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APPROVED BY

DISSERTATION COMMITTEE

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TABLE OF CONTENTS

		Page
LIST OF TABLES		vi
Chapter		
I.	INTRODUCTION	1
	The Problem	2
	Review of Related Research	3
	Summary	20
II.	TREATMENT OF THE PROBLEM	22
	Population to Be Studied	22
	Intelligence Defined	24
	Measured Achievement Defined	25
	Method of Comparing Predicted and Measured Achievement	27
	Instruments for Collecting Characteristic Data	29
	Sources and Procedures for Obtaining Data	30
	Treatment of Data	31
III.	INTERPRETATION AND TREATMENT OF DATA	34
	Description of Population to Be Studied	35
	Study of Population by Educational Factors	40
	Studies of the Comparative Achievement Levels	46
IV.	CHARACTERISTICS OF UNDER- AND OVER-ACHIEVERS	60
	Study of Characteristics of Students in Each Comparative Achievement Level by Teacher Rating Scale	60
	Study of Characteristics of Students in Each Comparative Achievement Level by Student Questionnaire	79

Chapter Page

V. SUMMARY OF FINDINGS AND RECOMMENDATIONS 90

The Findings 90
Conclusions and Recommendations 99

BIBLIOGRAPHY 101

APPENDIX
A. STUDENT QUESTIONNAIRE 111

B. RATING SCALE 114

LIST OF TABLES

Table		Page
1.	Number of Students with Test Data Complete by Individual Schools	23
2.	Summary of Educational Data: I.Q., Measured Achievement, Anticipated Achievement, Grade Point Average, and Comparative Achievement Levels by Individual Schools	36
3.	Summary of Educational Data: I.Q., Measured Achievement, Anticipated Achievement, Grade Point Average, and Comparative Achievement Levels by Individual Schools, Students with Extreme I.S.I.'s Excluded	37
4.	Number and Per Cent of Eighth Grade Population Divided by Intellectual Levels	39
5.	Number and Per Cent of Total Eighth Grade Population by Sex	40
6.	Correlation of General Intelligence, Measured Achievement, Grade Point Average, and Anticipated Achievement	41
7.	Mean, Standard Deviation, and Standard Error of the Mean of the Educational Factors	41
8.	Correlation Chart of Intelligence and Differences in School Years of Measured from Anticipated Achievement, Total All Students	44
9.	Mean and Standard Deviation of Intelligence Quotient and of Difference of Measured from Anticipated Achievement	45
10.	Number Mean and Standard Deviation of the Differences of Measured from Anticipated Achievement by the Three Levels of Intelligence	46

Table Page

11. Differences between Means of Measured from Anticipated Achievement by the Three Levels of Intelligence 46

12. Frequency Distribution of Divergence of Measured Achievement from Anticipated Achievement in School Years, Excluding Extreme I.S.I.'s 48

13. Number, Mean, and Standard Deviation of Comparative Achievement Levels by Academic Characteristics, Extreme I.S.I. Included 50

14. Number, Mean, and Standard Deviation of Comparative Achievement Levels by Academic Characteristics, Extreme I.S.I. Excluded 50

15. Differences between Comparative Achievement Levels on Academic Characteristics, Including All Eighth Graders with Complete Test Data 51

16. Differences between Comparative Achievement Levels on Academic Characteristics, Students with Extreme I.S.I.'s Excluded 52

17. Number and Per Cent of Achievement Levels Falling in Intelligence Levels, Including Extreme I.S.I.'s 55

18. Difference between Percentage of High and Low Comparative Achievement Levels Falling in Each Intelligence Level, Including Extreme I.S.I.'s . 56

19. Number and Per Cent of Comparative Achievement Levels Falling in Intelligence Levels, Excluding Extreme I.S.I.'s 57

20. Differences between Percentage of High and Low Comparative Achievement Levels Falling in Each Intelligence Level, Excluding Extreme I.S.I.'s . 57

21. Number and Per Cent of Each Sex by Comparative Achievement Levels 59

22. Differences of Sexes between Over and Under Comparative Achievement Levels 59

23. Number and Per Cent of Returns of Rating Scale . 60

Table Page

24. Number Rated, Mean and Standard Deviation of Ratings of Comparative Groups of Students as Rated by Teachers on Characteristic "Industry" . 62

25. Difference between Means of Comparative Groups of Students as Rated by Teachers on the Characteristic "Industry" 63

26. Number Rated, Mean and Standard Deviation of Ratings of Comparative Groups of Students as Rated by Teachers on Characteristic "Initiative" (Motivation) 65

27. Difference between Means of Comparative Groups of Students as Rated by Teachers on Characteristic "Initiative" (Motivation) 66

28. Number Rated, Mean and Standard Deviation of Ratings of Comparative Groups of Students as Rated by Teachers on Characteristic "Cooperation" (Peer Relationship) 67

29. Difference between Means of Comparative Groups of Students as Rated by Teachers on the Characteristic "Cooperation" (Peer Relationship) 68

30. Number Rated, Mean and Standard Deviation of Ratings of Comparative Groups of Students as Rated by Teachers on Characteristic "Responsibility" (Dependability) 70

31. Difference between Means of Comparative Groups of Students as Rated by Teachers on the Characteristic "Responsibility" (Dependability) 71

32. Number Rated, Mean and Standard Deviation of Ratings of Comparative Groups of Students as Rated by Teachers on Characteristic "Self-Confidence" (Attitude toward Self) 72

33. Difference between Means of Comparative Groups of Students as Rated by Teachers on the Characteristic "Self-Confidence" (Attitude toward Self) 73

34. Number Rated, Mean and Standard Deviation of Ratings of Comparative Groups of Students as Rated by Teachers on Characteristic "Emotional Stability" 74

Table Page

35. Difference between Means of Comparative Groups of Students as Rated by Teachers on the Characteristic "Emotional Stability" 75

36. Number Rated, Mean and Standard Deviation of Ratings of Comparative Groups of Students as Rated by Teachers on Characteristic "Seriousness of Purpose" 77

37. Difference between Means of Comparative Groups of Students as Rated by Teachers on the Characteristic "Seriousness of Purpose" 78

38. Number and Per Cent of Returns of Student Questionnaire 79

39. Difference between the Percentages of Over and Under Comparative Achievers Answering Yes to Questions on the Questionnaire 81

40. Study of Differences between the Means of Quantitative Answers Given by Under- and Over-Achievers on the Questionnaire 83

41. Amount of Education Completed by Parents, and Educational Expectations of Students by Comparative Achievement Levels from Questionnaire 87

42. Difference between Under- and Over-Achievers in Educational Accomplishment of Parents and in Educational Expectations of the Student 88

43. Means of Academic Characteristics by Levels of Achievement 95

A STUDY OF PREDICTED AND MEASURED ACHIEVEMENT AND SOME POSSIBLE CAUSATIVE FACTORS OF DIFFERENCES

CHAPTER I

INTRODUCTION

There is an ever increasing need for a more efficient use and development of the natural resource of the mental ability of the youth of America. Public concern ebbs and flows concerning this vital matter; presently it stands at high tide.

If public education is to attempt to develop adequately the potential of all the youth of all levels of ability, motivation, economic status, et cetera, in order to meet the needs of the individual and the nation, it is necessary not only to know the needs but also to be able to measure individual ability to profit from public education and to predict future achievement.

Educators must use and continue to develop scientific diagnosis and prognosis based upon scientific investigation and accurate measurement. What is taught must be securely founded on what can be learned. Any attempt by mere teaching

to create talents which have their roots in nature, and by mere teaching to remove limitations of natural endowment, is at best scientifically unsound and at worst professionally dishonest.

Public education is often accused of developing a cult of mediocrity or of developing the low-ability student at the expense of the more capable. To evaluate a system of education it is necessary to know which level of intellectual ability is profiting the most. Again scientific objective measurements of prediction and actual achievement must be used.

Old, but still persisting, is the question of why some students achieve above expectation while others fall below their expectation. Why is not the achievement of the student proportional to the ability of that student? Is it the age old story of the tortoise and the hare, not intelligence alone, but also of character traits, environment, and motivation?

The Problem

The primary concerns of this investigation are to measure the achievement of secondary school students, and to compare it with their potential achievement as measured by intelligence tests, to locate students whose measured achievement is above or below their predicted achievement, to determine the correlations of predictions of achievement

and actual achievement, and to compare characteristics of students achieving below to those achieving above their level of intellectual expectancy.

Some of the subsidiary questions are:

1. What are the correlations between predicted achievement and measured achievement?

2. Is the mean difference between predicted achievement and actual achievement greater at one intellectual level than at another?

3. What factors and characteristics, if any, differentiate between levels of comparative achievement?

The characteristics to be studied will be limited to measured test achievement, grade averages, attendance from available records, and additional data from a rating scale and questionnaire limited to one page each in order to survey the larger population.

Review of Related Research

The problem of finding reliable and valid measures of prediction and actual achievement must first be solved before any study of characteristics can be considered. Therefore since considerable research is available on this problem it is considered first.

Unreliability of School Marks or Grades

The unreliability of school marks as a technique of

appraisal was pointed out by Rinsland[1] over twenty years ago. He showed the wide variation of marks given by different teachers to the same subjective examination. Wide differences had been found even when the same teacher re-marked the examination after the first marks were forgotten. Tiegs[2] reported similar findings. Prior to this Starch[3] pointed out that, even though twenty years earlier this had been demonstrated, marks of that type were still being used widely as measures of achievement.

Kurtz and Bertin[4] in studying a group of college students found a difference between grade marks of the same pupils in different departments with t ratios of as high as 11.3 to show again their low validity and reliability.

Many studies of the correlation between intelligence tests and educational achievement grade marks have been made. Super[5] states that the correlation is not especially high,

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[1]Henry D. Rinsland, Manual for Constructing Objective Tests and Improving Grading in Elementary and High School Subjects (Chicago: John S. Swift Co., Inc., 1935), pp. 98-101.

[2]Ernest W. Tiegs, Tests and Measurements in the Improvement of Learning (Cambridge: Houghton Mifflin Company, 1939), pp. 9-10.

[3]D. Starch, Educational Psychology (New York: Macmillan Company, 1924).

[4]A. K. Kurtz and M. A. Bertin, "Reappraisal of Marking Practices," Educational Research Bulletin, XXXVII (March, 1958), 67-74.

[5]Donald Super, Appraisal of Vocational Fitness (New York: Harper and Brothers, 1949), p. 90.

the range being from .40 to .50 generally for high school studies.

Methods of Prediction

An early method was to predict directly from subjective judgment. Later objective measurements of intelligence were developed. The subjective method of expecting an I.Q. of above 100 to accomplish above average has been refined to more exact measurements. McCall[1] in the early twenties advocated the educational quotient. The educational quotient equals the educational age divided by the chronological age, times one hundred. The educational age is simply the score on a standardized achievement test changed to typical age norms. The E.Q. can be readily compared to the I.Q. This method uses only the factor of intelligence in prediction.

The accomplishment quotient as suggested by Stephens[2] and others is merely a refining of this comparison of E.Q. and I.Q. Accomplishment quotient equals educational quotient divided by intelligence quotient times one hundred. A student with an A.Q. of less than 100 would be achieving below capacity. A student with an A.Q. of 100 would be just up to capacity, and above 100 would be achieving beyond capacity.

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[1]William A. McCall, How to Measure Achievement in Education (New York: The Macmillan Company, 1922), p. 37.

[2]J. M. Stephens, The Study of Educational Growth (New York: Henry Holt and Company, 1951), p. 224.

