A STUDY OF TWO GROUPS OF PUPILS IN THE ODENVILLE HIGH SCHOOL WITH REGARD TO ALGEBRA AND GEOMETRY

By

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CHAPTER I

THE PROBLEM

Statement of the Problem

The problem in this study is to make certain comparisons of the pupils in the Odenville High School, who elected algebra and geometry, and of the pupils who did not elect those subjects during the year 1934-1935. The comparisons of the groups were made with regard to: (1) intelligence, (2) home background, (3) parental occupation, (4) achievement in arithmetic, and (5) teachers' marks.

Some Opinions Relative to the Place of Mathematics in Education

It is interesting to note the opinions of various scholars from ancient times to the present day relative to the place of mathematics in education. The consideration of this subject as an elective is not new. Protagoras, a Greek scholar during the time of Plato, has this to say about the question:

> "The others injure the young: for they drag them back against their will into arts which they would fain avoid, teaching them arithmetic and astronomy and geometry and music, but he who comes to me shall learn only that for which he comes."[1]

From this it is reasonable to conclude that Protagoras thought it harmful to a student to study mathematics

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1. Cajori, Florian, Mathematics in Liberal Education, pp. 21-22.

against his will. He approves the subject only when the pupil desires it.

Eliot, president of Harvard University from 1869 to 1909 says:

> "It is the received opinion that mathematics is an indispensable and universal constituent of education, possessing the venerable sanction of immemorial use."[1]

Butler, president of Columbia University, approves the study of algebra in high school provided valuable and practical material is presented with good teaching. He says:

> "Under the guise of mathematics much has been taught that is not mathematics at all. Abstruse and very absurd problems and puzzles in logic are to be found in almost every mathematical textbook under the delusive heading of 'Examples'. These simply vex and discourage the student and arouse in him a distaste for what is really valuable and practical in mathematical study. Good teaching in mathematics should enable the student who follows a classical course during the last three years in the secondary school, to enter college with a good understanding of arithmetic, algebra and geometry, both plane and solid."[2]

Dearborn, a psychologist, makes some very definite statements relative to mathematics, as follows:

> "From a psychological viewpoint of history, the notorious hereditary strenuosity of certain educators in regard to mathematics for the educated million is nothing more or less than parts of the medieval plan and opinion from which we have not yet succeeded in wholly escaping. ... Here some of my readers certainly are thinking of mental discipline, a real process. In reply the educational psychologist need only to say that

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1. Eliot, C.W., Century, (June, 1884); reprinted in C.W. Eliot, Educational Reform, New York, 1898, p. 92.
2. Butler, Nicholas Murray, The Meaning of Education, pp. 170-173.

> the mathephils have certainly never yet shown that mathematics is superior for this purpose to economics or to psychology or to biology. Algebra is a time-wasteful fetish, an anachronism for the greatest majority of the boys as well as for nearly all the girls. Geometry, really useful to the average mind in developing the spatial and quantitative imagination is made to seem more or less horrid by association."[1]

Dewey, probably the most outstanding philosopher of our contemporary life, makes the following statement:

> "Mathematics is said to have, for example, disciplinary value in habituating the pupil to accuracy of statement and closeness of reasoning, it has utilitarian value in giving command of the arts of calculation involved in trade and the imagination in dealing with the most general relations of things; even religious value in its concent of the infinite and allied ideas. But clearly mathematics does not accomplish such results, because it is endowed with miraculous potencies, called values; it has these values if and when it accomplished these results, and not otherwise."[2]

Paul Monroe, an authority in the history of education, in discussing principles of education in the secondary field, has this to say:

> "There are various other important reasons for studying algebra, such as the influence of exact truth upon character formation. How much of this can be carried over into the daily action has never yet been measured, and probably it never will be weighed with absolute accuracy. That this influence is real, however, seems undeniable. ...
>
> "The advocates of geometry claim that habits of persistence, of using only necessary steps in an argument, of holding to that which is true, of seeking for exact truth, and of arranging work in logical order, are instilled by the study of geometry. ... This claim is sanctioned by opinions of most people who have studied geometry under a worthy teacher, and no investigations thus far

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1. Dearborn, George V.N., School and Society, Vol. 4, (1916), p. 635.
2. Dewey, John, Democracy and Education, p. 267.

have shaken it."[1]

Cajori[2] made a study to determine the opinion of educators and others relative to the place of mathematics in a liberal education. He found that philosophers and psychologists favor mathematics by a vote of 66 to 26; educators by 62 to 21; mathematicians by 190 to 5; scientists by 18 to 4; literary men and statesmen by 48 to 24; and business men and lawyers by 219 to 48. By eliminating the vote cast by mathematicians the count remains 413 to 123, or a majority of 70 per cent favoring mathematics.

