

1965

A study to investigate the academic records of students taking four major subjects in high school and those taking five major subjects.

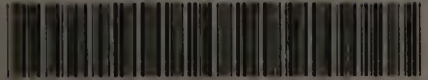
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A STUDY TO INVESTIGATE THE ACADEMIC RECORDS
OF STUDENTS TAKING FOUR MAJOR SUBJECTS
IN HIGH SCHOOL
AND THOSE TAKING FIVE MAJOR SUBJECTS

by
Carlton David Crosier

A problem presented in partial fulfillment
of the requirements for the
Master of Education Degree
School of Education
University of Massachusetts
1965

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CHAPTER I
INTRODUCTION

CHAPTER I

INTRODUCTION

Statement of Purpose. The purpose of this study is to gather information that will aid in studying whether West Springfield High School might limit the number of major academic subjects that a student might take in order to maintain a certain grade point average.

The question of which is scholastically better for the student to take, four or five major subjects, has been raised by parents, school board members, and some school personnel. One group maintains that it is more advantageous for a student to take only four major subjects in a school year, to concentrate his academic efforts on the four subjects, and to attempt to build a high scholastic average which will show to the student's advantage upon application to college. The second group argues that it is more to the student's advantage to take a greater load of college-preparatory subjects, generally five in the seven-period day, to gain a diversified background of subjects, and present this background when making application to college. This second group will further argue that those students taking only four subjects probably are not utilizing their free time to any better advantage, and are not earning any higher grades despite the smaller class load.

No studies have been made at West Springfield High School on any scale to provide information on this problem.

Examination of literature provided little to support either side in the argument. In fact, there appears to be very few studies made by researchers examining the effects of various course loads of secondary-school students on grade point averages. An effort will be made by this study to examine the data on twenty-eight secondary-school students and their scholastic averages after having taken either four or five major subjects.

Hypothesis. The hypothesis may be stated as follows: there is no significant difference in the grade point averages of students who take four major academic subjects and those who take five major academic subjects at West Springfield High School when sex, mental ability, and socio-economic level are comparable.

Significance of the Problem. The significance of the problem is to determine whether or not students can accomplish the same numerical averages at the conclusion of a school year, by taking five major academic subjects during a school year as can a similar group by taking four major subjects. If it is determined that students with similar socio-economic levels, mental ability levels, and sex who took only four subjects during a school year achieved significantly higher grades than students who had taken five major subjects, then it may indicate that four major subjects may be advantageous if a higher scholastic average is considered advisable.

Conversely, if the results of the study indicate that students of similar socio-economic levels, ability levels, and sex who had taken five major subjects during a school year achieved significantly higher grades than students who had taken only four major subjects, than the opposite may be concluded.

The results of this study will be based upon three factors: college board scores, class standing at the end of grade twelve, and final academic average at the completion of grade twelve. If the results of the study, made of the comparison of records of fourteen matching pairs of students, determine that there is no significant difference between the four-subject group and the five-subject group, then it will indicate that there is no need for a school policy to be established on the enrollment in four or five subjects solely for academic gain.

Limitations. This study will be limited to an examination of the permanent-record cards of students in the graduating classes of 1962, 1963, and 1964 at West Springfield High School. Only the records of these students who have taken college-preparatory courses in high school will be considered. Only the records of the junior year in high school will be examined in each case. Courses taken by students which were repeat courses, and consequently carried no academic credit, were excluded.

There are definite reasons for selecting the academic

records of the college-preparatory students in the junior year. West Springfield High School is a three-year high school. Students enter the high school after having attended one junior high for grades seven and eight and another junior high school for grade nine. Grade ten is the beginning of new environment for these students. The tenth year appears to be a period of transition and adjustment and their academic records during the grade-ten year sometimes reflect the ups and downs of adjustment.

A second reason for selecting the grade-eleven year is that some students who have a mild interest in attending college or have been urged by parents to pursue a college-preparatory course often find that such a college-preparatory course in high school is too difficult in content or too demanding of time. Thus, they will abandon the idea of a college program and select other subjects for the junior and senior years.