Clark[1] devised a procedure for evaluating achievement results by adjusting achievement test norms for group deviations of intelligence. The norms thus became more meaningful to the local group.

Recent studies, such as that of Armstrong,[2] who used the regression equation to predict student grade averages from intelligence, are still using only the one factor, intelligence, in prediction.

Tsao[3] developed the effort quotient (FQ) and a predicted achievement. While using only the factor of intelligence he did take into consideration the relationship between the test used to predict and the test used to measure achievement. The expected achievement score was the divergence of the student's intelligence test score from the mean score of the intelligence test plus a correction figure for the relationship of the two tests. To compute this correction figure he divided the mean score of the achievement test used by the product of the correlation of the two tests used times the

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[1]Willis W. Clark, "Evaluating School Achievement in Basic Skills in Relation to Mental Ability," Journal of Educational Research, XLVI (November, 1952), 179-91.

[2]Marian Elizabeth Armstrong, "A Comparison of the Interests and Social Adjustments of Underachievers and Normal Achievers at the Secondary School Level" (University Microfilms, Ann Arbor, Michigan), Ph.D. dissertation, The University of Connecticut, 1955, pp. 39-40.

[3]Fei Tsao, "Is AQ or F Score the Last Word in Determining Individual Effort," Journal of Educational Psychology, XXXIV (December, 1943), 513-25.

quotient of the standard deviation of the achievement test divided by the standard deviation of the intelligence test. The effort quotient was then the actual achievement test score divided by this predicted achievement times one hundred.

Further progress was made in prediction when the two factors of chronological age and intelligence were combined to yield an expected achievement. Horn[1] was one of the first to combine chronological age and intelligence by formula to determine an expected grade placement. Her formulas have been used to compile expectancy tables for Los Angeles, Denver, and other school systems.

The factor of opportunity to learn was still to be added. A student can hardly be expected to know information to which he has not been exposed. An older though duller student who has had more opportunity to learn may do better than a brighter younger student who has not progressed as far in school. The California Test Bureau[2] combined this factor in the form of actual school grade placement with the factors of intelligence and chronological age to produce an Intellectual Status Index. This formula is explained further in the next chapter. Resulting values deviating positively or

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[1]Alice M. Horn, Uneven Distribution of Effects of Specific Factors (Los Angeles: University of Southern California Press, 1941), p. 107.

[2]Ernest W. Tiegs and Willis W. Clark, Manual California Achievement Tests Complete Battery, Forms, W, X, Y (Los Angeles: California Test Bureau, 1957), pp. 47-49.

negatively from one hundred indicate above or below average characteristics of the student. The Intellectual Status Index determined by use of this formula is then converted into anticipated grade placement by means of norms established by multiple norming process on a nationwide sampling. This is the method of prediction used in this study.

Characteristics Related to Degree of Achievement

A concern of this study is with the factors and characteristics in addition to intelligence which may be related to school achievement. Pursom[1] found that of one thousand students studied the 30 per cent who were failing in high school had above average intelligence according to test of mental ability. Other studies even go so far as to indicate that a greater degree of overachievement is characteristic of the intellectually retarded while underachievement is more characteristic of the superior group.[2]

Shanner[3] points out that these generalizations may be

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[1]T. L. Pursom, "Traits Associated with Success and Failure of Students," The Non-Adjusted Pupil in Junior and Senior High School, Second Yearbook of the Department of High School Principals of the Michigan Education Association (1931), p. 81.

[2]W. Drayton Lewis, "The Relative Intellectual Achievement of Mentally Gifted and Retarded Children," Journal of Experimental Education, XIII (December, 1944), 98-109.

[3]William M. Shanner, "Relationship between Norms for Mental Maturity and Achievement Tests," California Journal of Educational Research, VII (January, 1956), 8.

incorrect because of basic differences in norming procedures of intelligence and achievement tests. Intelligence tests are based upon chronological age for norming while achievement tests are based on groupings by school grades. School groupings are more homogeneous because of retardation, acceleration and administrative procedure; therefore the range is narrower and the peak of the curve higher than is the more heterogeneous grouping by chronological age. If a correction is not made for the underlying difference in units, when achievement norms are based on the narrower deviation of grades and intelligence is based on the wider deviations of chronological age, the expectancy for bright students will be too high and for slow students too low.

Numerous studies have been made where testing techniques as well as non-testing techniques have provided valuable data. Three types of techniques are found in the literature. Intensive psychological studies of a small sampling of individuals are helpful to the specialist, and for the exceptional child, but are beyond the realm either in time or understanding of the average classroom teacher or public school personnel. Other studies have been made as a basis for preparing standardized questionnaires or tests to measure study habits, attitudes, and interests. The most helpful and practical type of study for public school people has been a mixture of testing and survey type inventory of a slightly larger sampling of students on a sociological and

environmental basis.

Psychological Studies

Robinowitz[1] has pointed out that studies comparing successful with unsuccessful students, or studies comparing students achieving above expectancy with students achieving below expectancy, have not consistently shown characteristics common to students of high achievement relative to ability. He undertook to examine ways in which a given group of pupils with high achievement-relative-to-ability differs from three control groups. The pupils' attitudes toward: (a) self-concept, (b) acceptance by family, (c) acceptance by peers, and (d) school achievement were studied to ascertain the importance of feeling toward the basic aspects of the environment in determing high achievement-relative-to-ability.

One experimental and three control groups of nine students each were selected by use of Tsao's[2] Effort Quotient with scores obtained from the Wechsler-Bellevue Intelligence Scale, Form I, and pupils' average academic mark. These students were examined by administering the Thematic Apperception Test, Q-sort Distribution, and Bonney's Social Distance Scale.

One conclusion was that, although the experimental group was accepted as well by family and peers as the control

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[1]Ralph Robinowitz, "Attributes of Pupils Achieving beyond Their Level of Expectancy," Journal of Personality, XXIV (March, 1956), 308-17.

[2]Tsao, op. cit., pp. 513-25.

groups, there was doubt and confusion in the important areas of family and peer acceptance. This may have caused these students to strive harder and thus place them in the over-achiever category.

Blackham[1] conducted a study at Cornell University in 1954. From 155 pupils in the eighth and ninth grades of a rural school fifteen over- and fifteen under-achievers in reading were selected. These two groups were studied by means of the Rorscharch Test, The Thematic Apperception Test, Mental Health Analysis, and a questionnaire completed by teachers and the school nurse.

The over-achievers-in-relation-to-ability were found to be in better mental health, to be more behaviorly mature, to be more emotionally stable, to be more introversive, to possess a greater amount of intellectual energy, and to have fewer emotional difficulties than the under-achiever.

Renaud,[2] Chief Psychologist of the University of California Student Health Services, on the basis of experience with fifteen hundred records at The Student Health Psychiatric Service, draws conclusions from the Minnesota

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[1]Garth J. Blackham, "A Clinical Study of the Personality Structures and Adjustments of Pupils Under-Achieving and Over-Achieving in Reading" (Dissertation Abstracts, Abstracts of Dissertations and Monograms in Microfilm), XV, No. 5-8 (1955), 1199.

[2]Harold Renaud quoted in Barbara Kirk, "Tests Versus Academic Performance in Malfunctioning Students," Journal Consultant Psychology, XVI (1952), 214-15.

Multiphasic Personality Inventory Records. The most frequent record associated with poor academic achievement is a tendency towards pervasive resistance on an unconscious level to any externally imposed task.

Tests or Questionnaire Construction Studies

A different approach has been to construct tests or questionnaires to evaluate the causes of over- and under-achievement. A comprehensive summary of this type of study is presented by Brown and Holtzman.[1] They state that, although in the past twenty years several study-habit questionnaires have been published, none has shown any appreciable correlation with grades in school. These studies have unsuccessfully attempted to differentiate between the good and poor students by investigating the mechanics and skills of studying. It is indicated that effort, motivation, and attitude are more important than mechanical procedure of studying.

Tiebout[2] in a three year Clinical Study of girls at Sarah Lawrence College concluded that the students whose scholastic records were poorer than expected tended to possess four personality characteristics: They need strong and immediate motivation, they have transitory interests, they tend

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[1]W. F. Brown and Holtzman, "Attitudes Questionnaire for Predicting Academic Success," Journal Educational Psychology, XLVI (February, 1955), 75-84.

[2]H. M. Tiebout, "The Misnamed Lazy Student," Educational Record, XXIV (1943), 113-29.

to be governed by strong hedonistic principles, and they have deep-seated problems in learning.

The need for the change of emphasis from study-habits to study-attitudes is borne out by most of the studies. In an investigation of 1250 school children, Cuff[1] discovered that many of the seventy-five most commonly recommended principles of study were reportedly being followed more exactly by the inferior than by the superior student.

Brown and Holtzman[2] endeavored to construct a self-rating questionnaire that would measure a student's attitude and motivation toward studying as well as his study habits. The statements for the questionnaire were compiled from group discussions with college freshmen, existing inventories on study habits, studies using observational and interview techniques to differentiate good and poor students, and reports on related experiments in the field of learning. The statements were refined and the resultant eighty-eight "study-attitudes" and one hundred "study-mechanics" items were assembled at random in questionnaire form with a five point scale. The preliminary questionnaire was administered at The University of Texas to matched groups of honor and low-scholarship students. Exploratory study suggested that a self-rating questionnaire referring to study-attitude would

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[1]N. B. Cuff, "Study Habits in Grade Four to Twelve," Journal of Educational Psychology, XXVIII (1937), 295-301.

[2]Brown and Holtzman, loc. cit.

be superior to a study-habits inventory in predicting scholastic success in college.

Gough[1] attempted to incorporate and apply the discoveries and findings of previous studies to the problem of forecasting scholastic achievement. He developed a scale of sixty-four items that he recommends as being ready for practical use and application. From his study and the survey of the list for possible trends and clusters he suggests the following tendencies as characteristic of the more successful students: optimistic self-confidence, acceptance of convention, personal efficiency, good peer relationship, and sense of academic effectiveness.

Educational Test, Sociological, and Environmental Studies

The former studies cited clearly indicate the importance of guidance in the school program and the need for understanding students as individuals. Use of guidance methods for individual analysis and skill in using the techniques of studying students are essential to understanding and assisting under-achievers. In the program of analysis testing techniques as well as non-testing techniques provide valuable data. Many studies of this sort have been made with valuable results.

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[1]Harrison G. Gough, "What Determines the Academic Achievement of High School Students," Journal of Educational Psychology, XL (1949), 76.

The case-study approach, in which testing techniques and other methods are used to collect all available data about the individual under-achiever, and then teachers, guidance workers, and others concerned with the pupil meet in case conference to interpret the data, has revealed some of the reasons for under-achievement. McQueen[1] lists a number of these reasons as follows: lack of subject-matter skills, lack of knowledge of how to study, personality problems, home and family problems, school and teacher problems, exhaustive outside work, and school curriculum that does not meet the pupil's needs.

Authorities give lists of variations of characteristics, interests and physical development in which children differ. Brueckner[2] lists some of the differences of pupils' study habits, attitudes, and reactions as being: (1) work habits--business like and inefficient, (2) participation in class activity, (3) reactions to various kinds of incentives and methods of motivation, (4) indifference, and (5) lack of interest.

Other authorities have gone farther and stated

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[1]Mildred McQueen, Helping Underachievers, Research Report, Science Research Associates (Chicago: Science Research Associates, 1958), pp. 2-3.