College Admission Requirements

In Alabama[3] algebra and geometry are elective subjects in the rural and county high schools. However, though listed as electives, they are in reality required for those who expect to attend college as will be noted from the following paragraph from the state program of studies:

> "The program of studies is arranged upon a system of constants and variables or electives. All pupils alike are to be required to complete the constants listed. Pupils who expect to enter college cannot afford to omit Elementary Algebra or Plane Geometry, as all standard colleges of this section of our country required these two units in mathematics for admission."[4]

In order to understand the admission requirements of the major state institutions of higher learning in Alabama

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1. Monroe, Paul, Principles of Secondary Education, pp. 534, 638.
2. Cajori, op. cit., pp. 161-163.
3. Program of Studies and Adopted Textbooks for County and Rural High Schools, pp. 28, 31.
4. Ibid., p. 5.

relative to algebra and geometry, it will be necessary to refer to the catalogues of the respective schools.

From the catalogue of the University of Alabama we have the following information:

> "Of the fifteen units required for admission, at least three must be in English, one in history, one in Algebra, and one in Geometry."[1]

A footnote reads:

> "Applicants for admissions to the school of commerce and business administration may present two units in algebra, or one unit in algebra and one unit in plane geometry."[2]

The Alabama Polytechnic Institute[3] at Auburn requires algebra and geometry for admission to the department of ageiculture, Pre-Law, Pre-Medicine, Secondary Education, Architecture, Interior Decoration, Commercial and Graphic Arts, and Engineering. Students may be admitted to the department of Elementary Education, Home Economics, and Veterinary Medicine with one unit in algebra.

The following passage is quoted from the catalogue of Alabama College at Montevallo:

> "Of the fifteen units of high school work required, the following are prescribed: English three units, mathematics two units, and History one unit."[4]

A footnote from the catalogue of Alabama College reads:

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1. University of Alabama Bulletin, General Catalogue for the Session of 1933-34, Number 117, p. 72.
2. Ibid.
3. The Alabama Polytechnic Institute, Catalogue, 1933-34, Vol. XXIX, Number 1, p. 31.
4. Alabama College, Catalogue, 1933-34, Vol. XXVI, Number 4, p. 39.

"A graduate of a standard high school may be admitted without plane geometry. Such a student, however, must secure credit in this subject before beginning the sophomore years."[1]

Scope of the Study

This study was confined to pupils in grades nine to twelve inclusive. Grades seven and eight were not included due to the fact that algebra and geometry are not taught in those grades.

It was considered unnecessary to make a study of the boys and girls separately. According to Thorndike,[2] there is little difference in mathematical ability between boys and girls. On the basis of a series of tests no great superiority of either sex in ability was found.

No attempts have been made in this study to deal with such questions as: what are the benefits to be derived from the s tudy of algebra and geometry; who should study these subjects; what are the levels of intelligence and achievement below which a pupil cannot be expected to pursue profitably a course in algebra or geometry; what is the place of mathematics in the secondary school curriculum in Alabama?

On the other hand the study has been concerned solely with the discovery of certain facts about those pupils who do, and those who do not, take algebra and geometry in the Odenville High School

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1. Alabama College, Catalogue, 1933-34, op. cit.
2. Thorndike, E.L., The Psychology of Algebra, pp. 412-14.

Sources of Data

The data for the study were obtained from records on file in the principal's office, from teachers' registers, and standardized tests. The tests used included: Sims Score Card for Socio-Economic Status, Form C; Henmon-Nelson Test of Mental Ability, Form A; and Otis Arithmetic Reasoning Test, Test 5, Form A.

Procedure

The writer gave all tests, and directed the scoring and tabulation of the results, the various tests were given during the first week of school. Pupils who enrolled late were given the tests upon entering. Teachers' marks were compiled at the close of the year.

CHAPTER II

The Community and the School

Description of the Community

Odenville is a rural village with a population in 1930 of 315, and in 1920 of 375.[1] The town is situated in the northern end of Cahaba valley in the western part of St. Clair County. The decrease in populatiom from 1920 to 1930 was probably due to some small industries such as a heading mill, and a cotton mill moving from the community.

St. Clair is strictly a rural county and the principal methods of making a living are farming and mining. From a survey made of the county in 1930 we have this information:

> "Agriculture is at the present time, the most important industry in the county. The area was originally covered with a reasonably good growth of mixed hardwood and pine timber which with the advent of the railroads was gradually cut out. By the time of the Civil War there had been a considerable agricultural development, and many prosperous farms and plantations were in evidence. ...
>
> "Corn is the principal acreage crop, but very little surplus is raised, being for the most part used on the farms, or sold locally. Cotton is the principal money crop, though dairying and poultry raising are beginning to receive somewhat greater attention. ...
>
> "Coal mining has been developed to a consid-

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1. Fifteenth Census of the United States, 1930, p. 81.

> erable extent, inasmuch as portions of two coal fields, the Cahaba and Coosa, occur within its boundaries. The Cahaba field, in the southwest corner, is now being mined more or less actively at Acmar and Margaret."[1]

Recently a new mine has been opened near Odenville, called Brookston. The map of St. Clair county on page 10 shows the location of Odenville with reference to these mining centers. It will be noted from the map on page 13 that these places are in the area served by the Odenville school.

History of the School

According to records on file in the principal's office, the school was established in 1908 at a cost of $10,000. The first session opened in September of that year with two teachers and 30 pupils. The school has had six principals during the twenty-seven years of its existence. The faculty has numbered seven since 1925.

