abreast of what is transpiring in the area of mathematics periodical report developments. New programs under consideration or experimental stage; listing of
available teaching materials; successful classroom experiences of master teachers; opportunities for increasing teacher competence; and other pertinent material. (See Table 10.)

Distribution of subjects by type of position(s) held.--The data concerning the positions held indicated that of the 35 respondents, thirty or 85.71 per cent were instructors in mathematics while five or 14.28 per cent served in the capacity of chairman of their mathematics department.

TABLE 11
DISTRIBUTION OF SUBJECTS BY TYPE OF POSITION(S) HELD

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics Instructors</td>
<td>30</td>
<td>85.71</td>
</tr>
<tr>
<td>Chairman of Mathematics</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Departments</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>99.99</td>
</tr>
</tbody>
</table>

Distribution of subjects by years of employment as a teacher of mathematics.--The data concerning the years of employment as a teacher of mathematics were: one or 2.85 per cent of the 35 respondents had 1-4 years; four or 14.42 per cent, 4-6 years; one or 2.85 per cent, 6-8 years; five or 14.28 per cent, 8-10 years; eight or 22.85 per cent, 10-15 years;
years; 10 or 28.54 per cent, 14-20 years; five or 14.42 per cent, 20-31 years; and one or 2.85 per cent, 31-33 years.

The data concerning the employment and the years of teaching experience coincided in the eight year categories of teaching mathematics and experience on present job.

TABLE 12 AND 13
DISTRIBUTION OF SUBJECTS BY YEARS OF TEACHING EXPERIENCE IN MATHEMATICS AND DISTRIBUTION OF SUBJECTS BY TEACHING EXPERIENCE ON PRESENT JOB

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>4-6</td>
<td>4</td>
<td>11.42</td>
</tr>
<tr>
<td>6-8</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>8-10</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>10-15</td>
<td>8</td>
<td>22.85</td>
</tr>
<tr>
<td>15-20</td>
<td>10</td>
<td>28.54</td>
</tr>
<tr>
<td>20-31</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>31-33</td>
<td>1</td>
<td>2.85</td>
</tr>
</tbody>
</table>

Total 35 100.92

Distribution of subjects by teaching experience on present job.--The teaching experiences on present job in the Chickasaw County Schools, was found to be the same as the
distribution of subjects by years of teaching experience in mathematics, the only difference being that this study showed that the age group from 15-20 years had the longest tenure on present teaching job. Because of the identical figures, Table 12 and 13 are combined.

Distribution of subjects familiar with the commission on mathematics of the College Entrance Examination Board. -- Table 14 shows the distribution of subjects familiarity with the commission on mathematics of the College Entrance Examination Board. Of the 35 mathematics teachers responding, 30 or 85.71 per cent were familiar and five or 14.28 per cent were not familiar with this Board.

TABLE 14

DISTRIBUTION OF SUBJECTS FAMILIAR WITH THE COMMISSION ON MATHEMATICS

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiar</td>
<td>30</td>
<td>85.71</td>
</tr>
<tr>
<td>Not Familiar</td>
<td>5</td>
<td>14.28</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>99.99</td>
</tr>
</tbody>
</table>

Distribution of subjects by agreement and disagreement with the Commission of Mathematics for Programs for College-Capable Students. -- The distribution of subjects by agreement and disagreement with the Commission on Mathematics Program
for College-Capable Students was, 34 or 97.14 per cent agreed while one or 2.85 per cent disagreed. This indicated that there was a togetherness on the acceptance of the Commission’s program in mathematics for college-capables. (See Table 15.)

**TABLE 15**

**DISTRIBUTION OF SUBJECTS BY AGREEMENT AND DISAGREEMENT WITH THE COMMISSION ON MATHEMATICS FOR COLLEGE-CAPABLES**

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreed</td>
<td>34</td>
<td>97.14</td>
</tr>
<tr>
<td>Disagreed</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>99.99</td>
</tr>
</tbody>
</table>

*Distribution of subjects by agreement and disagreement of general objectives in the "new mathematics".*--The data on the agreement and disagreement of the general objectives for the "new mathematics" as suggested by the Commission on Mathematics. These objectives make application to a strong preparation in developing understanding in mathematical structure and for treatment of mathematical concepts and skills for college bound freshmen indicated that: 34 or 97.42 per cent were in agreement while one or 2.57 per cent were not in agreement. (See Table 16.)
TABLE 16

DISTRIBUTION OF SUBJECTS BY AGREEMENT AND DISAGREEMENT OF GENERAL OBJECTIVES IN "NEW MATHEMATICS"

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>34</td>
<td>97.14</td>
</tr>
<tr>
<td>Disagreed</td>
<td>1</td>
<td>2.85</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>99.99</td>
</tr>
</tbody>
</table>

Distribution of subjects by agreement and disagreement of specific objectives in new mathematics, grades nine through twelve.--The data concerning the specific objectives of new mathematics by grade level 9-12. The extent of agreement and disagreement showed a togetherness in subject matter suggested since the agreement was 35 or 100.00 per cent. This indicates also that with these objectives one might expect and understanding of the deducative methods as a way of thinking and a reasonable skill in applying this method to mathematical situations as stressed by the sponsoring organizations for grade.