[2]L. J. Brueckner, "Techniques of Diagnosis," Educational Diagnosis, National Society for the Study of Education (Thirty-fourth Yearbook), p. 139.

characteristics of specific groups. Williamson[1] adds to these the following characteristics for under-achievers: habits of idleness and of getting by, indulgence in social activities, health disturbances, degree of interest in academic work, and scholastic standards differing from one school to another.

Valentine,[2] an educational psychologist from England, instead of using the term under-achievers, uses the term retarded and defines it as meaning that the subjects' attainment age is below the mental age. From a study of forty retarded or under-achieving students he concludes that detrimental environmental conditions or some form of emotional disturbance has been found as a handicap in nearly every case where a student of superior intelligence is achieving far below expectancy. In addition to these he concludes that the most common cause of under-achievement is unsuitable teaching methods for the slower student and frequent absences.

Selected pupils from the successive graduating classes during four years at Sullivan High School in Chicago were studied by Anspaugh.[3] About 1,100 students were included

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[1]E. G. Williamson, How to Counsel Students (New York: McGraw-Hill Book Co., 1939), p. 372.

[2]Hugh B. Valentine, "Some Results of Remedial Education in a Child Guidance Center," British Journal of Educational Psychology, XXI (1951), 146.

[3]G. E. Anspaugh, "Qualities Related to High Scholarship in Secondary School," The School Review, LXI (September, 1953), 337-40.

in these eight classes. A questionnaire endeavoring to determine the qualities and activities which distinguished the best graduating students from those who received low marks was filled in by the top-ranking 15 per cent and by the bottom-ranking 15 per cent of each class. A total of about 165 superior students and 165 inferior students were considered in this study of scholarship, irrespective of ability.

Anspaugh's conclusions in the study reveal the following significant points: (1) Motivation is more important than intelligence. (2) Membership in religious and social organizations is not significantly influential. (3) Home conditions, such as broken homes, number of siblings, and a quiet place at home to do school work have no significant effect. (4) A much higher per cent of good students than of poor ones was found among those who had been giving extensive service to the school. (5) The top group had been absent from school only about one-fourth as much as the lower group. (6) Frequent dating was rather more common among poor students than among good ones. (7) Students in the lower group had been working four or five times as many hours per week in outside employment as had the best students. (8) The number of hours a week spent on school work at home had a high correlation with school marks.

Armstrong[1] made a comparison of the interests and

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[1]Marion Elizabeth Armstrong, "A Comparison of the Interests and Social Adjustment of Underachievers and Normal

social adjustment of under-achievers and normal achievers of students in grades nine to eleven in Woodrow Wilson High School, Middletown, Connecticut. Intelligence quotient and average school marks were used as a basis for determining over- and under-achievement. Kuder Preference Records, Vocational and Personal, were administered; rating scales on cooperation, dependability and judgment were completed on all students by selected teachers. Each student was interviewed by a counselor, and personal records were studied.

The results showed the under-achievers to differ from the normal-achievers with a statistically significant difference in that occupational choice was due to influence of others and did not agree with dominant interests; outdoor activity was preferred; the girls were chosen less often for positions of responsibility; and the boys preferred companions older than themselves.

Kurtz and Swenson[1] report part of a study concerned with factors in addition to measured intelligence which may be related to school achievement. The study was made in a mid-western city of under ten thousand population concerning under- and over-achievers based on intelligence and achieve-

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Achievers at the Secondary School Level" (Dissertation Abstracts, Abstracts of Dissertations and Monographs in Microfilm), XV, No. 5-8 (1955), 1349-50.

[1]John L. Kurtz and Ester J. Swenson, "Factors Related to Over-achievement and Under-achievement in School," The School Review, LIX (November, 1951), 478-480.

ment tests. Along with test data, reports were available for each pupil on interviews with the children themselves, their parents, and their teachers. The report is based on forty students of each classification: four of each from grades four through eight, and five of each from grades nine through twelve.

The study was exploratory and did not seem to show that any one factor but a variety of interrelated factors tip the balance in one direction or another. The authors felt justified in making some statements in summary. In general, the homes of the over-achievers are more favorable, pleasant, and affectionate. The over-achiever has more peer relationships with similar standards of school achievement, while the under-achiever may not have friends, and, if he does, they have low standards of school achievement. The over-achiever is usually regarded as comparatively bright with a feeling of adequacy, alertness, attentiveness, and seems happy in the school atmosphere, while the under-achiever is unstable, feels inferior and may have emotional conflict. The over-achiever appears to be more academically inclined while the under-achiever is disinclined towards academic activity. Over-achievers have comparatively high distant future goals in comparison with the more limited educational and vocational aims of the under-achiever.

Summary

The attempts to identify the factors or characteristics of under- and over-achievers have not been particularly successful. The studies are at times contradictory and at best not too conclusive. There appear to be several important reasons for the unsatisfactory degree of relationship or correlation between the studies. Different measurements of achievement have been used as well as different areas of achievement. Results using grades as a measure of achievement reflect the unreliability of this technique of appraisal. Many studies based upon grades as a measurement of achievement are actually a study of the characteristics a student needs to get along in a classroom rather than a study of over-achievers and under-achievers. Other measurements of achievement have been of one segment of learning rather than of all accumulated knowledge. It would appear that a measurement of achievement by some standardized test of many factors of educational development would solve some of these inadequacies.

Many of the studies though intensive in nature and basically sound in methods of research have used such small numbers in their experimental and control groups than an adequate sampling is questionable. The use of similar methods on a larger population would provide a far better understanding of the problem and be more convincing to public school educators.

It is possible to identify some general factors from

the studies cited for use in further research. It would appear that the under-achiever rates lower or poorer and the over-achiever rates higher or better on the following characteristics:

1. Mental health
2. Peer relationships
3. Work habits and attitudes
4. Interest in academic activities
5. Degree of maturity
6. Attitude toward self
7. Attendance record
8. Family relationship
9. Orderliness and planfulness
10. Acceptance of convention
11. Personal efficiency, vitality and integration
12. Use made of outside school hours
13. Value judgments
14. Adequacy of outlook and goals

The above characteristics as identified subjectively by authorities and inconclusively by the studies listed may be used as the source of characteristics for further study. The use of a larger population to provide more reliable results and to be more acceptable to the public school educator will necessitate the use of larger control groups, and the use of group tests and group techniques to supply comparable, valid measures of predicted and measured achievement and to evaluate these characteristics.

CHAPTER II

TREATMENT OF THE PROBLEM

Population to Be Studied

Oklahoma City, where this study was conducted, is the capital and largest city of the state with an estimated population of 295,000. It is the cultural, industrial, and trading center for a large area of the great central plains. The people represent a cross section of the state and south central portion of the United States.

The population chosen for study was the public school eighth grade enrollment of nearly four thousand students during the 1957-58 school year. There are thirteen schools enrolling eighth grade students. Eight of these are six-year schools, and the other five are three-year junior highs. The schools have been partially integrated, with two of the schools having both white and colored, one all colored, and the remainder all white.

The test data were collected by each school and submitted to the central office. The percentage of students by schools with complete test data varied from a low of 46.1 per cent to a high of 97.5 per cent. This may be partially

explained by the large turnover of students in certain schools and by the relative completeness of the school records. Table 1 presents the information by individual schools and by a total of all schools.

TABLE 1

NUMBER OF STUDENTS WITH TEST DATA COMPLETE BY INDIVIDUAL SCHOOLS

School Number*	Number Eighth Grade Students Enrolled	Number with Intell. and Achieve. Test Data	Number with Incomplete Data	Percentage Students with Complete Data
1	157	153	4	97.5
2	345	242	103	70.1
3	339	246	93	72.6
4	361	331	30	91.7
5	249	161	88	64.7
6	111	58	53	52.3
7	134	120	14	89.6
8	482	342	140	70.9
9	568	546	22	96.1
10	188	167	21	88.8
11	405	261	144	64.4
12	245	113	132	46.1
13	222	157	65	70.7
Total	3806	2897	909	71.1

*Schools will not be identified by name.

Intelligence Defined

For the purpose of this study intelligence will be defined as that which is measured by the California Short-Form Test of Mental Maturity, Elementary, 1950 S-Form. This test provides a measure of mental capacity or mental development. By means of carefully selected and validated items in twelve or more sub-tests, this test measures intelligence through a sampling of mental processes in five areas: memory, spatial relationships, logical reasoning, numerical reasoning, and verbal concepts. The test yields both mental ages and I.Q.'s for language and non-language sections, as well as for the total test.

The Stanford-Binet, long recognized as the oldest and most widely used individual test of intelligence, is considered to be the standard for the measurement of validity of intelligence tests. The Division of Professional Services of the California Test Bureau[1] reports that the test of Mental Maturity was designed to measure by group process most of the mental processes sampled by the Stanford-Binet. They refer to the following works in support of its validity: Beldon[2] in a study in Los Angeles County in 1938 reported a

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[1]Division of Professional Services, California Test Bureau, assisted by James C. Coleman, California Test of Mental Maturity, Summary of Investigations Number Three (Los Angeles, California, 1956), p. 6.

[2]Daniel Beldon, "Factor Analysis of the California Test of Mental Maturity" (unpublished study, Educational Statistician, Los Angeles, 1938).

correlation of the CTMM Short Form and the Stanford-Binet of .84. Sheldon and Manolakes[1] further attest the validity by a correlation range of .629 to .757 for the same tests.

The Wechsler-Bellevue, another prominent individual test of intelligence, is also used as a standard of measurement of validity. Clark[2] reports a correlation of .81 using 1,172 eleventh grade students while Topetzes[3] using college students reports a correlation of .63 between the CTMM and the Wechsler-Bellevue. These data are submitted to substantiate the use of the California Test of Mental Maturity as the measurement of intelligence.

Measured Achievement Defined

Measured Achievement will be defined as that which is measured by the Complete Battery of the California Achievement Tests (Reading-Arithmetic-Language), as devised by Tiegs and Clark, 1950 edition. The tests are devised for measurement of achievement in the basic skill areas of reading, arithmetic, and language.

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[1]William D. Sheldon and George Manolakes, "Comparison of the Stanford-Binet, Revised Form L, and the California Test of Mental Maturity (S-Form)," Journal of Educational Psychology, VL (December, 1954), pp. 499-504.

[2]Jerry H. Clark, "An Investigation of Certain Relationships between the California Test of Mental Maturity and the Wechsler-Bellevue Intelligence Scale," Journal of General Psychology, XLI (July, 1949), pp. 21-5.

[3]Nick J. Topetzes, "A Program for the Selection of Trainees in Physical Medicine" (unpublished Ph.D. dissertation, University of Wisconsin, 1947).

Witty[1] refers to the Intermediate Battery as satisfying the criterion of validity based on their inclusion of items found in the typical curricula. Shores[2] rates the tests to be probably as accurate as other batteries and to have no equal in ease of administration, scoring, and recording of test data. The parts of the tests were correlated with like parts of the Metropolitan Achievement Tests and the Stanford Achievement Tests showing correlations ranging from .63 to .84.[3]

The high degree of relationship between achievement as measured by the California Achievement Tests Complete Battery and intelligence as measured by the California Test of Mental Maturity was an essential element in the selection of their use. Clark[4] found a correlation of .71 between the two tests in a study of eleventh grade students. Russell[5] obtained a correlation of .699 in a study of seventh and

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[1]Oscar Buros, The Third Mental Measurements Yearbook (New Brunswick: Rutgers University Press, 1948), p. 16.

[2]Oscar Buros, The Fourth Mental Measurements Yearbook (Highland Park: Gryphon Press, 1953), pp. 2-6.