In 1925 a vocational unit was added at a cost of $8000. There were 85 pupils enrolled in vocational classes during the school year 1934-1935.

The institution was established as the county high school under an act of the legislature in 1907, which read as follows:

> "The Governor, Auditor, and Superintendent of Education be and they are hereby constituted a Commission to locate as hereinafter provided,

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1. Industrial Survey of St. Clair County, Alabama Industrial Development Board, Birmingham, September, 1930, pp. 9-10.

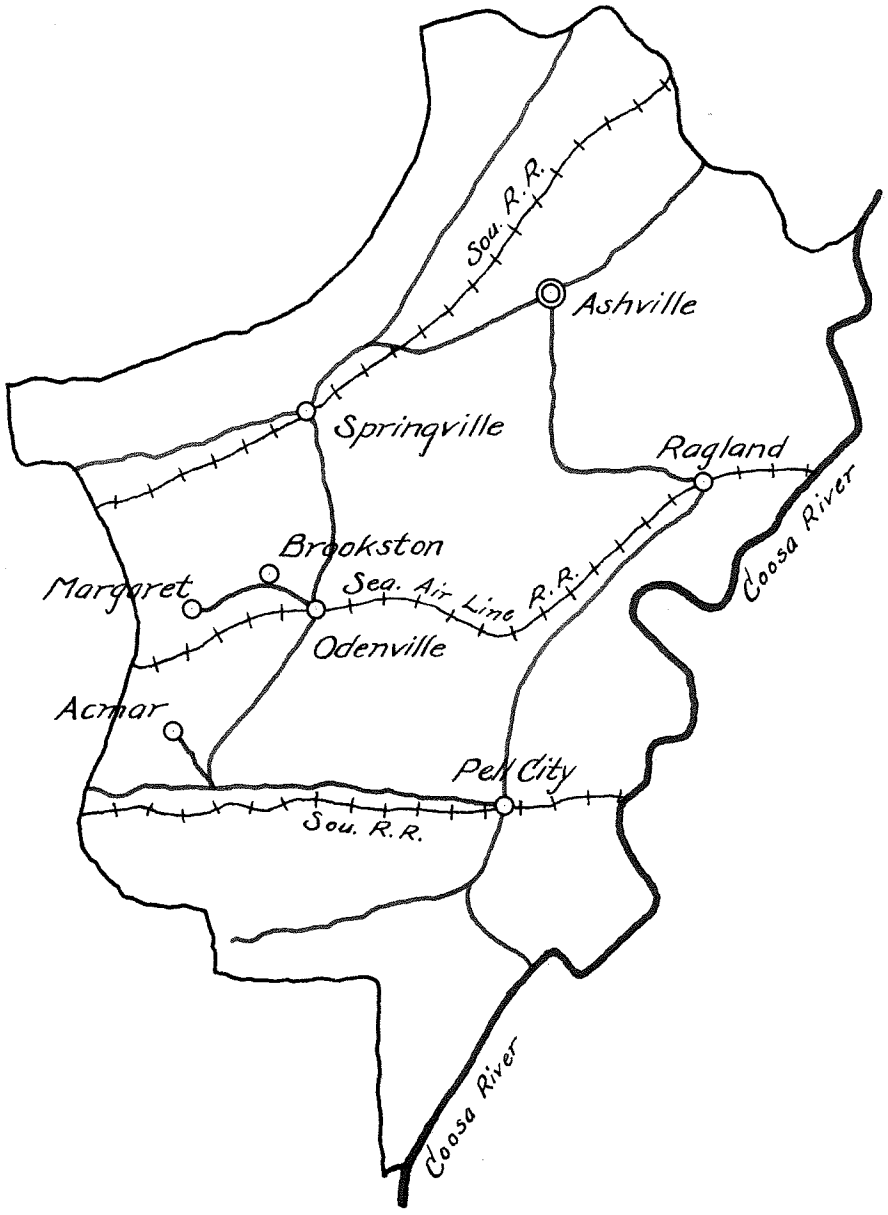

CHART I

MAP OF ST.CLAIR COUNTY

~CODE~

County Seat ◎

Towns ○

Roads ——

Railroads +++

> one high school in each of the counties of this state, provided that a high school shall not be established under the provisions of this act in any county in which there are already established an agricultural school, normal school for white people, the Polytechnic Institute, the University of Alabama, the Industrial School for White Girls, or a high school free to all the children of the county, until after a high school has been established in all the other counties."[1]

Having been established as the county high school, a portion of the school population for a number of years consisted of boarding pupils. At the present time there are six bus routes over which both junior and senior high school pupils are transported. Chart II on page 13 shows the location of the various bus routes leading to the Odenville High School. Table 1 shows the enrollment and the per cent of enrollment in each grade, and in the junior and senior high school groups.

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1. Public School Laws, Legislature of 1907, by the Department of Education, pp. 5-6.