The senior year also was eliminated as a source of material for this study. West Springfield High School requires a student to earn a specified minimum number of credits in order to graduate. A student who carries a full course load of subjects during the grade ten and grade eleven years can easily accumulate sufficient credits by the end of the junior year so that he need take only certain required subjects, such as English and history, plus one or two others in order to surpass the minimum graduation

credits. The elected courses need not necessarily be college-preparatory courses; instead they may be courses in an area which the student has an interest or feels that he can pass with a minimum of effort.

Furthermore, the senior year is a time when students may develop a tendency to lessen their academic endeavors because of the large number of extra-curricular and social activities which surround the senior year. These reasons caused me to disregard the senior year for this study.

The junior-year record of the selected students would be most significant for this study because many of those students who have little or no real interest in college have elected other programs and the students who remain in the college program are concerned with establishing a record which will be favorable to college admissions personnel.

Thus the grades which they achieve in the junior year may be more indicative of their best efforts.

Definition of Terms.

A. Major academic subject. Any subject in the school curriculum which has five class meetings per week for the entire school year, which requires daily preparation for class work, and for which five credits are awarded upon successful completion. Courses such as English, United States History, geometry, and chemistry are considered as major academic subjects.

B. Academic Average. The sum of the numerical grades

awarded to each student divided by the number of courses taken by each student.

The range of academic averages of the subjects used in this study was from 66.4 to 87.8 percent.

C. Permanent Record Cards. Record cards maintained by the school office upon which are recorded family information and occupations, scores of intelligence tests, extracurricular activities and honors, and grades earned in all subjects on the secondary school level.

Grades are listed on these record cards each term by members of the school faculty. Intelligence-test scores are recorded by office personnel as such results are received by the school. Other information is updated annually by the school office and guidance personnel.

D. College-preparatory course. A course of study which includes foreign languages, mathematics, science, English and history and is designed to prepare students to meet college entrance requirements.

CHAPTER II
RELATED LITERATURE

CHAPTER II

RELATED LITERATURE

The number of major academic subjects which a student should carry during a school year has been commented on by a number of authors, each generally offering an opinion based upon personal observation and experience. There was no literature related to the topic of this study where the author based his findings upon detailed study and research of sample cases. Many sources, of which Nordberg, Bradfield, and Odell serves as a good example, will make no definite statement.¹ They recommend certain basic subject fields, such as English, History, and science, to be taught in a secondary school and comment only on the point that a student should take a full course load in high school. They do not specify what constitutes a full course load. This, in fact, was the chief reason for undertaking this study.

A recent book by Carl Hansen discusses curriculum organization in the high schools of the District of Columbia.² In the book, the author describes the two college-preparatory tracks in the District schools, one for the

¹H. Orville Nordberg, James M. Bradfield, and William C. Odell, Secondary School Teaching. (N. Y., MacMillan Co., 1962), Ch. 4.

²Carl F. Hansen, The Four-Track Curriculum. (Englewood Cliffs, New Jersey, Prentice-Hall, Inc. 1964), Ch. 4.

average college-preparatory students and a second track, designated as the honors track, for students of better-than-average ability. The students in the regular college-preparatory track are required to earn sixteen Carnegie units in four years of high school, while the honors track group must earn eighteen Carnegie units for graduation. (A Carnegie unit is defined as a course meeting five times per week throughout the year and requiring outside preparation). A student needing only sixteen Carnegie units for graduation would need to carry only four major subjects per year, while a student in the honors track would be required to carry five major subjects in two of the four high-school years in order to meet the specified requirements.

The students in the honors track are selected primarily by measured ability as determined by intelligence tests, with an IQ of 120 generally being the line of division between regular and honor-track students. Here the indication is that the top students of a school, as defined by measured ability, should take a greater class load than other students and be expected to attain success in the program. There appears to be no evidence however to indicate that students who fall below the honors-track level could not satisfactorily carry five Carnegie Unit courses in one year any more than there is success guaranteed to those students in the honors track who must carry the greater course load.