[3]Ernest W. Tiegs and Willis W. Clark, Manual California Achievement Tests, Junior High Level W. X. Y. (Los Angeles: California Test Bureau, 1957), pp. 12-13.

[4]Willis W. Clark, "A Study of Factors Related to Mastery of Skills in Reading, Arithmetic, and Written Expression" (unpublished Ph.D. dissertation, University of Southern California, 1941).

[5]Ivan L. Russell, "Personality: Its Relation to Teachers' Marks" (unpublished Master's thesis, Southern Illinois University, 1950).

eighth grade students. On the basis of these and other findings the two tests were used in computing measured and predicted achievement.

Method of Comparing Predicted and Measured Achievement

Comparable units for the two tests are provided by the school year grade placement of the California Achievement Test and by the Intellectual Status Index formula and Anticipated Achievement charts for the California Test of Mental Maturity.[1]

The Intellectual Status Index combines the three factors of chronological age, mental ability, and school grade placement of the student in the following formula:[2]

$$I.S.I. = \frac{I.Q. \times C.A.}{G_{ca}}$$

where I.Q. is the intelligence quotient computed from the California Test of Mental Maturity; C.A. is chronological age in months of the student for the date for which it is desired to predict; and G_{ca} is a constant, the typical chronological age in months corresponding to the chronological grade placement of the first month of each school year on the norms of the California Test of Mental Maturity, which for the eighth grade is 161. Calculations are

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[1]Ernest W. Tiegs and Willis W. Clark, Manual California Achievement Tests, Advanced Forms W. X. Y. (Los Angeles, California: California Test Bureau, 1957), pp. 49-54.

[2]Ibid.

available in chart form.[1] This statistically devised number for the I.S.I. indicates the deviation of the student's chronological age and mental ability from those same characteristics of the basic norming sample for his grade in school. An index of 100 is the norm; therefore numbers above or below indicate superior or inferior expected achievement.

The Anticipated Grade Placement Charts published in the manual supply grade placement performance norms from a nation-wide sample of students with the same intellectual status index. The total anticipated achievement grade placements were computed by averaging the values of the components of the test from the charts in the manual. For I.S.I.'s from 80 to 135, these are based upon actual nation-wide test results. Since a significant number of cases with I.S.I. above 135 and below 80 were not found in the nation-wide sample to yield the degree of accuracy demanded by the California Test Bureau standards, unpublished extrapolated anticipated achievement values were supplied by the California Test Bureau for use in this study.[2] Two tables are usually given throughout this study, one to provide information on the total population, including those people with I.S.I.'s above 135 and below 80, hereafter referred to as extreme I.S.I.'s,

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[1]Now published as: Anticipated Achievement Calculator, Devised by William M. Shanner (Los Angeles: California Test Bureau, 1958).

[2]Ibid.

and the other excluding these extreme I.S.I.'s.

Instruments for Collecting Characteristic Data

Examination of the studies available suggested differences between over- and under-achievers, but because of the variety and differences of these suggestions adequate instruments were not available for the evaluation of these characteristics. Several fine rating scales, questionnaires, and other evaluative measures are available, but most cover wide ranges of characteristics and do not fit the needs of this study.

School records were examined and rejected as a source of personal information concerning the student. The pupil progress folders were often inaccessible because of the variety of methods of collecting data and the locations of files. When located they were incomplete, vague, or outdated because of arrival of new students and lack of clerical personnel to handle this type of records. Registrar files did not contain the desired personal information.

Many questionnaires and other means of collecting information of this type were examined. It was decided to hold the information to a minimum, to limit the total length of the questionnaire to one page, and to use only questions that could be answered with a check mark or a number in order to facilitate answering. The questionnaire thus devised is

shown as Appendix A.

The shortcomings and inadequacies of rating scales have been discussed at length in the various studies. However, in gathering a description of the characteristics desired, they reveal that a well-constructed rating scale offers the possibilities of quantifiable descriptions and appraisal based on observance of past behavior. Accordingly, after careful study of many rating scales and their criticisms, a scale of seven character traits was developed. Each item has five possible ratings with suggested explanations supplied; three descriptions are nearly identical to ones by Froehlich.[1] A copy of the rating scale to be marked by the rating teacher is shown as Appendix B.

Sources and Procedures for Obtaining Data

For a number of years the California Achievement Test has been administered by trained personnel in each Oklahoma City school to the entire eighth grade class during the month of November. The California Mental Maturity Test was administered by the Junior High School Counselors at the close of the sixth grade so that the results could be used for secondary school placement and guidance. Each school compiled a list of all eighth grade students enrolled with the California Achievement Test grade placement, the intelligence quotient

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[1]Clifford P. Froehlich, Guidance Services in Smaller Schools (New York: McGraw-Hill Book Company, Inc., 1950), pp. 191-92.

from the California Test of Mental Maturity, and the chronological age of each student as of November, 1957. These were submitted to the Department of Pupil-Services of the Oklahoma City Public Schools and then were used for this study.

From the permanent records of each school the grade averages and days absent of each student for the previous seventh grade school year were compiled. Grade point averages were computed on a scale of F = 0, D = 1, C = 2, B = 3, and A = 4.

Rating scales and questionnaires, with the name of the student to be studied filled in, were sent to the counselor of each school with instructions for their use. They were distributed and explained by the counselor to the teachers and students and, after completion, were collected and returned.

Treatment of Data

The relationship of the test data to other evaluations and to items of measured and predicted achievement were compiled into scattergrams and studied by the "Pearson r" product-moment coefficient of correlation. For other data of the frequency type the typical procedures of analysis, interpretation, and description were used. This information is presented through tables containing correlations, frequency distributions, descriptions of such distributions in terms of percentages and ratios, and discussions of their implications.

Partial and multiple correlations are presented on the predictive data. Since a part of the stated problem is to locate and to study the students whose measured achievement is above or below their predicted achievement, three comparative-achievement-levels were defined in the following manner. The differences of measured achievement grade placement from anticipated achievement grade placement were computed for each student. These differences were compiled into a frequency distribution and the mean and standard deviation computed. All students with a positive difference greater than one and one-half standard deviations above the mean difference were classed as over-achievers and those with a negative difference more than one and one-half standard deviations below the mean difference were classed as under-achievers. For comparison, those whose differences were the same as the mean difference of the entire eighth grade were classified as average-achievers. The over-achiever is then the approximate 7 per cent of students whose achievement farthest exceeds their expectations. The under-achiever is the approximate 7 per cent of students whose achievement falls farthest below their expectations. The average-achiever is an approximate 7 per cent who most nearly approximate expectation.

After the rating scales and questionnaires had been returned, they were tabulated by comparative achievement levels and compared by sex and by levels of intelligence.

To ascertain the significance of difference between means and percentages found, the null hypothesis was used, and the test of critical ratio was applied as a basis for its acceptance or rejection. If the critical ratio is 2.58 or more, the null hypothesis is rejected at the .01 level of significance, and if 1.96 or more the null hypothesis is rejected at the .05 level of significance. To provide greater accuracy with smaller numbers of students "t" a critical ratio in which a more exact estimate of the standard error of the difference between means is used, and the t-distribution with correct degrees of freedom is used to provide the proper levels of significance.[1]

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[1]Henry E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Company, 1953), pp. 217-23.

CHAPTER III

INTERPRETATION AND TREATMENT OF DATA

This study has two major parts. The first part consists of the study of the difference between predicted and actual achievement. The second part, presented in Chapter Four, studies those who are achieving above expectation and those who are achieving below expectation in an attempt to find distinguishing characteristics.

This chapter considers the differences between these predicted and actual achievements. Two methods of measuring actual achievement are submitted. The grade average is usually accepted as the teacher's judgment of the educational achievement of the student. Achievement as measured by standardized test is used as a measure of student accomplishment without the judgment of the teacher.

Two predictions of actual achievement are made: first, general intelligence as shown by the intelligence quotient; second, anticipated achievement is computed by means of a statistical formula combining intelligence, chronological age, and grade placement into an intellectual status index, which is then converted to norms of anticipated achievement.

Description of Population to Be Studied

Grade Placement and Grade Point Averages

The individual school was the basic unit for collecting the data. Although no attempt was made to evaluate the work of each school, it was helpful and interesting to compile the information concerning students from each school separately. Each school is listed by number rather than by name. The mean for each measurement and the number of students in each achievement level are listed. Tables 2 and 3 present this information. As would be expected, the individual school summaries reflect the intellectual level of the school and the socio-economic background of the community. The schools range from a mean I.Q. of 91.0 to a mean of 114.1. The total mean I.Q. of 104.8 is above the national norm of 100 as given for the normal eighth grade population in the Manual of the California Achievement Test.

The mean anticipated achievement of the schools ranged from a low of 7.5 to a high of 9.6 with a population mean of 8.7 school year grade placement. This gives the total eighth grade an expectation of six months above the national norm.

The national norm for the month the achievement test was administered was 8.1 school year grade placement. The individual school means ranged from a low of 6.6 to a high of 9.2, with a total eighth grade mean of 8.1 school year

TABLE 2

SUMMARY OF EDUCATIONAL DATA: I.Q., MEASURED ACHIEVEMENT, ANTICIPATED ACHIEVEMENT, GRADE POINT AVERAGE, AND COMPARATIVE ACHIEVEMENT LEVELS BY INDIVIDUAL SCHOOLS

School Number	Mean I.Q. of School	Mean Anticipated Achievement	Mean Measured Achievement	Difference between Mean Anticipated and Measured Ach.	Mean Grade Point Average	Number of Over-Achievers	Number of Under-Achievers	Number of Average-Achievers
1	107.4	8.95	8.5	-0.45	2.9	19	5	15
2	108.7	9.2	8.4	-0.8	2.7	14	30	20
3	91.0	7.5	6.6	-0.9	2.4	12	26	15
4	104.0	8.6	7.9	-0.7	2.9	16	42	22
5	103.4	8.7	8.2	-0.5	2.4	16	12	14
6	95.9	8.1	7.1	-1.0	2.6	1	8	2
7	96.6	8.1	7.2	-0.9	2.7	8	16	5
8	103.1	8.6	8.0	-0.6	2.5	23	30	21
9	112.1	9.3	8.9	-0.4	2.7	45	14	48
10	97.5	8.3	7.7	-0.6	2.7	7	33	14
11	102.6	8.5	7.8	-0.7	2.8	9	21	15
12	106.9	8.7	8.6	-0.1	2.9	25	6	5
13	114.1	9.6	9.2	-0.4	2.9	14	7	6
Mean and Total	104.8	8.7	8.1	-0.6	2.68	209	250	202

TABLE 3

SUMMARY OF EDUCATIONAL DATA: I.Q., MEASURED ACHIEVEMENT, ANTICIPATED ACHIEVEMENT, GRADE POINT AVERAGE, AND COMPARATIVE ACHIEVEMENT LEVELS BY INDIVIDUAL SCHOOLS, STUDENTS WITH EXTREME I.S.I.'S EXCLUDED

School Number	Mean I.Q. of School	Mean Anticipated Achievement	Mean Measured Achievement	Difference between Mean Anticipated and Measured Ach.	Mean Grade Point Average	Number of Over-Achievers	Number of Under-Achievers	Number of Average-Achievers
1	108.5	9.0	8.6	-0.4	2.9	18	5	15
2	109.1	9.2	8.4	-0.8	2.8	14	27	19
3	94.0	7.7	6.8	-0.9	2.5	10	25	13
4	104.4	8.7	8.0	-0.7	2.9	16	39	22
5	103.7	8.7	8.2	-0.5	2.4	15	12	13
6	95.9	8.1	7.1	-0.1	2.6	1	8	2
7	99.5	8.4	7.4	-1.0	2.7	7	16	4
8	103.7	8.7	8.0	-0.7	2.5	22	30	21
9	112.1	9.3	8.9	-0.4	2.7	45	13	46
10	99.4	8.4	8.0	-0.4	2.7	7	26	11
11	102.6	8.5	7.8	-0.7	2.8	9	20	15
12	106.6	8.7	8.6	-0.1	2.9	25	6	5
13	113.6	9.6	9.2	-0.4	2.9	13	7	6
Mean and Total	105.4	8.8	8.2	-0.6	2.68	202	234	192

grade placement for measured achievement.