The data concerning the agreement and disagreement of the specific objectives for grade ten showed that 28 or 80 per cent agreed with the objectives while seven or 20.00 per cent disagreed. This indicates that most of the teachers
were in agreement with the objectives of the College Entrance Examination Board.

TABLE 17

DISTRIBUTION OF SUBJECTS BY AGREEMENT AND DISAGREEMENT OF SPECIFIC OBJECTIVES IN THE "NEW MATHEMATICS" GRADES NINE THROUGH TWELVE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Agreement</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>9</td>
<td>35</td>
<td>100.00</td>
</tr>
<tr>
<td>10</td>
<td>28</td>
<td>80.00</td>
</tr>
<tr>
<td>11</td>
<td>20</td>
<td>57.42</td>
</tr>
<tr>
<td>12</td>
<td>35</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
<td>337.42</td>
</tr>
</tbody>
</table>

The data of agreement and disagreement of the specific objectives for grade eleven showed 20 or 57.42 per cent agreed and 15 or 42.85 per cent did not agree. This percentage showed that the majority of the teachers in this category showed the subjects accepted the position of the authorities in the field of mathematics.

The data of agreement and disagreement on the specific objects of the new mathematics program were of the 35 subjects all the subjects were in a togetherness on the agreement
and disagreement of statements in that, of the 35 subjects, all or 100.00 per cent were in complete agreement with grade 12 while none disagreed. (See Table 17.)

Distribution of subjects by agreement and disagreement of contents for grades nine through twelve as recommended by the National Committee on Mathematical Requirements.--The distribution of content for grades 9-12 as recommended by the National Committee on Mathematical Requirements on the content of the mathematics courses for 9-12.

There have been discussions for a long time that the traditional courses in high school mathematics were inadequate, and more recently, since the advent of the space age, there has come the conviction that the courses in the Junior Colleges are also in need of revision if they are to serve all the students. It was these discussions from study groups of dissatisfaction that gave rise to the reorganization movement which has gained acceptance by so many of the schools in the United States through the past few years.

Authors of textbooks differ among themselves with respect to order of topics and the arrangement of material, but they agree generally with respect to the subject matter to be included in the grades. This includes sequential organization; that is, for each mathematics course, the content is based upon instruction which proceeded it and in the
preparation for the courses that follow. Provision is made also for transfer of students from one sequence to another.

The data revealed that 31 or 88.56 per cent agreed to content for grade nine and four or 11.42 per cent did not agree. Thirty-five or 100.00 per cent agreed to grade ten; 30 or 85.71 per cent agreed to content for grade eleven; and five or 14.28 per cent did not agree. Thirty-four or 97.14 per cent agreed on the content for grade twelve while one or 2.85 per cent did not agree. (See Table 18.)

TABLE 18

DISTRIBUTION OF CONTENT BY SUBJECTS FOR GRADES NINE THROUGH TWELVE AS RECOMMENDED BY THE NATIONAL COMMITTEE ON MATHEMATICAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Grade</th>
<th>Agreement</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>9th</td>
<td>31</td>
<td>88.56</td>
</tr>
<tr>
<td>10th</td>
<td>35</td>
<td>100.00</td>
</tr>
<tr>
<td>11th</td>
<td>30</td>
<td>85.71</td>
</tr>
<tr>
<td>12th</td>
<td>34</td>
<td>97.14</td>
</tr>
<tr>
<td>Total</td>
<td>134</td>
<td>82.83</td>
</tr>
</tbody>
</table>

Distribution of subjects by agreement and disagreement with specific content grades nine through twelve.--Of the 35 respondents, 35 or 100.00 per cent agreed to specific content
for grade nine; 30 or 85.71 per cent agreed to content for grade ten, while five or 14.28 per cent disagreed. Thirty-five or 100.00 per cent agreed to specific content for grade eleven while none disagreed; 34 or 97.14 per cent agreed to specific content for grade twelve, while one or 2.85 per cent disagreed. (See Table 19.)

**TABLE 19**

**DISTRIBUTION OF SUBJECTS BY AGREEMENT AND DISAGREEMENT WITH SPECIFIC CONTENT**

**GRADES NINE THROUGH TWELVE**

| Grade | Agreement | | Disagreement |
|---|---|---|
| | Number | Per Cent | Number | Per Cent |
| 9th | 35 | 100.00 | | |
| 10th | 30 | 85.71 | 5 | 14.28 |
| 11th | 35 | 100.00 | | |
| 12th | 34 | 97.14 | 1 | 2.85 |
| Total | 130 | 71.44 | 6 | 28.56 |
CHAPTER III

SUMMARY AND CONCLUSIONS

Rationale

Recapitulation of theoretical bases of the study.--The challenge to American education is greater than the impact of the remarkable scientific and technological upsurge evident in Russia. The real challenge is in the revolutionary stride man has made in extending control over his environment.\(^1\) This advancement is essentially due to the application of science to technology and the consequent organization and industrialization of the American Society. Mathematics has had an important role to play in this process. The twentieth century has been the golden age of mathematics; far more theoretical mathematics and applied mathematics have been created in this time than in any other previous period in history.