Martin Mayer also refers to sixteen Carnegie Units as

being basic minimum standards for students enrolled in the four-year college-preparatory course.³ This figure of sixteen units undoubtedly is set to satisfy requirements established by many colleges for admissions to their institutions. Such a program would have a student enrolled in four major academic courses each year for the four-year tenure in high school. It is expected that students would take other courses to fill out the normal six or seven-period day, but the elected subjects would not necessarily be major academic subjects. He recommends that some students elect a fifth and perhaps a sixth academic subject to fill out their daily programs, rather than elective subjects of a non-academic nature, such as certain industrial arts courses. Presumably those students who would elect the greater number of major subjects are those with greater academic ability.

The topic of academic ability and the academically talented is discussed by Theodore Herberg.⁴ The Massachusetts Committee for the Academically Talented defined the academically talented individual generally as one who was in the top 10% of his class and one whose IQ was 120 or greater. The purpose of this committee was to define the criteria for

³Martin Mayer, The Schools. (New York, Hayser and Brothers, 1961), Ch. 1.

⁴Theodore Herberg, "The Academically Talented", Massachusetts Teacher, (Volume XLI, #5, February 1962) Pages 5-7.

top students and encourage that more attention be devoted to these people. Presumably, one way in which this could be accomplished is to offer a greater variety of strong elective courses designed to better prepare these talented students for college. Once such a program is available, the top students should be encouraged to participate in its offerings.

Dr. Conant, in one of his major works on the schools of the United States, also comments on academically talented students of United States high schools.⁵ He defined the academically talented as being the upper 15% of students on a national basis. In another work, Conant further talks of this group as generally having IQ's of 115 and above, although he is not as high on this figure as was the Massachusetts Committee on their figure.⁶ In both writings, Conant strongly recommends that the top group of students carry at least eighteen major subjects in four years as a minimum load. This of course would mean that in two of their four high-school years the top students would carry five subjects per year. He further suggests that students of lesser measured ability carry lighter academic loads, so that the performance in each course might be strong.

⁵James B. Conant, The American High School Today. (New York, McGraw-Hill Company, 1959), Pages 57-65.

⁶James B. Conant, Slums and Suburbs. (New York, McGraw-Hill Company, 1961), Ch. 4.

Dr. Conant's comments as set forth in an article in 1962 concerning the comprehensive high schools of the nation was of interest.⁷ He repeats his thoughts that the top 15% of the national group, those above 115 IQ, can carry a minimum of eighteen courses in four years, "effectively and rewardingly." He makes the point that such a full course load is necessary in order for this group to prepare themselves for the top professions. Without this full load of courses certain avenues in college are closed to the student.

Dr. Conant, in the same article, cites examples to illustrate his point about the academically talented students with eighteen courses and the students of lesser ability with fewer courses. In a certain class at the Bronx High School of Science, 100% of the students in the 115-129 IQ group carried eighteen or more subjects during the four-year high school period, apparently with a high degree of success. By comparison, in Newton, Massachusetts, High School, a secondary school which he presumes to be stronger than the average, only 33% of the boys and 21% of the girls in the 90-104 IQ group could successfully carry eighteen major academic subjects in the four years. His point here is that the better students, as determined by measured

⁷James B. Conant, "The Comprehensive High School", (NEA Journal, May 1962), Pages 29 & 30.

ability, can carry five major academic subjects during a school year, while the students of lesser measured ability are better suited to only four major academic subjects in a school year.

One of the factors which may serve to limit the number of subjects that a student carries during a school year is the number of periods in the school day. Administrators vary widely in their thinking on this subject. Some favor a daily schedule allowing fifty-five to sixty minutes in each period. Such a schedule generally allows time for only six periods during the normal day. This may restrict a student to four major subjects, especially if physical education is a requirement and the student has a laboratory course which includes some double periods. Conant states that six periods should be a basic minimum in any school and that seven or perhaps even eight periods would allow for more elections in the program and offer encouragement for students to carry a greater number of courses.⁸ With a seven-period day, a student could easily fit five major academic courses into his program and still meet such other requirements in the school program as physical education and driver education. The figure of seven or eight appears to be more common than the lessers number, although one source refused even to

⁸James B. Conant, The American High School Today. (New York, McGraw-Hill, 1959), Pages 57-65.

comment on a specific number, leaving the program completely at the discretion of the individual administration.⁹

Examinations of the Readers Guide to Periodical Literature and the Education Index were made seeking literature pertinent to this study. No information was found of any study or writing which was specifically related to this study. Several articles which were mentioned in the Readers Guide did serve as background material and are included in the bibliography.