It may be concluded then, from the measured achievement test mean grade placement alone, that the Oklahoma City school system is doing as well as the national average. When this same mean is compared with the mean intelligence of 104.8 I.Q. and the mean anticipated achievement of 8.8 school year grade placement, it can only be concluded that the total eighth grade, although right at the national norm for measured achievement, is falling six-tenths of a year behind the national norm of anticipated achievement.

The difference between the anticipated and measured achievement of the individual school tends to reflect the mean intelligence quotient of the school. Those schools with a mean intelligence quotient above the total all school mean tend to have a smaller negative difference than the all school mean difference. Those with a lower school mean intelligence quotient tend to have a larger negative difference between anticipated and measured achievement.

Description of Population by Intellectual Levels

Students in this study are divided into three levels of intellectual ability. Students with I.Q.'s of 90 to 109 are considered as being in the range of average ability. Nearly half of the students of the normal population fall in this range, with one-fourth above and one-fourth below. From Table 4 it may be seen that the 43.9 per cent of students in

the normal range of 90 to 109 I.Q. approximates this norm, but that there are over twice as many (39.6 per cent) in the upper intellectual level as there are (16.5 per cent) in the lower level of intellect.

This uneven distribution of the upper and lower intellectual levels of the population studied is reflected in the distribution of the three intellectual levels within each comparative-achievement level. Table 4 presents these data.

TABLE 4

NUMBER AND PER CENT OF EIGHTH GRADE POPULATION DIVIDED BY INTELLECTUAL LEVELS

Intellectual Level	Total All Students		Students with Extreme I.S.I.'s not Included	
	Number	Per Cent	Number	Per Cent
I.Q. 110 and Above	1145	39.6	1118	40.4
I.Q. 90 to 109	1272	43.9	1272	45.9
I.Q. 89 and Below	476	16.5	378	13.7
Total	3893	100.0	2768	100.0

Description of Population by Sex

In order to understand later differences found in the distribution of comparative achievement levels by sex, it was necessary to look at the eighth grade population. There was found to be nearly an equal distribution of sexes in the

eighth grade population, 50.3 per cent females and the other half males. Inequalities of division by sexes cannot then be attributed to differences in the general population. Table 5 presents this information.

TABLE 5

NUMBER AND PER CENT OF TOTAL EIGHTH GRADE POPULATION BY SEX

Sex	Number Enrolled	Per Cent of Total Eighth Grade
Males	1891	49.7
Females	1915	50.3
Total	3806	100.0

Study of Population by Educational Factors

The four educational factors--general intelligence, measured achievement, grade point average, and anticipated achievement--are often used as major factors to predict future academic success. In this study a high correlation was found between academic success as measured by standardized tests and predictions of academic success based upon (1) general intelligence and (2) the formula and norms for anticipated achievement. The correlation between any two factors listed is shown in Table 6 and may be read by looking along the row of one factor to the place where it intersects the column of the number of the other factor and reading the

correlation listed there. The mean, standard deviation and the standard error of the mean for the four educational factors studied are furnished in Table 7.

TABLE 6

CORRELATION OF GENERAL INTELLIGENCE, MEASURED ACHIEVEMENT, GRADE POINT AVERAGE, AND ANTICIPATED ACHIEVEMENT*

Educational Factors	(1)	(2)	(3)	(4)
1. General Intelligence		.808	.429	....
2. Measured Achievement	.829		.539	.789
3. Grade Point Average	.441	.588		.43
4. Anticipated Achievement	....	.816	.432	

*The figures below the diagonal line include the total group studied, while the figures above the diagonal do not include the students with the extreme high and low I.S.I.'s.

TABLE 7

MEAN, STANDARD DEVIATION, AND STANDARD ERROR OF THE MEAN OF THE EDUCATIONAL FACTORS

Educational Factors	Total All Eighth Grade			Total Minus Extreme I.S.I.'s		
	M	σ	SE_M	M	σ	SE_M
General Intelligence	104.8	15.02	.279	105.43	13.63	.259
Measured Achievement	8.09	1.49	.028	8.16	1.402	.027
Grade Point Average	2.68	.68	.013	2.68	.68	.013
Anticipated Achievement	8.72	1.28	.024	8.78	1.15	.022

Partial and Multiple Correlations

Grade point averages were studied because of their low correlation with the other measures of prediction and achievement and because of their most common use of grade point averages by students, parents, and the general public as the basis for judging the academic success of the child. Partial coefficients of correlation for (1) intelligence, (2) measured achievement, and (3) grade point averages were computed and were found to be as follows: $r_{13.2} = -.102$; $r_{23.1} = .449$; $r_{12.3} = .829$.

The partial coefficient of correlation of grade point average and intelligence when measured achievement is held constant is -.102, showing practically no correlation, and what is there is negative.

The partial coefficient of correlation of grade point average and measured achievement when intelligence is held constant is .499, showing a small positive correlation. Since grade point averages do not affect the correlation between intelligence and measured achievement, there is no change in the correlation.

The following regression equation may be used to predict the grade point average (X_3) of a student from his general intelligence (X_1) and measured achievement (X_2):

$$X_3 = -.0065\ X_1 + .033X_2 + 3.09 \pm .539$$

The standard error for the predicted score is .539. The multiple correlation, $R_{3(12)}$ equals .61, and is the

coefficient of correlation between grade point averages actually earned (X_3) and grade point averages predicted from the regression equation using general intelligence (X_1) and measured achievement (X_2).

Thus, since future academic success can be predicted more accurately as test measured achievement than as grade point average, measured achievement is selected as the measure of academic success to be used for the study of levels of comparative achievement.

Study of Achievement by Intellectual Levels

A subsidiary question of the stated problem was: Is the mean difference between predicted achievement and actual achievement greater at one intellectual level than another? The correlation between intelligence and the divergence of measured from anticipated achievement was computed to be .026 for all students and .063, excluding extreme I.S.I.'s. Table 8 is presented as an example of this nearly zero correlation.

The mean intelligence quotient for the total eighth grade is 104.8 and the difference between measured achievement and anticipated achievement is -.63. Table 9 shows this information for the total eighth grade and for the extreme I.S.I.'s excluded.

The total eighth grade was then divided into the three levels of intelligence. See Tables 10 and 11. The

TABLE 8

CORRELATION CHART OF INTELLIGENCE AND DIFFERENCES IN SCHOOL YEARS OF MEASURED FROM ANTICIPATED ACHIEVEMENT, TOTAL ALL STUDENTS

I.Q.	Difference of Measured from Anticipated Achievement															f
	- 4.5 4.9	- 4.0 4.4	- 3.5 3.9	- 3.0 3.4	- 2.5 2.9	- 2.0 2.4	- 1.5 1.9	- 1.0 1.4	- 0.5 0.9	- 0.0 0.4	+ 0.1 0.5	+ 0.6 1.0	+ 1.1 1.5	+ 1.6 2.0	+ 2.1 2.5	
150-4				1												1
145-9					1	1			1							3
140-4					1	1	4	3	4							13
135-9						2	6	8	1	4	2					23
130-4						4	8	24	25	13	3	1				78
125-9				1	1	5	12	23	43	45	15					145
120-4					2	6	12	34	70	73	31	6				234
115-9					5	8	21	49	80	74	32	18	5			292
110-4					1	16	35	51	78	77	63	25	10			356
105-9				1	44	15	27	52	85	74	52	18	13	1	2	344
100-4				2	1	8	33	58	82	64	44	15	9			316
95-9	1		1	2	2	13	42	53	74	68	41	21	10	1		329
90-4				1	3	18	34	59	61	48	31	17	6	3	2	283
85-9				1	3	14	34	42	38	39	19	8	2			200
80-4			1		2	7	15	30	38	32	9	7				141
75-9					1	5	7	23	14	13	5	2	2			72
70-4					1	3	2	8	14	5	3	1	1		1	39
65-9							1	1	9	7		1				19
60-4								1	1				1			3
55-9								1								1
50-4											1					1
	1		2	9	28	126	293	520	718	636	351	140	59	5	4	2893

$r = .026$

TABLE 9

MEAN AND STANDARD DEVIATION OF INTELLIGENCE QUOTIENT AND OF DIFFERENCE OF MEASURED FROM ANTICIPATED ACHIEVEMENT

Items	Total All Eighth Grade		Total Minus Extreme I.S.I.'s	
	M	σ	M	σ
Intelligence Quotient	104.8	15.2	105.4	13.65
Difference between Measured and Anticipated Achievement	-.63	.835	-.624	.83

means and standard deviations of the differences were calculated for each. Compared with the mean difference of -.63 school year of the total population, the high (I.Q. 110 and above) and average (I.Q. 90-109) intellectual groups had a smaller negative difference, while the lower intellectual group had a larger negative difference. No significant difference was shown between the means of the high and average I.Q. groups, while the differences between the mean difference of the low and high, and low and average intellectual groups, showed a significant difference far above the .01 level. We may then conclude that the groups defined as high and average intellectual students are profiting equally from their education, but that the low intellectual student is falling far behind.

TABLE 10

NUMBER MEAN AND STANDARD DEVIATION OF THE DIFFERENCES OF MEASURED FROM ANTICIPATED ACHIEVEMENT BY THE THREE LEVELS OF INTELLIGENCE

Intelligence Levels	N	M	σ
I.Q. 110 and Above	1145	-0.605	.77
I.Q. 90 to 109	1292	-0.596	.86
I.Q. 89 and Below	476	-0.798	.83

TABLE 11

DIFFERENCES BETWEEN MEANS OF MEASURED FROM ANTICIPATED ACHIEVEMENT BY THE THREE LEVELS OF INTELLIGENCE

Intelligence Levels	SD	Mean Difference	SE_D	t Ratio
High & Aver. I.Q.	.819	.009	.034	.265
Low & Aver. I.Q.	.852	.202	.0025	80.8*
High & Low I.Q.	.787	.193	.0024	80.42*

*Significant at the 1 per cent level.

Studies of the Comparative Achievement Levels

One approach to studying the characteristics that affect achievement is to attempt to find traits which best distinguish between those who are achieving below expectancy and those who are achieving above expectancy. The remainder of this chapter describes the attempt to discover some

answers to the question, "How do over-achievers differ from under-achievers?"

Three sources of information are used to answer this question: school records, rating scale, and questionnaire. Listed under academic characteristics are those that are usually found in, and can be taken from, school records. These are intelligence quotient, test measured achievement, grade mark average, days absent from school, and chronological age in months.

In order to study those who were profiting least and those who were profiting most from their education, three comparative achievement levels were determined. The difference of each student's measured achievement from his anticipated achievement in tenths of a school year was figured and a frequency distribution of these divergencies made.

Since the anticipated achievement norms within the I.S.I. range of 80 to 135 were established by multiple norming of the California Achievement Test, and the values outside this range are extrapolated, it was decided to consider only the data for students who fell between 80 and 135 I.S.I. The frequency distribution of these students by divergence of measured achievement from anticipated achievement is presented in Table 12.