To meet the many challenges of this age, we need more and better trained teachers--teachers of mathematics and science, if young people are to be inspired with the magnificent

sense of adventure and the increasing opportunities which should encourage them to explore the ever widening vistas of knowledge and discovery open to them.

How well are curriculums of our schools meeting the demands of today? The Rockefeller Report on Education answers as follows:

The fateful question is not whether we have done well or whether we are doing better than we have done in the past, but whether we are meeting the stern demands and unparalleled opportunities of times, and the answer is we are not.¹

With these changes in and contributions of mathematics, it has become essential that the mathematical curriculum in our schools be well planned and the mathematical knowledge and skills well taught. Because of this, the various mathematical organizations in the United States formulated the School Mathematics Study Group, out of which grew the new mathematics program. Some of these new programs are:


3. The Ball State Teachers Experimental Program.

4. The Greater Cleveland Mathematics Program.

Possible ways which may improve teacher qualifications

are in-service training, workshops, attendance at summer school, evening classes, or institutes sponsored by the national government and numerous foundations and industries.

The National Council of Teachers of Mathematics, and the Committee of the Undergraduate Program, (C.U.P.M.), have proposed a minimum program for the updating of teacher certification. This program includes both college and high school preparation in mathematics. The proposed program is as follows: Three years of high school mathematics, followed by one year of college algebra, a year of trigonometry, and analytical geometry and if possible a year of logic. In the second year, differential and integral calculus should be studied. In the third year, one course in modern geometry and courses in probability, statistics and modern algebra are suggested. In the fourth year, courses in higher algebra II and theory of numbers.\(^1\)

With this background in mathematics, a prospective or inexperienced teacher should be able to make his teaching more meaningful and productive, both in the classroom situation and in his profession. Furthermore, it should enable the teacher to contribute significantly to the changing

society of which he is a part.

Evolution of the problem.--The writer's interest in this specific problem was incited and developed during a year of fellowship at the National Science Foundation Institute, Atlanta University, Atlanta, Georgia. It was because of this academic interest in the "New Mathematics" that the writer chose to fulfill the research requirement for the Master of Arts degree by conducting this study of the "New Mathematics" curriculum.

Contribution to educational knowledge.--It is hoped that the findings of this study will achieve two things, namely:

1. To determine whether or not the concept of "New Mathematics" is taking effect in the state of Mississippi.

2. To encourage further research into philosophy, curriculum, and methodology of the "New Mathematics" approach.

Statement of the problem.--The primary problem and major purposes of this study were to ascertain the level of selected factors of teacher-personnel status together with the extent of agreement and disagreement of opinions on "traditional" and "New" mathematics as held by teachers in Chickasaw County, Mississippi as compared to the criteria principles of curriculum experts.

The purposes of the study.--The major purpose of this
study was to determine the extent to which teachers of mathematics agree with or respect the findings of research and the formulations of mathematics educators as to the teaching and learning of modern mathematics. More specifically, the purposes of this research were to:

1. Determine selected factors on the educational status of mathematics teachers in the Chickasaw County, Mississippi, Schools.

2. Determine the organization and placement of content of the mathematics program in the Chickasaw County, Mississippi, Schools.

3. To determine the extent of agreement and disagreement for the selected teachers on the concepts of: General Objectives and Specific Objectives.

4. Determine the extent of agreement and disagreement for the selected teachers on the content of the mathematics program according to grade level: (a) Grade nine, (b) Grade ten, (c) Grade eleven, and (d) Grade twelve.

5. Determine the agreement and disagreement of opinions on the methods of teaching and the process of learning as expressed by the teachers who were subjects of the study.

6. Determine the agreement and disagreement for the selected teachers on the specific factors of content and specific formulas of the mathematics program according to grade level: (a) Grade nine, (b) Grade ten, (c) Grade eleven, and (d) Grade twelve.

7. Formulate statements of findings, conclusions and recommendations that may be derived from the interpretation of the data.

Definition of terms.--The significant terms used throughout the research were operationally defined, with
reference to the source material used.

1. "Traditional Method" - This method, often referred to as the drill method is one by which the learner practices or repeats a process again and again until it is learned, after an understanding is given by the teacher.¹

2. "New Method" - A method in which emphasis is placed on relationship application, terminology and undefined terms based on the postulates.²

3. "Academic Training" - This refers to the courses in mathematics, taken at the college level or above, which were pursued by the subjects.³

Recapitulation of the research-design of the study.--

Significant aspects of the locale and research-design of the study are outlined below.