It is hoped that the findings of this study will add in some measure to the literature available on the number of academic courses that a student might be required to carry during a school year and maintain a certain grade point average.

⁹Rudyard K. Bent and Lloyd E. McCann, Administration of Secondary Schools. (New York, McGraw-Hill, 1960), Ch. 12.

CHAPTER III
METHODS AND PROCEDURES

CHAPTER III

METHODS AND PROCEDURES

Subjects. The subjects in this study were senior high school students who had completed the junior year at West Springfield High School. In all, records of three hundred seventy-five male and female high school juniors were examined. These students ranged in age from sixteen to eighteen years and were all enrolled in the college-preparatory course at West Springfield High School.

Procedure. An examination of the records of the graduating classes of 1962, 1963, and 1964 were made to determine the students in these classes who could be categorized as college-preparatory students. The categorization and selection of those students was confirmed by conference with the guidance counsellors of these classes and others who were familiar with the students in each of the three selected graduating classes.

After having determined the names of those students in each class who qualified under the definition of college-preparatory student, an examination of the permanent record card of each selected student was made. From these cards the following data were obtained:

- a) Measured academic ability, using the most recently-administered intelligence test. In most of the cases selected, this was the Otis Short Form Test of Mental Maturity, administered during the junior

year in West Springfield High School. In the few cases where this was not true, the students were transfer students to West Springfield High School and had been administered intelligence quotient tests in other schools.

- b) Academic average at the end of the junior year in high school.
- c) Occupation of the parent who was the principal support for the family.

The selected students were then divided into two groups, those students who had taken four college-preparatory subjects in the junior year and those students who had taken five college-preparatory subjects in the junior year. One-hundred and thirty-eight students were included in the first group and two-hundred and thirty-seven students in the latter group.

An examination of the assembled data was made to determine matching pairs using the following criteria:

- a) Sex
- b) Intelligence Quotient, using the scores obtained from permanent-record cards. Exact comparisons were used, and in each of the subjects chosen for the matching pairs the Otis Short-Form Test provided the Intelligence Quotient score.
- c) Numerical academic average at the conclusion of the junior year. A differential of .5 was allowed

in determining the matching pairs.

- d) Occupational level of parent who was principal support of the family. The categories used were:
1. Professional and managerial (higher)
 2. Professional and managerial (regular)
 3. Semi-professional and Low managerial
 4. Skilled support and maintenance
 5. Semi-skilled support and maintenance
 6. Unskilled support and maintenance

Explanation of Occupational Levels. One of the criteria used to match the pairs was the occupational level of the parent who was the principal support of the family. Anne Roe, in her book The Psychology of Occupations, has established six categories of socio-economic levels and divided the population of the United States into these six categories, as listed above.¹ I have used this list as a basis of categorization of occupations for my subjects in this study.

A further guide to determination of categories of occupation was provided by Gist and Halbert in Urban Society.² They devote a chapter to comments and excerpts from studies made of socio-economic levels in several communities

¹Anne Roe, The Psychology of Occupations. (N. Y., Wiley and Co., 1956), Page 59.

²Noel Gist and L. A. Halbert, Urban Society, (N. Y., Crowell and Co., 1950), Ch. 14.

throughout the Nation. Backgrounds and composition of the categories varied to some extent, depending on the individual community, but essentially six categories again were determined.