TABLE 12

FREQUENCY DISTRIBUTION OF DIVERGENCE OF MEASURED ACHIEVEMENT FROM ANTICIPATED ACHIEVEMENT IN SCHOOL YEARS, EXCLUDING EXTREME I.S.I.'S

School Year	f	School Year	f	School Year	f
+2.5		0.0	98	-2.3	4
+2.4	2	-0.1	137	-2.6	8
+2.3		-0.2	109	-2.7	9
+2.2	1	-0.3	122	-2.8	2
+2.1	1	-0.4	146	-2.9	2
+2.0		-0.5	130	-3.0	3
+1.9		-0.6	149	-3.1	1
+1.8	3	-0.7	132	-3.2	1
+1.7	1	-0.8	143	-3.3	
+1.6	1	-0.9	132	-3.4	3
+1.5	4	-1.0	122	-3.5	1
+1.4	12	-1.1	116	-3.6	
+1.3	14	-1.2	93	-3.7	
+1.2	9	-1.3	77	-3.8	1
+1.1	17	-1.4	83	-3.9	
+1.0	23	-1.5	73	-4.0	
+0.9	17	-1.6	66	-4.1	
+0.8	32	-1.7	61	-4.2	
+0.7	29	-1.8	47	-4.3	
+0.6	36	-1.9	33	-4.4	
+0.5	48	-2.0	31	-4.5	
+0.4	59	-2.1	33	-4.6	1
+0.3	69	-2.2	15		
+0.2	79	-2.3	24		
+0.1	88	-2.4	15		

After the mean and standard deviation were computed, those students with a difference of one and one-half standard deviations above the mean were classed as over-achievers. Those with differences of one and one-half standard deviations or more below the mean were classed as under-achievers. Those with a zero deviation were classed as average-achievers

to provide a comparison group. When the standard deviations were changed to actual score values, over-achievers were those with a school year difference of +0.6 and above. Under-achievers were those with a school year difference of -1.8 and under. The average-achievers were those with -0.6 school year difference plus every third person with -0.7 school year difference added to provide an equal number with the other two groups.

Study of Comparative Achievement Levels by Academic Characteristics

The mean and standard deviation for intelligence, days absent, measured achievement, grade mark average, and chronological age were computed for the total class and for each comparative achievement level. Information as to recorded grade mark averages and days absent was least adequate because of the failure to receive records on many students entering the Oklahoma City School System. Tables 13 and 14 show this information, and Tables 15 and 16 compare the differences between comparative achievement levels.

No significant difference was found between the mean I.Q. of 102 for the over-achiever group and the 102.6 of the under-achiever group. Both groups were below the mean I.Q. of 104.8 for the total eighth grade. A significant difference was found between the means of both the over- and under-achiever and the mean I.Q. of 107.02 for the average-achiever. One reason for the over-achievers having a lower mean average

TABLE 13

NUMBER, MEAN, AND STANDARD DEVIATION OF COMPAR
BY ACADEMIC CHARACTERISTICS, EXTREME

Academic Characteristics	Over-Achievers			Average-Achiev	
	N	M	σ	N	M
Intelligence Quotient	209	102	11.75	202	107.02
Measured Achievement	209	9.26	.899	202	8.3
Grade Mark Average	177	3.2	.545	175	2.75
Chronological Age	209	161.1	5.1	202	162.1

TABLE 14

NUMBER, MEAN, AND STANDARD DEVIATION OF COMPAR
BY ACADEMIC CHARACTERISTICS, EXTREME

Academic Characteristics	Over-Achievers			Average-Achie	
	N	M	σ	N	M
Intelligence Quotient	202	103	10.4	192	108.5
Measured Achievement	202	9.33	.83	192	8.44
Grade Mark Average	199	3.2	.54	166	2.78
Days Absent	164	5.04	4.24	175	6.68
Chronological Age	202	160.9	4.99	192	162.6

LE 13

ON OF COMPARATIVE ACHIEVEMENT LEVELS
CS, EXTREME I.S.I. INCLUDED

erage-Achievers			Under-Achievers			Total Class		
	M	σ	N	M	σ	N	M	σ
2	107.02	14.9	250	102.6	16.05	2893	104.8	15.02
2	8.3	1.27	250	6.76	1.4	2893	8.09	1.49
5	2.75	.65	209	2.15	.655	2833	2.68	.68
2	162.1	5.55	250	166.8	7.85			

LE 14

ON OF COMPARATIVE ACHIEVEMENT LEVELS
CS, EXTREME I.S.I. EXCLUDED

erage-Achievers			Under-Achievers			Total Class		
	M	σ	N	M	σ	N	M	σ
2	108.5	13.05	234	102	13.56	2768	105.4	13.63
2	8.44	1.11	234	6.66	1.2	2768	8.16	1.4
5	2.78	.635	197	2.13	.63	2733	2.68	.68
5	6.68	6.18	194	8.71	10.26			
2	162.6	5.42	234	166.25	8.03			

TABLE 15

DIFFERENCES BETWEEN COMPARATIVE ACHIEVEMENT LEVELS ON ACADEMIC CHARACTERISTICS, INCLUDING ALL EIGHTH GRADERS WITH COMPLETE TEST DATA

Levels of Achievement	SD	Mean Difference	SE_D	t Ratio
Intelligence Quotient				
Over and Average	13.41	5.02	1.31	3.83*
Under and Average	15.58	4.42	1.47	3.12*
Over and Under	13.8	.6	1.28	0.47
Measured Achievement				
Over and Average	1.09	.96	.108	8.89*
Under and Average	1.35	1.54	.128	12.03*
Grade Mark Average				
Over and Average	.599	.45	.064	7.03*
Under and Average	.653	.6	.067	8.96*
Chronological Age				
Over and Average	5.33	1.0	.525	1.91
Under and Average	6.91	4.7	.62	7.58*

*Significant at the 1 per cent level.

TABLE 16

DIFFERENCES BETWEEN COMPARATIVE ACHIEVEMENT LEVELS ON ACADEMIC CHARACTERISTICS, STUDENTS WITH EXTREME I.S.I.'S EXCLUDED

Levels of Achievement	SD	Mean Difference	SE_D	t Ratio
Intelligence Quotient				
Over and Average	11.79	5.5	1.19	4.62*
Under and Average	13.56	6.5	1.32	4.92*
Over and Under	12.37	1.0	1.23	0.81
Measured Achievement				
Over and Average	.977	.89	.098	9.16*
Under and Average	1.16	1.78	.113	15.45*
Grade Mark Average				
Over and Average	.562	.42	.043	9.77*
Under and Average	.608	.65	.064	10.16*
Days Absent				
Over and Average	2.83	1.64	.307	5.34*
Under and Average	8.49	2.03	.21	9.66*
Chronological Age in Months				
Over and Average	3.95	1.61	.399	4.04*
Under and Average	7.98	3.65	.778	4.69*

*Significant at the 1 per cent level.

I.Q. than the average-achiever is that a positive difference would be prohibited to the higher level intellectual students by a comparable upper limit on both tests, and just the opposite would be true for the lower limits of the lower intellectual student.

In measured achievement the over-achiever rates highest with a mean school year grade placement of 9.26, the average-achiever next with a mean grade placement of 8.3, while the under-achiever falls far below the norm with a mean grade placement of 6.76. The statistical significant difference between means as shown in Table 15, is far above the .01 level. Therefore we may conclude over-achievers on a comparative basis are also high-achievers on a purely achievement basis.

The over-achievers with a mean chronological age of 161.1 months are younger than the average-achievers' 162.1 months or the under-achievers' 166.8 months. A significant difference above the .01 level was found between the under-achievers and the other two levels. Achievement then would have a negative correlation with age. A partial explanation of the older chronological age of the under-achievers would be the retention of the under-achiever as revealed in the questionnaire.

Grade point averages show a low correlation with the other academic characteristics of the total population, yet there is a statistically significant difference at the .01

level between the mean grade point averages of the three levels. The mean grade point average of the over-achiever is 3.2 or a letter grade of B+, the average-achiever 2.75 or B-, and the under-achiever 2.15 or C+. There is then a relationship between teachers' grades and the comparative achievement levels.

Attendance of the three comparative achievement levels shows mean differences significant at above the .01 level. The over-achiever has a mean of only 5.04 days absent while the under-achiever is absent nearly twice that many times or 8.71 days. The number of days absent is not available for the total eighth grade class or the students with extremes of I.S.I.'s and, therefore, can not be placed in the tables.

The only significant difference between Tables 15 and 16 is in chronological age. The mean difference between the under- and over-achiever for the total eighth grade with complete test data is not significant at the .05 level, but when the extreme I.S.I.'s are excluded, it is significant at the .01 level.

Evidence shows that the over-achiever has a higher measured achievement, has higher grade point average, is younger in age, and has fewer absences from school. The under-achiever shows a reverse trend. In intelligence both the under- and over-achiever rate below the average-achiever.

Consideration of Comparative Achievement Levels by Levels of Intelligence

In order to study further the question of which level of intelligence is profiting most from the public schools, the three levels of comparative achievement were compared as to the percentage of each falling into the above average (I.Q. 110 and above), the average (I.Q. 90 to 109), and the below average (I.Q. 89 and below) intellectual groupings. Table 17 presents these figures with percentages for the total eighth grade.

TABLE 17

NUMBER AND PER CENT OF ACHIEVEMENT LEVELS FALLING IN INTELLIGENCE LEVELS, INCLUDING EXTREME I.S.I.'S

Comparative Achievement Levels	I.Q. 110 and Above		I.Q. 90 to 109		I.Q. 89 and Below	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Over-Achievers	68	28.7	125	59.8	24	11.5
Average-Achievers	100	49.5	75	37.1	27	13.4
Under-Achievers	82	32.8	111	44.4	57	22.8
Total 8th Grade	1145	39.6	1272	43.9	476	16.5

When compared to the curve of the percentages for the total eighth grade the over-achievers peak at the average (I.Q. 90 to 109) level; the average-achievers are skewed

towards the above average (I.Q. 110 and above); and the under-achievers are skewed toward the below average (I.Q. 89 and below) level.

In Table 17, reading vertically, the difference between the percentage of 28.7 per cent over-achievers and 32.8 per cent under-achievers falling in the higher intellectual grouping (I.Q. 110 and above) is not significant. The percentage difference of 15.4 per cent more over-achievers than under-achievers in the average (I.Q. 90 to 109) intellectual grouping is significant at the .01 level. The percentage difference of 11.3 per cent more under-achievers than over-achievers in the lower (I.Q. 89 and below) intellectual grouping has a significance at the .01 level. Table 18 presents these differences. The excluding of the extreme I.S.I.'s in Tables 19 and 20 does not change the significance.

TABLE 18

DIFFERENCE BETWEEN PERCENTAGE OF HIGH AND LOW COMPARATIVE ACHIEVEMENT LEVELS FALLING IN EACH INTELLIGENCE LEVEL, INCLUDING EXTREME I.S.I.'S

Intelligence Levels	Per Cent Difference	$\sigma_{D\%}$	t Ratio
I.Q. 110 and Above	-4.1	4.38	.94
I.Q. 90 to 109	15.4	4.74	3.24*
I.Q. 89 and Below	11.3	3.6	3.14*

*Significant at .01 level.