1. Locale and period of the study: This study was conducted in Chickasaw County, Mississippi, located in the Northeast section of Mississippi. The principal source of income is dairy farming, crop and row crop farming and other small businesses provide additional sources of income. During the year of 1962-63, the county had an enrollment of 3,500 pupils.

2. Method of research: The descriptive survey method of research was used to collect the data.


3. Subjects: The subjects of this study were the 35 mathematics teachers of the Chickasaw County, Mississippi, Schools.

4. Instrument used: This was a modification of a previously constructed and validated as well as much used questionnaire on the degree of agreement and disagreement of teachers with the principles of content and methodology in mathematics instruction set forth as criteria by the questionnaire instrument.

5. Criterion of reliability: The criterion of reliability of the data collected was the willingness to and accuracy of the subjects' reaction to the questionnaire items.

6. Research procedure: The procedural steps used in conducting this study were as follows:

a. Permission to conduct this study was secured from the proper authorities.

b. The findings, conclusions, implications and recommendations stemming from the analysis and interpretation of the data was compiled and presented in the final thesis copy.

Summary of related literature.--The twentieth century has been the golden age of mathematics; far more theoretical mathematics and applied mathematics have been created in this
time than in any other previous period in history. To meet
the many challenges of this age and period we need more and
better trained teachers—teachers of mathematics and science
if young people are to be inspired with the magnificent sense
of adventure and the increasing opportunities which should
encourage them to explore the ever widening vistas of knowl-
dedge and discovery open to them.

How well are the curriculums of our schools meeting the
demands of today? The Rockefeller Report on Education answers
as follows:

The fateful question is not whether we have done well
or whether we are doing better than we have done in the
past, but whether we are meeting the stern demands of un-
paralleled opportunities of time, and the answer is we
are not.1

With these changes in the contribution of mathematics,
it has become essential that the mathematical curriculum in
our schools be well planned and the mathematical knowledges
and skills well taught. Because of this, the various organ-
izations in the United States formulated the School Math-
ematics Study Group, out of which grew the New Mathematics
Program. Some of these new programs are:

1. The University of Illinois Committee on School

2. The University of Maryland Mathematics Project,
   (U.M.M.P.).

1Rockefeller Brothers Fund, Inc., op. cit.
3. The Ball State Teachers Experimental Program.

4. The Greater Cleveland Mathematics Program.

The National Council of Teachers of Mathematics, and the Committee on Undergraduate Programs, (C.U.P.M.) have proposed a minimum program for updating teacher certification. This program includes both high school and college preparation in mathematics. The proposed program is as follows: Three years of high school mathematics, followed by one year of college algebra, a year of trigonometry and analytical geometry and if possible a year of logic. In the second year, differential and integral calculus should be included. In the third year, one course in modern algebra, probability, statistics and a course in modern geometry is suggested. In the fourth year, a course in modern algebra II and theory of numbers are suggested.¹

With this background in mathematics, a prospective or inexperienced teacher should be able to make his teaching more meaningful and productive, both in the classroom situation and in his profession in general. Furthermore, it should enable the teacher to contribute significantly to the changing society of which he is a part.

The problem of improving teacher-learning process is not a new one. It has existed for many years and can be traced back to the traditional schools of previous generations. Although the problem was found there, its intensity then cannot be equally compared with the grave need to improve mathematics teaching in the modern schools.

The drill theory as designated, by educators, was largely conceived of as mental gymnastics, since previously the study of arithmetic involved merely the commitment to memory of a succession of rules for performing processes, unconnected with each other, or with any rational principles.¹

It is evident, then, that no great demand for understanding and generalization were present and no great changes or improvements were really deemed necessary. The main idea was the achievement through memorization, through repeated, oftimes meaningless, exposure to the idea, principles, or process to be learned. This is at the heart of the drill theory.² Today the trend has changed in the teaching of mathematics from meaningless competitive exercises in computations to an understanding of the principles upon which


the computation is based. Further, the new mathematics is taught in a so-called life activated experience which provides meaning and understanding to mathematical processes. It has to do with need, interest, responses, and also the life outside of the school. The theory associated with this type of learning is called the "meaning theory."

Another theory called the "incidental learning" which emphasizes the principles that learning can and does take place within, and does take place within, and because of the situational stimulation although the specific learning, if not directly planned or sought for as a goal.

There are two principles which seem to be generally accepted in mathematics education which are also thoroughly related to general teaching and curriculum planning as stated by Phillip S. Jones.¹

1. Mathematics should be taught with an emphasis on meaning and understanding, that should in general precede practice and largely replace rote learning.

2. Meaning and understanding are not acquired instantaneously or completely at any one time, but grow, develop and extend within the student as he has spiraled experiences with ideas and their applications.