They were:

1. Upper-upper: the very wealthy manufacturers and businessmen, people in high managerial positions, outstanding professional people, people of independent wealth.
2. Lower-upper: smaller manufacturers, prominent merchants, professional people, high-salaried supervisory personnel.
3. Upper-middle: technicians, individuals with some post-secondary education or training, small retailers, highly-skilled craftsmen and supervisory personnel.
4. Lower-middle: skilled workers and craftsmen, civil servants, foreman, salesmen.
5. Upper-lower: semi-skilled labor, retail employees wage earners.
6. Lower-lower: unskilled labor, migrant workers chronically unemployed persons, people from impoverished homes.

This listing amplified upon type of occupations contained within each category and was of assistance in determining appropriate occupational categories for individual

cases.

The categorizing of the parent who was the principal support of the family was made through information gained from several sources. In a number of cases the author was personally familiar with the backgrounds of the student and the family. This was of assistance in determining grouping. The school permanent-record cards listed the occupation of parents and this served as a source of information. The permanent-record cards are reviewed annually by the guidance counselors and are reasonably up-to-date. In several instances, however, only a general field of employment was listed, such as salesman or manager. In those cases where the information was inconclusive from these sources, I consulted other personnel at West Springfield High School who were acquainted with the family background of the individual students. Generally it was possible to fit the family background of the student into one of the described categories. In those instances where the category designation was not so clear-cut, I made further inquiry of school personnel, guidance counselors, and also examined the guidance counselor's folder on the particular individual. The individual was disregarded as a test subject if no definite category could be determined.

Matching Pairs. Fourteen matching pairs were selected from the records of the three-hundred seventy-five students who were considered. Statistics in Table 1 indicate the

data of each of the selected pairs:

TABLE 1

PAIR DESCRIPTIONS OF MATCHING PAIRS USED AS SUBJECTS
FOR THIS STUDY

<u>Pair #</u>	<u>Sex</u>	<u>IQ</u>	<u>Average</u>		<u>Socio-Economic Level</u>
			<u>5 subject</u>	<u>4 subject</u>	
1	F	125	87.4	87.8	2
2	F	124	75.4	75.4	5
3	F	118	86.6	86.1	2
4	F	116	83.6	83.6	4
5	M	113	75.6	75.8	2
6	M	112	77.6	78.0	5
7	M	112	74.0	74.5	4
8	M	112	66.4	66.8	2
9	F	111	80.8	80.4	3
10	M	111	75.4	75.0	3
11	M	110	81.2	81.1	5
12	M	110	72.6	72.3	2
13	M	110	75.8	75.4	4
14	F	101	72.6	72.3	3

After having determined the matching pairs as described above, certain criteria were established for use in

determining the outcomes of this study. The three criteria used to measure the outcome were the College Entrance Examination Board scores, rank in class at the conclusion of the senior year, and academic average at the completion of grade twelve. This information was gained from the permanent-record cards of each student in the selected pairs. These outcomes will be discussed in chapter four of this study.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Three conditions were examined in determining the outcomes of this study. They were the College Entrance Examination Board scores of the individuals, the rank in class of each individual at the end of the senior year, and the academic average of each student at the end of grade twelve.

After having determined the data to be used in measuring the outcome of this study (data as shown in table II), each column was totaled and the mean of each column computed. A comparison of the mean of each column in the four-subject group was then made with the corresponding column in the five-subject group. Three separate tests were used to determine the significance of the difference between the means of the corresponding column in each group, a t-test, a rank order correlation by pairs, and a method of analysis of variance as described by Garrett.¹

College Entrance Examination Board. The College Entrance Examination Board score was the sum of the scores on the verbal and mathematical Scholastic Aptitude Tests. In most cases the college-preparatory students had taken the College Entrance Examination Board tests more than once. The scores used were taken from the most recent test performance of each student. Only one student had not taken

¹Henry E. Garrett, Statistics in Psychology and Education. (New York, Longmans Green and Co., 1958), pp. 277-288.