Table 1

Enrollment and Per Cent of Total Enrollment in Each Grade in the Odenville School, 1934-1935

Grades	Enrollment	Per Cent of Total Enrollment
12	26	12.3
11	29	13.6
10	46	21.6
Senior High	101	47.4
9	29	13.6
8	34	15.9
7	49	23.0
Junior High	112	52.6
Total	213	100

Table 1 shows that the per cent of the total number enrolled varied from 12.3 per cent in the twelfth grade to 23 per cent in the seventh. The enrollment in the various junior high school grades is approximately the same as that in the corresponding senior high school grades. The tenth grade enrollment is greater than that in the ninth grade due to the fact that the graduates of the Moody Junior High School enter this grade at Odenville each year. This keeps the total enrollment in the senior high school about equal to that in the junior high.

Chart III on page 14 shows the distribution of the school population for the year 1934-1935.

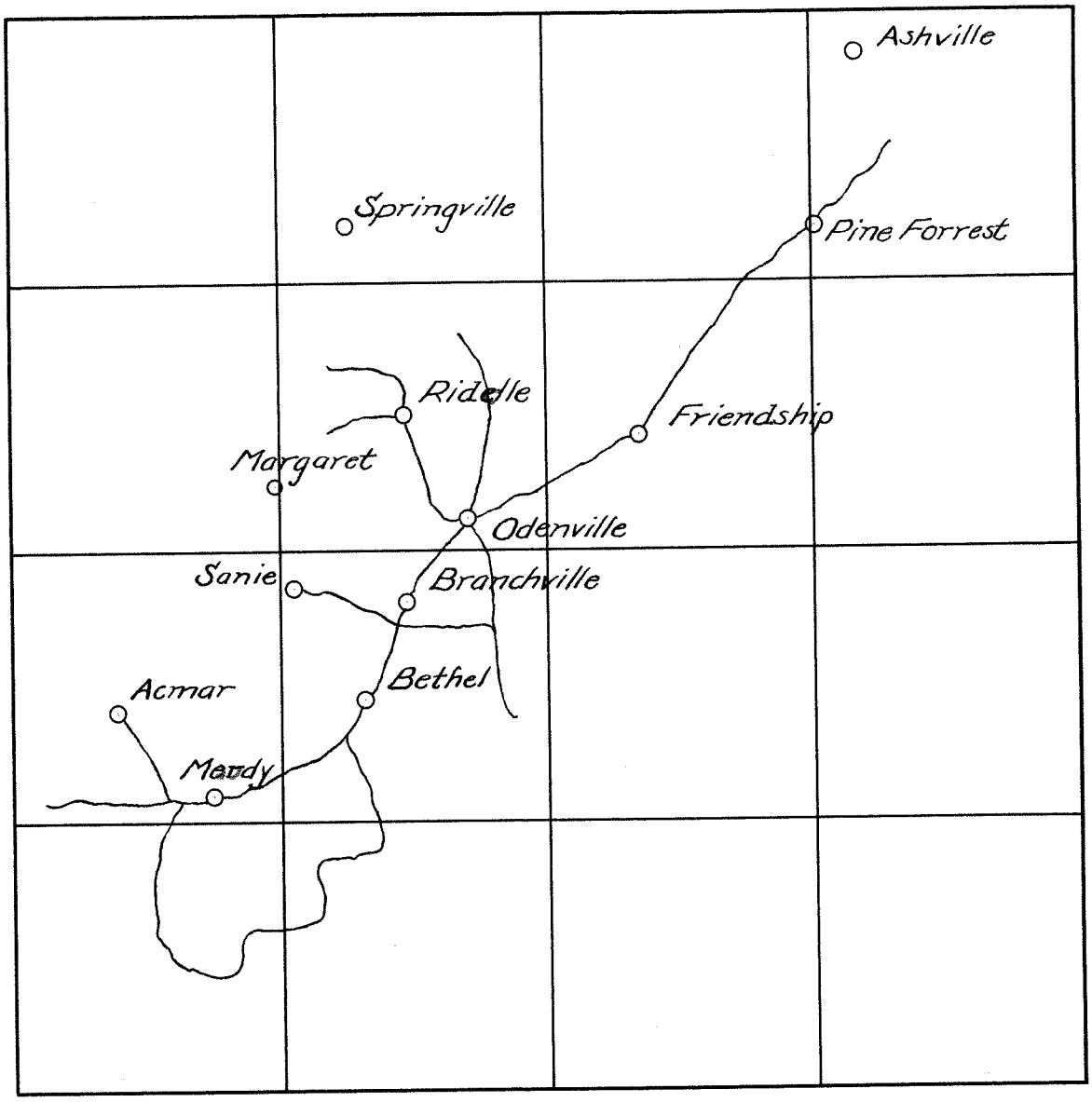

CHART II

Location Of Six Bus Routes To The Odenville High School
1934-1935

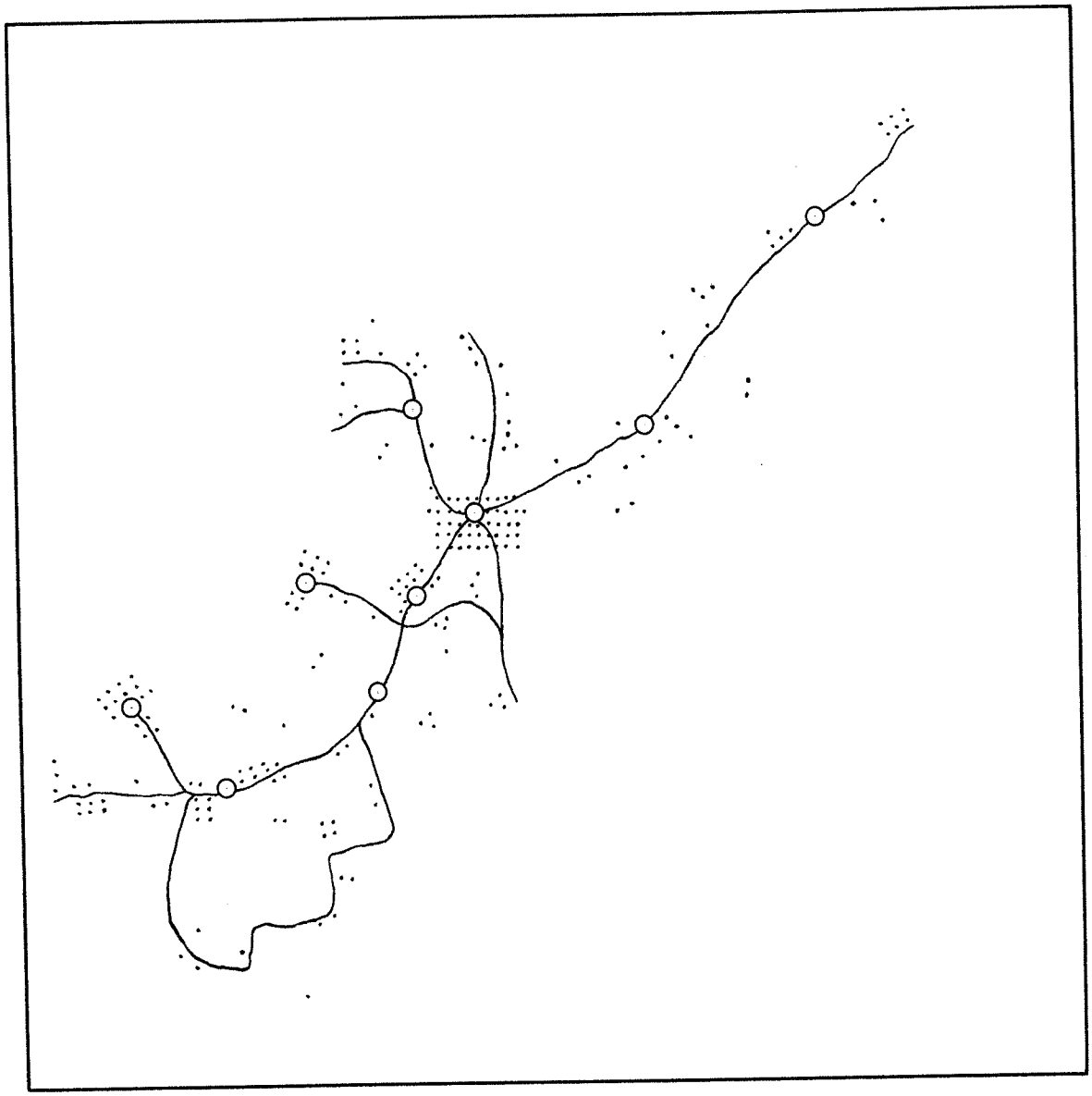

CHART III

Location Of The Homes Of Pupils Who Attended The Odenville High School, 1934-1935

The Curriculum

Being a rural high school the course of study is fixed by the State Board of Education and the individual schools are not permitted to deviate from the program outlined, as the following statement indicates:

> "It shall be the duty of the principal and assistants in each high school to follow faithfully the course of study prescribed by the State Board of Education."[1]