In discussing a justification for the study of mathematics, Young states:

The facts of mathematics, important as they are, are not the strongest justification for the study of the subject by all pupils. Still more important than the subject matter, mathematics is the fact that it exemplifies, most typically, clearly, and simply, certain modes of thoughts which are of the utmost importance to every one.¹

David generalized about the aims of mathematics as set forth by the National Committee on Mathematical Requirements as follows:

1. The cultivation of an understanding of the fundamental concepts and processes of mathematics sufficient to perform efficiently the vocational task required of the individual.

2. The development of the power to think logically, to critically analyze a given situation, to determine relative values, and to reach definite conclusions which can be substantiated.

3. The acquisition of an appreciation of mathematics for its precision, beauty, power, systematic organization, clarity of symbolic language, exact logical reasoning, and its great capacity for yielding generalizations and predictions.²

In a study made by Bush, it was found that the above objectives which were advocated by Butler and Wren, were agreed upon by many educators. The majority of the subjects that participated in the study were generally in agreement with the objectives listed below, even though some were


expressed differently.¹

Powell, in discussing the improvement in mathematics instruction states:

The improvement in mathematics programs and teaching will depend upon the extent to which we identify the problem, coordinate our efforts to solve them, and make the results known to all classroom teachers.²

Summary of basic findings.--The basic findings of this study are set forth in the separate statements which follow:

1. Marital Status. Table 1 revealed that 23 or 65.14 per cent were married; five or 14.28 per cent were single; three or 8.57 per cent were widows and four or 11.42 per cent were divorced. There were a total of 35 subjects involved in this study.

2. Sex. Table 2 revealed that 10 or 28.89 per cent were male; and that 25 or 71.42 per cent were female. There were 35 subjects in this study.

3. Religion. Table 3 revealed that five or 14.28 per cent of the subjects were Episcopalian; eight or 22.85 per cent were Methodist; 10 or 28.54 per cent were Baptist; four or 11.42 per cent were Catholic; five or 14.28 per cent were Presbyterian; and three or 8.57 per cent had no affiliation with any church.

4. Undergraduate and Graduate Degrees. Table 4 revealed that there were 14 or 40.00 per cent that had B.S. degrees; nine or 25.00 per cent had A.B. degrees; five or 14.28 per cent had M.A. degrees; and that seven or 20.00 per cent had M.S. degrees.


5. **Undergraduate Schools Attended.** Table 5 revealed that there were 14 or 40.00 per cent attended Rust College; five or 14.28 per cent attended Jackson State College; five or 14.28 per cent attended Mississippi Vocational College; four or 11.42 per cent attended Alcorn College; five or 14.28 per cent attended Tougaloo College; and that two or 5.71 per cent attended Mississippi Industrial College.

6. **Graduate Schools Attended.** Table 6 revealed that two or 5.71 per cent attended Fisk University; two or 5.71 per cent attended Atlanta University; four or 11.42 per cent attended Indiana University; two or 5.71 per cent attended Northwestern University; four or 11.42 per cent attended Tuskegee Institute; five or 14.28 per cent attended Jackson State College; one or 2.85 per cent attended Syracuse University; one or 2.85 per cent attended Bradley University; and seven or 20.00 per cent attended Tennessee State University.

7. **Minor Field of Study.** Table 7 revealed that eight or 22.00 per cent had minors in mathematics; 11 or 31.42 per cent had minors in education; four or 11.42 per cent had minors in biology; two or 5.71 per cent had minors in chemistry; two or 5.71 per cent had minors in English; five or 14.28 per cent had minors in social studies; and three or 8.57 per cent had minors in music.

8. **Major Field of Study.** Table 8 revealed that ten or 28.99 per cent had majors in mathematics; four or 11.42 per cent had majors in English; 16 or 48.57 per cent had majors in education; three or 8.57 per cent had majors in chemistry; and that two or 5.71 per cent had majors in biology.

9. **Major Courses in the Area of Analysis.** Table 9 revealed that 10 or 9.6 per cent had courses in analysis; 15 or 15.60 per cent had courses in trigonometry; 20 or 20.80 per cent had courses in plane geometry; 14 or 14.56 per cent had courses in calculus; 12 or 12.48 per cent had courses in solid geometry; 11 or 11.44 per cent had courses in advance calculus; and that 14 or 14.56 per cent had courses in differential geometry.
a. Application - In the area of application, the study revealed that 13 or 13.52 per cent had infinite series and that 17 or 17.68 per cent had mechanics. In the area of algebra, the study revealed that 15 or 15.60 per cent had matrices; 10 or 10.40 per cent had abstract algebra; and that 14 or 14.56 per cent had geometry. In the area of Foundation of Mathematics, the study revealed that 14 or 14.56 per cent had Set Theory; 14 or 14.56 per cent had symbolic logic; and that 15 or 15.60 per cent had postulates.