TABLE II

COLLEGE ENTRANCE EXAMINATION BOARD SCORES, RANK IN CLASS, AND GRADE TWELVE AVERAGE OF SUBJECTS OF STUDY

Four-Subject Individual

Pair #	CEEB	Rank	Percentile Rank in Class	Avg.
1	1207	16/237	93.5	86.6
2	--	160/350	54.5	71.5
3	893	12/237	95.2	85.7
4	1042	38/237	84.2	75.5
5	931	85/350	75.9	76.8
6	985	73/237	68.5	76.5
7	870	214/350	39.0	69.3
8	820	131/237	44.9	67.5
9	1032	48/237	80.0	76.8
10	845	196/350	44.5	78.8
11	987	51/237	78.7	77.6
12	1012	109/350	69.0	73.5
13	927	109/350	69.0	76.5
14	734	150/350	57.2	69.6

TABLE II-Continued

<u>Five-Subject Individual</u>				
Pair #	CEEB	Rank	Percentile Rank in Class	Avg.
1	1184	10/254	96.3	88.0
2	1064	77/254	69.9	79.0
3	1141	11/237	95.6	88.6
4	1037	21/350	94.2	85.8
5	998	75/350	78.8	72.4
6	912	68/350	81.5	72.4
7	807	153/350	56.5	64.6
8	1001	113/254	55.8	68.0
9	897	46/254	82.2	81.8
10	1006	99/254	61.2	76.0
11	1109	45/254	83.1	77.2
12	932	146/254	43.2	65.0
13	867	128/350	63.5	71.6
14	747	76/254	71.3	75.5

the College Board tests, the one exception being the four-subject individual in pair #2. No reason is known for this individual not taking the test.

The mean of the College Entrance Examination Board scores for the five-subject group was 978.7; the mean for the four-subject group was 945.0. The difference in the means was 33.7, with the five-subject group presenting the higher mean.

Rank in Class. Rank in class at the conclusion of the senior year is based upon the student's academic work throughout his or her four-year high school career. Because of the difference in the number of students in each of the graduating classes used in this study, a percentile rank had more comparative meaning than the simple numerical standing of the individual student in the graduating class. Therefore I computed the percentile rank in class for each student, using the method prescribed by Best.²

The mean of the percentile rank in class for the five-subject group was 73.82; the mean of the four-subject group was 68.22. The difference between the means of the two groups was 5.60, with the five-subject group maintaining the higher mean.

Academic Average at the Conclusion of Grade Twelve.

The third statistic for each student used to measure the

²John W. Best, Research in Education. (Englewood Cliffs, N. J., Prentice-Hall, Inc., 1959), Page 215.

outcome for this study was the academic average at the conclusion of grade twelve.

The mean of the grade twelve average for the five-subject group was 76.34; the mean for the four-subject group was 75.86. The difference in the means of the two groups was .48, with the five-subject group again maintaining the higher average.

Other Possible Factors Influencing Academic Achievement.

It is recognized by the author that there are many other factors which may influence a student's academic results and achievement in addition to the number of major academic courses in which a student is enrolled in a given school year. One such factor is the environment from which a student emerges. The encouragement, or lack of it, which a student receives at home may have a definite bearing on the individual's academic achievement.

A second variable factor which might be a consideration is the number of activities in which a student participates outside of the academic realm of the school. Many arguments have been advanced pro and con concerning the effect of extra-curricular activities upon students and their academic achievement.

Motivation of the student is another variable factor which may have a distinct bearing upon an individual's academic achievement. The academic desire which an individual possesses, whether it is to gain higher grades in school,

obtain a better employment position after completion of school or perhaps to earn a college scholarship, no doubt has a definite bearing on the student's ultimate academic result.

The above variables, and others, all influence the end result of the academic achievement of some high school students. In making this study I have not attempted to consider what influence these variables would have on a student's academic record, for each of these variables could conceivably be the topic of a separate study. My concern has been only with those factors listed previously in this paper.

Statistical Tests. The hypothesis in chapter one of this study stated that there is no significant difference in the grade point averages of students who take four major academic subjects and those who take five major academic subjects at West Springfield High School when sex, mental ability, and socio-economic level are comparable. Statistical tests were applied to the data listed in table II to support or reject the null hypothesis as previously stated.