In April of each year the school places in the hands of each pupil a so-called elective sheet on which are listed all the required subjects and electives as suggested in the state program of studies for rural high schools.[2] A copy of this elective sheet is shown on page 16. Each pupil is requested to take it home, confer with his parents, and then list in the space provided the subjects he wishes to pursue the following year. He then takes it to the faculty adviser for approval. No special effort is put forth to encourage pupils to elect algebra or geometry. Their attention is merely called to the fact that these subjects are required for admission to most colleges in this state.

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1. Program of Studies and Adopted Textbooks for County and Rural High Schools, op. cit., p. 8.
2. Ibid.

Program of Studies
1934-35

Junior I	Junior II	Junior III
Constants	Constants	Constants
English	English	English
Mathematics	Mathematics	Social Studies
Social Studies	Social Studies	Physical Education
Study of Occupations	General Science	
Practical Arts	Physical Education	Electives (choose 2)
Physical Education		Mathematics
	Electives (choose 2)	Commercial Arts
Electives (choose 1)		Foreign Language
	Occupational Studies	Voc. Agriculture
Music Appreciation	Foreign Language	Voc. Home Economics
Art Appreciation	Music Appreciation	
	Art Appreciation	

Senior I	Senior II	Senior III
Constants	Constants	Constants
English	English	English
Physical Education	American History	Citizenship
	Phys. Education	Phys. Education
Electives (choose 3)		
	Electives (choose 2)	Electives (choose 2)
Biology		
World History	Physics	Chemistry
Plane Geometry	Industrial Hist.	Industrial History
Foreign Language	Business Arith.	Business Arithmetic
Voc. Agriculture	Voc. Agriculture	Voc. Agriculture
Voc. Home Economics	Voc. Home Economics	Voc. Home Economics

Subjects

_____

_____

_____

_____

_____

_____

Grade _____

Pupil _____

Approved:

_____
Teacher

All back work must be scheduled first.