10. Mathematical Journals Read by Subjects. Table 10 revealed that one or 2.85 per cent read the American Mathematical Monthly; nine or 25.71 per cent read the Arithmetic Teacher; 20 or 57.42 per cent read the Mathematics Teacher; one or 2.85 per cent read the Classroom Teacher; one or 2.85 per cent read the Current Science; one or 2.85 per cent read the Mathematical Weekly; two or 5.71 per cent read Science and Mathematics Teacher; one or 2.85 per cent read Science World; two or 5.71 per cent read the Mathematical Journal; and that one read the Education Digest.

11. Positions Held. Table 11 revealed that five or 14.25 per cent were chairmen and that 30 or 85.50 per cent were mathematics instructors.

12. Tenure on Present Job. Table 12 revealed that one subject had 1-4 years of experience on present job; four had 4-6 years; one had 6-8 years; five had 8-10 years; eight had 10-15 years; 10 had 15-20 years; five had 20-31 years; and one had 31-33 years.

13. Teaching Experience in Mathematics. Table 13 revealed that one subject had 1-4 years of teaching experience in mathematics; four had 4-6 years; one had 6-8 years; five had 8-10 years; eight had 10-15 years; 10 had 15-20 years; five had 20-31 years; and one had 31-33 years.

14. Familiarity With Commission on Mathematics. Table 14 revealed that 30 or 87.14 were familiar and that five or 14.28 per cent were not familiar.

15. Agreement and Disagreement With Commission on
Mathematics for College-Capables. Table 15 revealed that 34 or 97.14 per cent agreed and that one or 2.85 per cent disagreed.

16. Agreement and Disagreement of General Objectives in "New Mathematics." Table 16 revealed that on the variables of general objectives for mathematics education was found that the extent of agreement and disagreement in concepts held between teachers and the criteria statement was as follows: The agreement between opinions and the criteria revealed that 34 or 97.14 per cent agreed to the general objectives and that one or 2.85 per cent disagreed.

17. Agreement and Disagreement of Specific Objectives in "New Mathematics" Grades 9-12. Table 17 revealed that the variables of specific objectives held between teachers' opinions and the criteria statement revealed that 34 or 97.14 agreed and that one or 2.85 per cent disagreed.

Grade Ten - The agreement and disagreement between teachers' opinions and the criteria on specific objectives revealed that there were 30 or 85.50 per cent agreed and that five or 14.28 per cent disagreed. There were more agreements than disagreements.

Grade Eleven - The agreement and disagreement between teachers' opinions and the criteria on the specific objectives revealed that there were 35 or 100.00 per cent that agreed and none disagreed. There was total togetherness on this objective.

Grade Twelve - The agreement and disagreement between teachers' opinions and the criteria on the specific objectives revealed that 34 or 97.14 per cent agreed and that one or 2.85 per cent did not agree. There were more agreements than disagreements.

18. Agreement and Disagreement on Content for Grades 9-12. Table 18 revealed that the agreement and disagreement between teachers' opinions and the criteria on the mathematics content recommended by the Commission on College Preparatory Mathematics that 35 or 100.00 per cent agreed.
Grade Ten - The agreement and disagreement between teachers' opinions and the criteria on the mathematics content recommended by the Commission on College Preparatory Mathematics revealed that there were 35 or 100.00 per cent who agreed. There was complete agreement on this specific objective.

Grade Eleven - The agreement and disagreement between teachers' opinions and the criteria on mathematics content recommended by the Commission on College Preparatory Mathematics revealed that there were 33 who agreed and two or 5.71 per cent disagreed.

Grade Twelve - The agreement and disagreement between teachers' opinions and the criteria on mathematics content recommended by the Commission on College Preparatory Mathematics revealed that there were 35 or 100.00 per cent agreement.

19. Agreement or Disagreement on Specific Content for Grades 9-12. In Table 19 the agreement and disagreement between teachers' opinions and the criteria on specific content as recommended by the Commission on College Preparatory Mathematics revealed that 35 or 100.00 per cent agreed and that none disagreed. There was complete agreement on the content for grade nine.

Grade Ten - The agreement and disagreement between teachers' opinions and the criteria on specific content as recommended by the Commission on College Preparatory Mathematics revealed that 30 or 85.71 per cent agreed, while five or 14.28 per cent disagreed.

Grade Eleven - The agreement and disagreement between teachers' opinions and the criteria on specific content as recommended by the Commission on College Preparatory Mathematics revealed that 35 or 100.00 per cent agreed. There was complete agreement here.

Grade Twelve - The agreement and disagreement between teachers' opinions and the criteria on specific content as recommended by the Commission on College Preparatory Mathematics revealed that 34 or 97.14 per cent agreed, while one or 2.85 per cent disagreed.
Conclusions and Implications

1. There is a need for more teachers with majors in mathematics.

2. There is a need for school officials to continue the in-service training program, seminars and workshops in mathematics to update teacher competency in the "New" mathematics as well as the "traditional" mathematics.

3. There is a need for all teachers of mathematics to familiarize themselves with the suggested program of the College Entrance Examination Board for college preparatory mathematics.

4. There is a need for more undergraduate and graduate courses to be taken by the mathematics teachers in the Chickasaw County School System.