TABLE 19

NUMBER AND PER CENT OF COMPARATIVE ACHIEVEMENT LEVELS FALLING IN INTELLIGENCE LEVELS, EXCLUDING EXTREME I.S.I.'S

Comparative Achievement Levels	I.Q. 110 and Above		I.Q. 90 to 109		I.Q. 89 and Below	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Over-Achievers	60	29.7	125	61.9	17	8.4
Average-Achievers	99	51.5	75	39.1	18	9.4
Under-Achievers	73	31.2	111	47.4	50	21.4
Total Three Groups	232	36.9	311	49.5	85	13.5

TABLE 20

DIFFERENCES BETWEEN PERCENTAGE OF HIGH AND LOW COMPARATIVE ACHIEVEMENT LEVELS FALLING IN EACH INTELLIGENCE LEVEL, EXCLUDING EXTREME I.S.I.'S

Intelligence Levels	Per Cent Difference	$\sigma_{D\%}$	t Ratio
I.Q. 110 and Above	1.5	4.44	.34
I.Q. 90 to 109	14.5	4.47	3.24*
I.Q. 89 and Below	13.0	4.46	2.92*

*Significant at .01 level.

It may then be concluded that the under-achievers have the highest per cent in the lower level of intelligence. A higher percentage of average-achievers are in the highest level of intelligence. Since those of the highest level of intelligence are fairly evenly distributed, they are doing at least as well as can be expected. The ceiling measurement limit of the achievement test would restrain the higher intellectual group from having measured achievement higher than anticipated achievement.

Sex Differences in Comparative Achievement Levels

At the time of the study a total of 3806 eighth grade students were enrolled in the Oklahoma City Public Schools. Of these 1891, or 49.7 per cent, were boys and 1915, or 50.3 per cent, girls. In contrast to this distribution, Table 21 shows the under-achievers to be predominantly male, 72 per cent, and the over-achievers to be predominantly female, 75 per cent. Table 22 shows this difference to be significant at the .01 level.

The reasons for this diversity by sex are not being considered in this study. Two factors might be mentioned as possible causes. The earlier maturing of the female probably causes a part of this difference. The early education of the child in home, church, and school is dominated by women, who possibly are better able to understand the needs and motivate the female than the male child. The small number of men in

our educational system, especially in the elementary, probably plays an important part in this discrepancy.

TABLE 21

NUMBER AND PER CENT OF EACH SEX BY COMPARATIVE ACHIEVEMENT LEVELS

Sex	Over-Achievers		Average-Achievers		Under-Achievers	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Male	50	25	85	44	169	72
Female	152	75	107	56	65	28

TABLE 22

DIFFERENCES OF SEXES BETWEEN OVER AND UNDER COMPARATIVE ACHIEVEMENT LEVELS

Sex	Per Cent Difference	$\sigma_{D\%}$	t Ratio
Male	47	4.5	10.44*
Female	47	4.5	10.44*

*Significant at .01 level.

CHAPTER IV

CHARACTERISTICS OF UNDER- AND OVER-ACHIEVERS

Study of Characteristics of Students in Each Comparative Achievement Level by Teacher Rating Scale

A rating scale for each student in the three levels of comparative achievement was sent to the teacher considered to have the best knowledge of that student. A copy of the scale is placed as Appendix B. The rating scales were completed by the teachers and returned through the school counselor. The per cent and number of returned rating scales are shown in Table 23.

TABLE 23

NUMBER AND PER CENT OF RETURNS OF RATING SCALE

Item	Over-Achievers	Average-Achievers	Under-Achievers	Total
Number Sent Out	202	192	234	628
Number Returned	172	167	206	545
Per Cent Returned	85	87	88	87

The rating scale has seven characteristics to be rated by the teacher on a five point scale. Each level had a brief description to assist the teacher in rating the students. The lowest possible rating was given a value of one with each rating increasing in value by one point to the highest rating of five. The mean rating on each characteristic was computed for each comparative achievement level.

It will be noted from the following tables than on each characteristic the rating scale of teacher judgment distinguishes among the three comparative achievement levels at the statistically significant level of .01. The corresponding significant difference between levels of intelligence and between sexes as seen on the same tables may partially be explained by the small number of students in the lower intellectual group of the population studied, by the relationship between comparative achievement and intelligence, and by the relationship between comparative achievement and sex as already pointed out.

Industry (Work Habits and Attitudes)

Industry defined as "work habits and attitudes" was the first characteristic to be studied on the rating scale. The lowest rating was explained by the phrase "Seldom works even under pressure." The highest ratings had a suggested explanation of "Seeks additional work." A total of 547 students were rated by teachers. The over-achievers had a mean rating of 3.87 which would be in the rating described as

TABLE 24

NUMBER RATED, MEAN AND STANDARD DEVIATION OF RATINGS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "INDUSTRY"

Item	Number Rated	Mean Rating	σ
Levels of Comparative Achievement			
Over-Achievers	171	3.87	.89
Average-Achievers	170	3.31	1.05
Under-Achievers	206	2.36	1.06
Sex			
Male	272	2.75	1.17
Female	275	3.36	1.37
Levels of Intelligence			
I.Q. 110 and Above	198	3.35	1.21
I.Q. 90 to 109	288	3.11	1.16
I.Q. 89 and Below	61	2.53	1.07

"Prepares assigned work regularly." The average-achievers received a mean rating of 3.31 which would be in the rating with the suggested explanation of "Works reasonably well if motivation exists." The under-achievers received a rating

TABLE 25

DIFFERENCE BETWEEN MEANS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON THE CHARACTERISTIC "INDUSTRY"

Item	Mean Difference	S.D.	SE_D	t Ratio
Levels of Comparative Achievement				
Over and Average	.56	.97	.105	5.33*
Under and Average	.95	1.05	.109	8.71*
Over and Under	1.51	.99	.101	14.98*
Sex				
Male and Female	.61	1.277	.11	5.55*
Levels of Intelligence				
High and Average	.24	1.18	.109	2.2**
Low and Average	.58	1.14	.16	3.63*

*Significant at .01 level.

**Significant at .05 level.

of 2.36 placing them in the rating with an explanation of "Needs extra pressure to undertake much work." The differences are all significant at far above the .01 level. It would appear that the quality "Industry" is a distinguishing characteristic between the three levels of comparative achievement.

The students rated were divided by sex and intellectual levels where again significant differences were found. These differences were smaller than that between comparative achievement level; and, as has been previously pointed out, these differences could possibly be explained by the relationship of sex and intelligence to comparative achievement levels. Tables 24 and 25 show these comparisons.

Initiative (Motivation)

Initiative in the form of "motivation" was the second characteristic to be studied on the rating scale. The lowest rating carried the suggested explanation of "Retiring; unwilling to assume responsibility." The highest rating carried a suggested explanation of "Born leader, actively creative." A total of 529 students were rated by the teachers. The over-achievers were given a mean rating of 3.37 which would fall slightly below the rating with the suggested explanation of "Consistently self reliant" and in the top of the rating explained as "Shows leadership occasionally." The average-achievers with a mean rating of 2.83 fell in the lower half of the rating labeled "Shows leadership occasionally." The under-achievers with a mean rating of 2.15 would be in the lower part of the rating explained by "Conforms, seldom initiates." The differences between these ratings are all significant far above the .01 level. Initiative then would appear to be one of the distinguishing characteristics

TABLE 26

NUMBER RATED, MEAN AND STANDARD DEVIATION OF RATINGS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "INITIATIVE" (MOTIVATION)

Item	Number	Mean	σ
Levels of Comparative Achievement			
Over-Achievers	170	3.37	1.06
Average-Achievers	171	2.83	1.07
Under-Achievers	188	2.15	1.02
Sex			
Male	257	2.49	1.17
Female	272	3.03	1.06
Levels of Intelligence			
I.Q. 110 and Above	181	3.13	1.16
I.Q. 90 to 109	288	2.66	1.12
I.Q. 89 and Below	60	2.1	1.01

between the three levels of comparative achievers.

The ratings by sex and by intellectual levels again differed at significant levels, with the possible same explanation of the close relationship between sex, intelligence, and comparative achievement. Tables 26 and 27 show these comparisons.

TABLE 27

DIFFERENCE BETWEEN MEANS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "INITIATIVE" (MOTIVATION)

Item	Mean Difference	S.D.	SE_D	t Ratio
Comparative Achievement				
Over and Average	.54	1.19	.13	4.15*
Under and Average	.68	1.04	.11	6.8*
Sex				
Male and Female	.54	1.11	.10	5.4*
Levels of Intelligence				
High and Average	.47	1.14	.11	4.27*
Low and Average	.56	1.11	.16	3.50*
High and Low	1.03	1.12	.16	6.06*

*Significant at .01 level.

Cooperation (Peer Relationship)

Cooperation studied in the form of "peer relationship" was the third characteristic to be considered on the rating scale. The lowest rating carried the suggested explanation of "Obstructive to others." The highest possible rating carried the suggested explanation of "Works exceptionally well with others." As shown in Table 28, a total of 520 students

TABLE 28

NUMBER RATED, MEAN AND STANDARD DEVIATION OF RATINGS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "COOPERATION" (PEER RELATIONSHIP)

Item	Number	Mean	σ
Levels of Comparative Achievement			
Over-Achievers	171	3.99	1.03
Average-Achievers	165	3.56	1.06
Under-Achievers	184	2.76	1.13
Sex			
Male	251	3.08	1.19
Female	269	3.73	1.11
Levels of Intelligence			
I.Q. 110 and Above	181	3.72	1.15
I.Q. 90 to 109	277	3.33	1.3
I.Q. 89 and Below	62	2.94	1.17

were rated by the teachers on this characteristic. The over-achievers received a rating of 3.99, which would fall in the rating explained by "Usually can be counted on to work well with others, occasional difficulty." The average-achievers with a rating of 3.56 would be just slightly within the above rating and slightly above the rating, "Gets along reasonably

TABLE 29

DIFFERENCE BETWEEN MEANS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON THE CHARACTERISTIC "COOPERATION" (PEER RELATIONSHIP)

Item	Mean Difference	S.D.	SE_D	t Ratio
Comparative Achievement				
Over and Average	.43	1.04	.113	3.81*
Under and Average	.80	.82	.088	8.18*
Sex				
Male and Female	.65	1.15	.10	6.5*
Levels of Intelligence				
High and Average	.39	1.25	.12	2.41**
Low and Average	.39	1.28	.18	2.16**
High and Low	.78	1.15	.17	4.59**

*Significant at .01 level.

**Significant at .05 level.

well with most people." The under-achiever with a mean rating of 2.76 would rate in the lower part of the above rating and slightly above the rating described as "Indifferent, self-centered, often in difficulty."

As shown in Table 29, the differences between these mean ratings are significant above the .01 level. The

ratings by sex and by intellectual levels again differed at significant levels, with the possible previously mentioned explanation of the close relationship between sex, intelligence, and comparative achievement.

Responsibility (Dependability)

The fourth trait to be studied by the teacher rating scale was "Responsibility." The data are presented in Table 30. The highest possible rating carried the suggested explanation of "Assumes responsibility; needs no supervision." The lowest possible rating carried the suggested explanation of "Unreliable, unstable, irresponsible." The over-achievers received a mean rating of 3.88, which would fall in the rating, "Can be trusted to carry out tasks well without supervision." The average-achievers received a mean rating of 3.35, which would place them in the rating described as "Usually dependable." The under-achievers with a mean rating of 2.56 fell in the lowest portion of the same rating and just slightly above the rating described as "Careless, requires much supervision."

The differences as shown in Table 31 between these mean ratings are significant above the .01 level of significance. The ratings by sex and by levels of intelligence also differ at a highly significant level, with the possible explanation previously mentioned of the close relationship between sex, intelligence, and comparative achievement.