Algebra and geometry are required for those who expect to enter college.

Summary

1. The population of Odenville has shown little change in fifteen years. Unless new industries are developed it is likely to continue a small village. The principal industries are agriculture and mining.

2. An act of the legislature in 1907 made the county high school possible, and the institution at Odenville was established the following year. In 1925 a vocational unit was added.

3. The school during the first session had thirty pupils and two teachers. During the year 1934-1935 there were 213 pupils and seven teachers. Of the total enrollment, 112 were junior high school pupils, and 101 were senior high.

4. For a number of years a portion of the school population consisted of boarding pupils. At present six bus routes provide transportation.

5. As a rural high school the course of study followed is that fixed by the State Board of Education. All elective subjects in the state program of studies recommended for small high schools are offered.

CHAPTER III

Presentation of Data

The purpose of this chapter is to present and analyze the data relative to the two groups being studied. The following factors will be considered in the order mentioned: (1) intelligence, (2) home background of pupils, (3) occupations of parents, (4) achievement in arithmetic, and (5) teachers' marks.

Intelligence

In order to compare the mental ability of the pupils electing algebra and geometry with the mental ability of those not electing these subjects, the Henmon-Nelson Test of Mental Ability was given.

Table 2 shows a distribution of the pupils according to intelligence quotients derived from the tests.

Table 2

Total Distribution of Pupils in the Two Groups According to Intelligence Quotients

I.Q.	Number Students Electing Algebra and Geometry	Number Students Not Electing Algebra and Geometry
135-139	1	
130-134	0	
125-129	2	
120-124	1	
115-119	2	2
110-114	0	2
105-109	7	4
100-104	8	4
95-99	7	2
90-94	15	11
85-89	6	7
80-84	2	6
75-79	0	4
70-74	0	3
Total	49	45
Mean	99.5 ± 1.14	91.7 ± 1.33
S.D.	11.9	11.8
Difference in means	7.8 ± 1.74	

The mean score for the group electing algebra and geometry is 99.5, and that of the group not studying those subjects is 91.7. The standard deviation of the first group is 11.9 while the standard deviation of the second is 11.8. The difference between the two means is 7.8 with a probable error of 1.74. The differenve is four times the probable error which is a significant difference. To determine whether the difference between two means is sig-

nificant, Holzinger gives the following:

> "The general rule is that a difference of any statistical constant of any sort is not significant unless it is at least four times its probable error."[1]

The pupils studying algebra and geometry had a higher intelligence quotient than the pupils not studying those subjects.

The question may be raised as to how the group taking algebra compares in intelligence with the group taking geomatry. Table 3 shows a distribution of those two groups.

Table 3

Distribution of Pupils Electing Geometry and of Those Electing Algebra According to Intelligence Quotients

I.Q.	Electing Geometry	Electing Algebra
135-139	1	
130-134	0	
125-129	1	1
120-124	1	0
115-119	1	1
110-114	0	0
105-109	5	1
100-104	4	5
95-99	4	3
90-94	6	6
85-89	3	4
80-84	0	2
Total	26	23
Mean	104.3 ± 1.57	96.3 ± 1.47
S.D.	12.5	10.45
Difference in means	8 ± 2.15	

1. Holzinger, K.J., Statistical Methods for Students in Education, p. 237.

It will be observed that 23 pupils elected algebra and 26 geometry. The mean I.Q. of the algebra group was 96.3 with a standard deviation of 10.45, and of the geometry group 104.3 with a standard deviation of 12.05. The difference in the means of these two groups was 8 with a probable error of 2.15. This difference is significant being approximately 4 times the probable error.

Socio-Economic Status of Pupils

In order to determine the home background of the pupils composing the two groups, the Sims Test for Socio-Economic Status[1] was used. The purpose of this test is to provide a simple, convenient, and objective device for ascertaining the general, cultural, social, and economic background furnished by the homes of the pupils.[2] Table 4 shows the distribution of scores made by the two groups on the socio-economic tests.

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1. Sims, Verner M., The Measurement of Socio-Economic Status.
2. Sims, Verner M., Manual of Directions for the Score Card for Socio-Economic Status, p. 2.

Table 4

Distribution of Socio-Economic Status Scores Made by the Pupils Electing Algebra and Geometry, and by the Pupils not Electing Those Subjects

Scores	Electing Algebra and Geometry	Not Electing Algebra and Geometry
25-26	1	1
23-24	1	0
21-22	0	1
19-20	1	0
17-18	5	2
15-16	6	2
13-14	9	5
11-12	8	13
9-10	12	12
7-8	4	8
5-6	2	1
Number	49	45
Mean	13.5 ± .38	11.3 ± .37
S.D.	4.12	3.74
Difference in means	2.2 ± .53	

The mean for the group electing algebra and geometry was 13.5, and the mean for the group not electing those subjects was 11.3. The standard deviation of the first group was 4.12 and of the second 3.74. The difference between the two means was 2.2 with a probable error of .53. The difference was four times the probable error which was significant.