5. There is a need for teachers with majors in mathematics to be placed in positions of teaching mathematics.

6. There is a need for teachers to continue reading mathematical journals, reports, articles and other mathematical materials to keep abreast of the new developments in mathematics.

7. There is a need for teachers to seek fellowships, scholarships and other financial assistance to attend institutes in the "New" mathematics.

8. There is a need for more teachers with a broad background in the suggested curriculum courses for teaching the "New" as well as the "traditional" mathematics.

Recommendations

Steps which may be taken to increase proficiency in the mathematics program in Chickasaw County Schools are:

1. That school system continue to inaugurate workshops, seminars, and in-service training programs to increase
teacher competency in mathematics teaching, and these programs should be operative throughout the academic year.

2. Teachers should be employed who have broad preparation in the "New" mathematics as well as the "traditional" mathematics.

3. Teachers should be placed in their major field (mathematics) when employed by the Chickasaw County School System.

4. Teachers should seek scholarship and fellowship grants to up-date their academic preparation in the "New" mathematics in general.

5. Teachers should continue subscribing to magazines and other mathematics literature to keep abreast with the new developments in mathematics.
BIBLIOGRAPHY

Books


Reports


**Unpublished Material**


APPENDIX
Dear Sir:

I am conducting a research study for a Master's degree at Atlanta University, Atlanta, Georgia. My topic is entitled "The Effect the New Curriculum in Mathematics Has Upon Negro Teachers in Chickasaw County." I urgently request your cooperation in collecting data by completing the enclosed questionnaire.

This questionnaire has been devised so as to require a minimum of writing and time. You will find a space reserved at the end of the questionnaire to write in any comments you desire. Comments on any items will be appreciated.

When this questionnaire has been properly executed, please return it to me by the enclosed self-addressed and stamped envelope. It is not necessary for you to sign your name.

Thank you very much for your time and consideration.

Very truly yours,

(Mrs.) Julia B. Williams
For: Teachers of Mathematics in Chickasaw County Mississippi

Part I

PERSONAL INFORMATION

Please indicate the appropriate responses in the space provided.

1. Married____ Single____ Widow(er)____ Divorced____

2. Sex: Male_____ Female_____

3. Church preference: Protestant____ Episcopal____
   Methodist____ Presbyterian____ Catholic_____

4. Degree(s) held:
   Bachelor of Arts____
   Bachelor of Science_____ Master of Science____
   Master of Arts____
   Further study beyond Master's degree toward Doctorate____
   Other:______________________________________________

5. Where did you earn your undergraduate degree? ___________
   ______________________________________________________________________

6. Where did you do your graduate work? (Write on lines below)

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<tr>
<th>Institution</th>
<th>Years Study</th>
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7. Major Field:________________ Minor Field:________________

8. Please check the mathematics courses you have had by using the following list:
a. Analysis:

- Basic functions of Analysis
- Trigonometry
- Plane Analytical Geometry
- Calculus
- Solid Analytic Geometry
- Advanced Calculus
- Differential Equations

b. Applications:

- Mechanics (Statistics or Dynamics)
- Infinite series

c. Algebra:

- Abstract Algebra (fields, rings, groups, linear algebra, vector spaces)
- Matrices
- Geometry

d. Foundations of Mathematics:

- Theory of Sets
- Mathematical or Symbolic Logic
- Postulates for Geometry

9. What mathematics magazines do you read? ________________

10. Indicate the type(s) of position(s) you now hold:

- Chairman of Mathematics Department
- Instructor of Mathematics
- Other(s) (specify) __________________________

11. Grade level you teach __________________________

12. Indicate the number of years you have been employed as a teacher of mathematics by circling one number below.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 Over 25 years
13. Indicate the number of years you have been employed on your present job by circling one number below:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 Over 25 years

14. Are you familiar with the New Mathematics and the report of the Commission on Mathematics of the College Entrance Examination Board entitled "Program for College Preparatory Mathematics?" (check) Yes______ No______

15. Do you feel that the proposed mathematics program for college-capable students issued by the College Entrance Examination Board is appropriate for grades 9-12? (check) Yes______ No______

Part II

GENERAL CONSIDERATIONS

In this section, general and specific objectives, proposed content, and specific topics are presented as "suggested" for a college-preparatory sequence for grades 9-12. If you are in agreement or disagreement with the objectives and content of the courses listed, please check (X) on the lines under A (agree) or D (disagree). Remember to check each.

General Objectives

1. Provide strong preparation both in concepts and in skills for college mathematics at the level of calculus and geometry.