Rank Order Correlation by Pairs. One of the tests applied was the rank order correlation by pairs, as described by Garrett.³ Utilizing the formula
$$r = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$
 comparisons were made of the outcome of the five-subject group and the

³Henry E. Garrett, Statistics in Psychology and Education. (New York City, Longmans, Green and Company, 1958), Pages 371-374.

four-subject group in the College Entrance Examination Board scores, the percentile rank in class, and the grade twelve average. In each case a correlation coefficient (ρ) was determined; degrees of freedom were computed and, applying the determined degrees of freedom to a table in Garrett, figures were extracted for the .05 and .01 levels of confidence.⁴

TABLE III
RESULTS OF RANKED ORDER CORRELATION BY PAIRS

		.05 Level	.01 Level
CEEB	-318.97	.553	.684
Percentile Rank in Class	-3.66	.532	.661
Grade 12 Average	.131	.532	.661

It is observed from the above table that the level of confidence at both the .05 and .01 levels exceeded the correlation coefficient in all three cases. The indication

⁴Henry E. Garrett, op. cit. Page 201.

here is that there is no significant difference in the two groups of subjects used in this study, those with four academic major subjects and those with five major academic subjects.

T-Test. A second statistical test applied to the gathered data was a t-test, designed to determine if there was any significant difference between the means of the groups in each of the three categories, College Entrance Examination Board scores, percentile rank in class, and grade twelve average. The formula $t = \frac{\bar{X}_a - \bar{X}_b}{\sqrt{\frac{s^2}{N_a} + \frac{s^2}{N_b}}}$ was utilized to determine the t-score in each of the three categories.⁵ Levels of confidence at the .05 and .01 levels were extracted from a table of t and a comparison made of the obtained t-score and the levels of confidence.⁶ Table IV shows the results of t-test as applied to means.

In order to reject the null hypothesis, the t-score would have to exceed the level of confidence figure. The t-score was less than the level of confidence score in each case. Again this would indicate that there is no significant difference between the two groups of subjects in the study, those with four major academic subjects and those with five academic major subjects.

Analysis of Variance of Means. The third statistical test applied to the assembled data was a method of analysis

⁵Henry E. Garrett, op. cit. Page 292.

⁶Ibid. Page 449

of variance of means, as described by Garrett.⁷ A variance ratio, or F-score, and the degrees of freedom were determined. Reference was made to a chart to gain the levels of confidence of the .05 and .01 levels.⁸ The results of this test again indicated no significant difference between the means of the two groups, those with five major subjects and those with four major subjects.

TABLE IV
RESULTS OF T-TEST AS APPLIED TO MEANS

	t-score	.05 level	.01 level
CEEB	.0266	2.06	2.79
Percentile Rank in Class	.058	2.06	2.78
Grade 12 Average	.00463	2.06	2.78

⁷Henry E. Garrett, op. cit. Pages 277-288.

⁸Ibid. Page 451.

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CHAPTER V
CONCLUSIONS AND IMPLICATIONS

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Conclusions. My conclusions in this study, based upon the application of three separate statistical tests, a rank order correlation by pairs, a t-test, and an analysis of variance of means, is that there is no significant difference in the academic results of the two groups of subjects studied, those who had taken four major academic subjects and those who had taken five major academic subjects.

Furthermore it would appear that a policy which dictated or restricted the number of major academic subjects which a student was allowed or compelled to carry during a school year would be of no value if the academic average of the student was the chief concern. Conceivably there could be other factors which might necessitate such a policy, physical space and length of school day to mention but two possibilities, but the academic results of individuals appear not to be significantly different regardless of whether they are enrolled in four or five major academic subjects.

Implications. The implications derived from these results are that the number of major academic subjects which a student carried in a school year, four subjects or five subjects, would have no significant effect upon the College Entrance Examination Board scores, rank in class, or final grade point average of the student during his high-school

career.

I would suggest that further studies and research be conducted on this same topic, as my study covers only a segment of college-preparatory high school students. The available literature on this topic is very limited, with most authors who touch upon the topic at all merely speculating as to which is the more satisfactory program. It would be interesting to me to read the results of other such studies to determine if my findings in this survey were corroborated or refuted by other researchers.

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