Table 3 indicated that the pupils taking geometry had a higher intelligence quotient than the pupils taking algebra. These same two groups electing algebra and geometry will now be compared relative to home background.

Table 5 shows a distribution of the scores made by the pupils syudying algebra and geometry.

Table 5

Distribution of Socio-Economic Scores Made by Pupils Electing Geometry and by Those Electing Algebra

Scores	Electing Geometry	Electing Algebra
25-26	1	
23-24	1	
21-22	0	
19-20	1	
17-18	4	1
15-16	2	4
13-14	6	3
11-12	2	6
9-10	8	4
7-8	1	3
5-6	0	2
Number	26	23
Mean	13.7 ± .49	11.3 ± .55
S.D.	4.2	3.5
Difference in means	2.4 ± .73	

The mean of the group electing geometry was 13.7, and the mean of the group electing algebra was 11.3. The standard deviation of the first was 4.2 and of the second 3.5. The difference between the means was 2.4. This difference was only three times the probable error which was not significant.

Occupations of Parents

In order to determine to what extent the trade or profession pursued by the parents was a factor in this study, the parental occupations were considered. This information was secured from the socio-economic tests. In this study, Sims[1] lists the different occupations in five groups. The various gradations range from the common laborer to the group containing the professions, proprietors of large businesses, and higher executives. The five occupational groups are listed as follows:

Group I. Professional men, proprietors of large businesses, and higher executives.

Group II. Commercial service, clerical service, large land owners, managerial service of a lower order than in Group I, and business proprietors employing from five to ten men.

Group III. Artisans, proprietors, petty officials, printing trades employees, skilled laborers with some managerial responsibility, shop owners, and business proprietors employing from one to five men.

Group IV. Skilled laborers (with the exception of printers), who work for some one else, building trades, transportation trades, manufacturing trades involving skilled labor, personal service, small shop owners doing their own work.

Group V. Unskilled laborers, common laborers, helpers, peddlers, varied employment, venders, unemployed.

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1. Sims, op. cit., p. 9.

The results of the study of the occupations of the parents are shown in Table 6.

Table 6

Percentage of Parents of Pupils Studying Algebra and Geometry and of Pupils not Studying Those Subjects in the Different Occupational Groups

Group	Algebra and Geometry	No Algebra & Geometry	Per Cent of Total
I	6.1	2.2	4.1
II	16.3	11.1	13.7
III	20.4	22.2	21.3
IV	25.8	26.8	26.3
V	31.4	37.7	34.6
Total	100	100	100

Table 6 indicates that the number of parents whose children study algebra and geometry decreases from 31.4 per cent in Group V to 6.1 per cent in Group I. The number of parents whose children do nor study algebra and geometry decreases from 37.7 per cent in Group V to 2.2 per cent in Group I.

On the basis of this study it appears that parental occupation has some influence upon the children in their choice of algebra and geometry. There are more pupils electing these subjects from homes of a higher occupational level.

Achievement

To determine the educational progress of the pupils in the two groups, an achievement test in arithmetic was given. The test used was The Otis Arithmetic Reasoning Test, Test 5. The results of the arithmetic tests are given in Table 7.

Table 7

Distribution of Pupils According to Arithmetic Scores

Scores	Number Pupils Electing Algebra and Geometry	Not Electing Algebra and Geometry
19-20	3	1
17-18	7	3
15-16	9	7
13-14	12	10
11-12	6	9
9-10	8	12
7-8	2	2
5-6	2	1
Total	49	45
Mean	13.34 ± .33	11.58 ± .3
S.D.	3.5	3.02
Difference in means	1.76 ± .44	

The mean score on the arithmetic test of the group electing algebra and geometry was 13.34, and that of the group not electing those subjects was 11.58. The standard deviation of the mean of the first group was 3.5, and of the second 3.02. The difference between the two means was 1.76 with a probable error of .44. This difference was found to be significant.

Teachers' Marks

The school uses the ranking system of determining the marks given to pupils. The normal distribution serves roughly as a guide, but it is not strictly applied. Symonds, in discussing school marks, says:

> "The plan which is most widely accepted to insure uniformity of standards is the use of the normal probability curve. ... Accordingly it has been suggested that one way to insure uniform standards in marking throughout a school is to require that the marks of the school and of each class approximate the normal distribution or some standard distribution agreed upon by school authorities. ... This plan had been abused by trying to enforce it too rigorously. The normal distribution is only a guide - it is not expected that it will be applied to the last decimal place."[1]

The marking system in the high school at Odenville is a five-point scale having five letters, A, B, C, and D represneting four degrees of quality of passing work, and F a failing quality. Using this system the average mark of a group of pupils approximates a C. Hence it is difficult to compare groups on a basis of letter marks. To meet this difficulty a method was used by which the letter marks could be converted into numerical values. The plan adopted gave to the mark A the value of 10; to B the value of 7; to C the value of 5; and to D the value of 3. F received no value.