2. Provide an understanding of the nature and role of deductive reasoning in algebra as well as geometry.

3. Develop an appreciation of mathematical structure.

4. Provide judicious use of unifying ideas—sets, variables, functions, and relations.

5. Provide for additional alternative units for grade 12
6. Provide for treatment of inequalities along with equations.

Specific Objectives

Mathematics for grade 9 (Elementary Mathematics or Algebra I) should be:

1. To develop in the students the ability to perform algebraic manipulation.

2. To provide development and understanding of the properties of a number field.

Mathematics for grade 10 (Elementary Mathematics II or Plane and Solid Geometry) should be:

1. To develop acquisition of information about geometric figures in the plane and in the space.

2. To develop an understanding of the deductive method as a way of thinking and a reasonable skill in applying this method to mathematical situations.

3. To provide opportunities for original and creative thinking.

Mathematics for grade 11 (Intermediate Mathematics or Algebra II and Trigonometry) should be:

1. To develop the essentials of algebra and trigonometry.

2. To provide the students with a key to understanding the numerical relationships involved in economics, psychology, biology, chemistry and other related fields.

Mathematics for grade 12 (Elementary Functions and Introductory Probability with Statistical Applications or Modern Algebra) should be:
1. To acquaint the students with certain functions that deepen the meaning in intermediate mathematics.

2. To promote genuine theoretical understanding.

3. To introduce the students to probability concepts and to the mathematics involved in these ideas.

4. To illustrate ways in which probability concepts apply to certain common statistical problems.

5. To make clear to the students that deductions are powerful means for organizing the subject matter of other branches of mathematics.

Content in mathematics for grade 9 should include: A D

1. Set theory.

2. Use of symbols.

3. Formulas.

4. Commutative, associative and distributive laws.

5. Positive and negative numbers.

6. Number scales and lines.

7. Concepts of equations and equalities.

8. Linear equations and inequalities in one variable.

9. Linear equations and inequalities in two variable.

10. Polynomial expressions.

11. Rational expressions.

12. Informal deduction in algebra.
13. Quadratic equations.

Content in mathematics for grades 10 should include:

1. The review of properties of common geometric figures.

2. Line segments and their measurements.

3. Angles and their measurements

4. Deductive reasoning.

5. Sequence of theorems culminating in the Pythagorean Theorem.

6. Rectangle coordinates.

7. Direct line segment.

8. Equation of a straight line.


10. Equation of a circle.

11. Locus in two and three dimensions.

12. Drawing of three-dimensional figures.

13. Angles between skew lines and planes.

14. Solid and plane figures.

Content in mathematics for grades 11 should include:

1. The development of number concepts.

2. Linear functions.

3. Ordered pairs and set of ordered pairs.

4. Radicals.

5. Quadratic equations (real and complex).
Content in mathematics for grade 12 should include:

1. The review and extension of concepts of sets.

2. Functions: definition, domain, graphical tests and methods of determining functions.

3. Relations: definition, domain, range, and functions as a special kind of relation.


5. Polynomial functions.

6. Exponential functions.

7. Logarithmic functions.

8. Circular functions.

9. The nature of probability and statistics.

10. The frequency of distribution.

11. The mean and standard deviation.

12. The binomial distribution.

13. Sampling from a finite population.

14. The system of rational numbers.
Specific Considerations

In this section, a list of some formulas and examples of content which might be taught are presented for grades 9-12. If you are in agreement that content should be taught such as is presented, please check (x) on the lines under A if you are in disagreement check (x) on the lines under D.

Specific Content

Some of the specific examples of content and formulas that should be taught in grade 9 are:

1. \( a + b = b + a \)
2. \( x^2 - 6x + 8 = 0 \)
3. \( x^2 - 16 = 0 \)
4. \( \frac{4}{12^2 + y^2} \)
5. \( 2(a+3) = 2(a) + 2(3) \)
6. \( 6x + 15 = 33 \)
7. \( y = kx^3 \)

Some of the specific examples of content and formulas that should be taught in grade 10 are:

1. \( y = x^2 + 2x - 3 \)
2. \( x^2 + y^2 = 25 \)
3. \( \overrightarrow{P_1P_2} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \)
4. \( PP_1 = \sqrt{(S - 5)^2 + (Y + 4)^2} \)
5. \( (x - h)^2 + (y - k)^2 = a^2 \)
6. \( (x - 4)^2 + (y - 3)^2 = 25 \)
Some of the specific examples of content and formulas that should be taught in grade 11 are:

1. $y = mx + b$

2. $2 = 1 + \frac{1}{2} = \frac{1}{3} + \ldots + \frac{1}{2^{n-1}}$

3. $F = [(x, y)] y = 2x + 3$

4. $\tan \theta = \frac{y}{x}$

5. $\sin \theta = \frac{1}{2}$

6. $a = x, a = 0$

Some of the specific examples of content and formulas that should be taught in grade 12 are:

1. $a + b = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix} + \begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix}$

2. The graph of $R = [(x, y)] y = x^2$

3. $y = a^x$

4. $y = \log_a X$

5. $Y = 6^2$

6. $\frac{0}{3} + \frac{5}{-3}$

7. $x^2 + y^2 = 13$

8. $a^2 = b^2 + c^2 - 2bc \cos A$
VITA

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