By using the method just explained the average for each pupil was found in terms of a numerical value. The

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1. Symonds, op. cit., pp. 510-511.

results are shown in Table 8.

Table 8

Distribution of Teachers' Marks Expressed in Numerical Values

Interval	Electing Algebra and Geometry	Not Electing Algebra and Geometry
10-10.99	2	
9-9.99	2	2
8-8.99	1	2
7-7.99	6	3
6-6.99	2	2
5-5.99	13	9
4-4.99	13	11
3-3.99	6	10
2-2.99	2	3
1-1.99	1	2
0- .99	1	1
Total	49	45
Mean	5.4 ± .2	4.8 ± .21
S.D.	2.08	2.09
Difference in means	.6 ± .29	

The mean for the group electing algebra and geometry was 5.4 with a probable error of .2, and the mean of the group not electing algebra and geometry was 4.8 with a probable error of .21. The standard deviation of the first mean was 2.08, and of the second 2.09. The difference between the two means was .6 with a probable error of .29. This difference is not enough to be considered significant.

Summary

This chapter has been devoted to the presentation and analysis of the data compiled from the various comparisons made. The factors considered were: intelligence, home background of pupils, occupations of parents, achievement in arithmetic, and teachers' marks.

1. In order to make a comparison of the intelligence of the two groups, a test of mental ability was given. The mean intelligence quotient for the group electing algebra and geometry was 99.5, and for the group not electing those subjects 91.7. The difference between the means was 7.8 which was found to be a significant difference.

2. The mean intelligence quotient of the group studying geometry was 104.3, and that of the algebra group was 96.3. The difference between these two means was found to be significant.

3. The mean socio-economic status score for the pupils electing algebra and geometry was 13.5, and for those not electing algebra and geometry the mean was 11.3. Again the difference was found to be significant.

4. The mean socio-economic status score of the pupils electing geometry was 13.7, and of those electing algebra 11.3. The difference between the two means was 2.4 which was found not to be significant.

5. The parents of 31.4 per cent of the pupils electing algebra and geometry were unskilled laborers, 25.8 per cent were skilled, and 6.2 per cent were professional people.

The parents of 37.7 per cent of the pupils not electing algebra and geometry were unskilled laborers, 26.8 per cent were skilled, and 2.2 per cent belonged to the professional class.

6. The mean arithmetic score of the group electing algenra and geometry was 13.34, and of the group not electing those subjects 11.58. The difference between the two mean scores was 1.76 which was found to be significant.

7. The distribution of teachers' marks expressed in numerical values gave a mean of 5.4 for the pupils electing algebra and geometry, and 4.8 for those not electing these subjects. The difference between the means was only .6 which was not significant.

CHAPTER IV

GENERAL SUMMARY

In this study the pupils in the Odenville High School in grades nine to twelve inclusive who elected algebra and geometry were compared with the pupils who did not elect those subjects during the year 1934-1935. The groups were compared with respect to: intelligence, home background, occupations of parents, achievement in arithmetic, and teachers' marks.

The essential facts found in this study may be summarized as follows:

1. Scholars from ancient times down to the present have been divided in their opinion as to the place of algebra and geometry in the education of an individual. An investigation by Cajori indicated that philosophers, psychologists, and teachers favored algebra and geometry by a vote of three to one. Business men, statesmen, and mathematicians favored the subject more strongly. Eliminating the mathematicians a majority of 70 per cent favored algebra and geometry.

2. The major state institutions of higher learning in Alabama required algebra and geometry for admission.

3. The people of the Odenville community are farmers and industrial workers. A few business and professional men are found in the area served by the school.

4. The enrollment of the Odenville school for the year 1934-1935 was 213. Of this number 112 were junior high school pupils, and 101 were senior high. The number in grades nine to twelve inclusive electing algebra and geometry was 49, and the number not electing those subjects was 45.

5. On the basis of the Henmon-Nelson Test of Mental Ability, the pupils electing algebra and geometry had a higher intelligence quotient than the pupils who did not elect those subjects. The pupils who elected geoemtry had

a higher intelligence quotient than those electing algebra, and the pupils electing algebra had a higher mean score of intelligence than those who did not elect either subject.

6. The pupils electing algebra and geometry scored higher on the Sims Test for socio-economic status than the pupils who did not elect those subjects. The geometry pupils had a slightly higher mean score than the algebra group, but the difference was not enough to be significant.

7. Parental occupation was a factor considered in this study. The percentage of pupils electing algebra and geometry whose parents were unskilled laborers was 31.4, and it was 37.7 for those not electing algebra and geometry. The percentage of pupils studying algebra and geometry whose parents belonged to the higher occupational groups was some greater than that of pupils not studying those subjects.

8. The mean arithmetic score for the group studying algebra and geometry was higher than it was for the other group.

9. There was little difference between the two groups of pupils with respect to teachers' marks. The group electing algebra and geometry had a slightly higher average, but the difference was not great enough to be significant.

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