TABLE 30

NUMBER RATED, MEAN AND STANDARD DEVIATION OF RATINGS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "RESPONSIBILITY" (DEPENDABILITY)

Item	Number	Mean	σ
Levels of Comparative Achievement			
Over-Achievers	169	3.88	.095
Average-Achievers	176	3.35	.22
Under-Achievers	191	2.56	1.02
Sex			
Male	258	2.88	1.09
Female	278	3.56	1.09
Levels of Intelligence			
I.Q. 110 and Above	189	3.59	1.15
I.Q. 90 to 109	287	3.05	1.21
I.Q. 89 and Below	60	2.68	.99

Self-Confidence

Other studies as previously mentioned have suggested self-confidence as a possible distinguishing characteristic, which is studied in the fifth trait on our rating scale as

TABLE 31

DIFFERENCE BETWEEN MEANS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON THE CHARACTERISTIC "RESPONSIBILITY" (DEPENDABILITY)

Item	Mean Difference	S.D.	SE_D	t Ratio
Comparative Achievement Levels				
Over and Average	.53	1.32	.14	3.78*
Under and Average	.79	.75	.07	11.29*
Sex				
Male and Female	.68	1.09	.94	7.23*
Levels of Intelligence				
High and Average	.54	1.19	.11	4.91*
Low and Average	.37	1.18	.17	2.17*
High and Low	.91	1.11	5.68	5.68*

*Significant at .01 level.

"Attitude toward self." The highest possible rating was given a suggested description "Seems absolutely sure of himself." The lowest possible rating was described by the expression, "Has no self-confidence." The over-achievers received a mean rating of 3.91, which would place them in the middle of the rating described as "Usually seems confident,

but occasionally lack of self-confidence is evident." As shown in Table 32, the average-achievers received a mean rating of 3.43 to place them high in the suggested rating of "Confident about half of the time." The under-achiever rated in the lower portion of this rating description and just above the rating described as "Occasionally seems confident, but usually seems not to believe in himself." Teachers designated this as a distinguishing characteristic.

TABLE 32

NUMBER RATED, MEAN AND STANDARD DEVIATION OF RATINGS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "SELF-CONFIDENCE" (ATTITUDE TOWARD SELF)

Item	Number	Mean	σ
Levels of Comparative Achievement			
Over-Achievers	171	3.91	.27
Average-Achievers	171	3.43	.302
Under-Achievers	187	2.86	1.1
Sex			
Male	255	3.22	1.105
Female	274	3.54	.995
Levels of Intelligence			
I.Q. 110 and Above	185	3.69	1.0
I.Q. 90 to 109	283	3.36	1.03
I.Q. 89 and Below	61	2.57	.99

The differences between the mean ratings are significant above the .01 level of significance, as shown in Table 33. The ratings by sex and by intellectual level again showed a difference at a significant level. The prior explanation of the close relationship between sex, intelligence, and comparative achievement may be the possible explanation.

TABLE 33

DIFFERENCE BETWEEN MEANS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON THE CHARACTERISTIC "SELF-CONFIDENCE" (ATTITUDE TOWARD SELF)

Item	Mean Difference	S.D.	SE_D	t Ratio
Comparative Achievement Levels				
Over and Average	.48	.905	.098	4.89*
Under and Average	.57	1.03	.109	5.23*
Sex				
Male and Female	.32	1.05	.09	3.55*
Levels of Intelligence				
High and Average	.33	1.03	.097	3.40*
Low and Average	.79	1.03	.14	5.64*

*Significant at .01 level.

Emotional Stability

Emotional stability, often discussed as one of the contributing factors of over- and under-achievement, was used as the sixth point on the rating scale and given as its highest possible rating a description of "Always well poised and self-possessed." The lowest possible rating was given a possible description of "Flighty or temperamental." As shown in Table 34, the teachers rated the over-achievers with a

TABLE 34

NUMBER RATED, MEAN AND STANDARD DEVIATION OF RATINGS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "EMOTIONAL STABILITY"

Item	Number	Mean	σ
Levels of Comparative Achievement			
Over-Achievers	171	4.12	1.05
Average-Achievers	171	3.59	1.15
Under-Achievers	190	2.86	1.16
Sex			
Male	261	3.25	1.15
Female	271	3.67	1.29
Levels of Intelligence			
I.Q. 110 and Above	183	3.81	1.15
I.Q. 90 to 109	289	3.42	1.21
I.Q. 89 and Below	60	2.98	1.2

TABLE 35

DIFFERENCE BETWEEN MEANS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON THE CHARACTERISTIC "EMOTIONAL STABILITY"

Item	Mean Difference	S.D.	SE_D	t Ratio
Comparative Achievement Levels				
Over and Average	.53	1.32	.12	4.42*
Under and Average	.73	1.11	.117	6.23*
Sex				
Male and Female	.42	1.26	.11	3.82*
Levels of Intelligence				
High and Average	.39	1.19	.11	3.54*
Low and Average	.44	1.11	.14	3.14*

*Significant at .01 level.

mean rating of 4.12, which would fall in the rating described as "Usually well composed, but some times flighty." The average-achievers with a mean rating of 3.59 fell between this rating and the one described as "Is happy or depressed as conditions warrant." The under-achievers were given a mean rating of 2.86 to place them in the lower portion of the above description and slightly above the rating described as "Usually somewhat temperamental, but at times well composed."

Teachers labeled each comparative achievement level differently on this characteristic, again by a significant difference.

The differences between these mean ratings are significant above the .01 level of significance, as shown in Table 35. The ratings by sex and intellectual levels again differed at a significant level. The possible explanation of the close relationship between sex, intelligence, and comparative achievement has previously been mentioned.

Seriousness of Purpose

The seventh and last trait to be studied was that of "Seriousness of Purpose." The highest possible rating was given a suggested description of "Distinctly has definite purposes." The lowest possible rating was given a suggested description of "Purposeless." As shown in Table 36, the teachers gave the over-achievers a mean rating of 3.61 which would place them in the rating described as "Seems to have a definite purpose." The average-achievers received a mean rating of 3.01 to place them in the rating level described as "Normally purposeful." The under-achievers were given a mean rating of 2.13 by the teachers to place them in the next lower rating described as "Seems to have a purpose at times but often wavers." Teachers gave the three levels of comparative achievers significantly different ratings on this characteristic.

TABLE 36

NUMBER RATED, MEAN AND STANDARD DEVIATION OF RATINGS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON CHARACTERISTIC "SERIOUSNESS OF PURPOSE"

Item	Number	Mean	σ
Levels of Comparative Achievement			
Over-Achievers	172	3.61	.96
Average-Achievers	170	3.01	1.11
Under-Achievers	187	2.13	1.07
Sex			
Male	256	2.66	1.21
Female	283	3.18	1.13
Levels of Intelligence			
I.Q. 110 and Above	182	3.23	1.18
I.Q. 90 to 109	287	2.88	1.16
I.Q. 89 and Below	60	2.27	.94

The differences between the mean ratings are significant above the .01 level, as shown in Table 37. The ratings by sex and by intelligence levels also differed at slightly less significance. The close relationship between sex, intelligence, and comparative achievement has previously been mentioned as a possible factor in this significance.

TABLE 37

DIFFERENCE BETWEEN MEANS OF COMPARATIVE GROUPS OF STUDENTS AS RATED BY TEACHERS ON THE CHARACTERISTIC "SERIOUSNESS OF PURPOSE"

Item	Mean Difference	S.D.	SE_D	t Ratio
Comparative Achievement Levels				
Over and Average	.61	1.23	.11	5.55*
Under and Average	.88	1.09	.12	7.33*
Sex				
Male and Female	.52	1.17	.102	5.1*
Levels of Intelligence				
High and Average	.35	1.17	.095	3.68*
Low and Average	.61	1.13	.16	3.81*

*Significant at .01 level.

In summary we may conclude that the seven characteristics: Industry, Initiative, Cooperation, Responsibility, Self Confidence, Emotional Stability, and Seriousness of Purpose as listed on the rating scale distinguish among the three levels of comparative achievement at a statistically significant level. In the opinion of the teachers the over-achiever rates higher in each of these characteristics while

the under-achiever rates much lower.

Study of Characteristics of Students in Each Comparative Achievement Level by Student Questionnaire

A questionnaire for each student rating in one of the comparative achievement groups was sent to his school with the student's name written on it. A copy of the questionnaire is included as Appendix B. A teacher then assisted the students in filling out the questionnaire. A few of the items of information were incomplete because of the inability of some children to answer, but most questionnaires were completely filled in and information adequate to ascertain significant trends was available. Table 38 shows the number and per cent of the questionnaires returned.

TABLE 38

NUMBER AND PER CENT OF RETURNS OF STUDENT QUESTIONNAIRE

Item	Over-Achievers	Average-Achievers	Under-Achievers	Total
Number Sent Out	202	192	234	628
Number Returned	169	167	187	523
Per Cent Returned	84	87	80	83

Except for the factual information, questions of home address, and occupation of parents, the questions could all be answered by checking a box or placing a number in a

blank. For ease in presentation of tables the questions have been divided into groupings of types of answers rather than types of information. The questions that can be answered by yes or no are grouped in Table 39 to give the percentage of students answering yes.

The information from the questionnaire was tabulated in frequency distribution as a basis for making comparisons between under- and over-achievers. To ascertain the significance of differences between means and percentages found, the null hypothesis was used and the test of critical ratio was applied as a basis for its acceptance or rejection. If the t ratio is 2.58 or more, the null hypothesis is rejected at the .01 level of significance.

The interest of the parent in the school is closely related to the comparative achievement of the child. In answer to the question "Are either of your parents members of the P.T.A.?" 62.9 per cent of the over-achievers answered yes while only 41.1 per cent of the under-achievers answered yes. The difference was found to be significant at the .01 level. In answer to the question, "How many times this year have your parents attended a function of any sort at the school?" 72.9 per cent of the over-achievers answered yes while only 55 per cent of the under-achievers answered yes. The difference between these two was significant at the .01 level of significance.

TABLE 39

DIFFERENCE BETWEEN THE PERCENTAGES OF OVER AND UNDER COMPARATIVE ACHIEVERS ANSWERING YES TO QUESTIONS ON THE QUESTIONNAIRE

Questions from Questionnaire	Per Cent of Comparative Achievement		Per Cent Difference	$\sigma_{D\%}$	t Ratio
	Over	Under			
Does your mother work away from home?	43.9	49.5	5.6	5.24	1.07
Do you have a regular place at home to prepare school homework?	69.2	72.	2.8	4.83	.58
Do you have a regular time at home to prepare school homework?	36.4	41.9	5.5	5.16	1.12
Have you ever been double promoted?	2.9	6.9	4.0	7.36	.54
Have you ever failed to promote?	2.4	23.5	21.1	3.62	5.81*
Are either of your parents members of the P.T.A.?	62.9	41.1	21.8	5.39	4.04*
Several questions to answer the question: Are you living with less than both parents?	25.	31.8	6.8	4.8	1.42
How many times this year have your parents attended a function of any sort at the school? Per cent answering one or more.	72.9	55.	17.9	3.84	4.66*

*Significant at the .01 level.

Teachers again are shown to be able to recognize the under-achieving student as revealed in the question, "Have you ever failed to be promoted?" While only 2.4 per cent of the over-achievers reported ever failing to be promoted, 23.5 per cent of the under-achieving students reported failures. Here the difference between the two mean percentages was significant at the .01 level.

Although no other questions in this category revealed significant differences between means, some interesting trends were shown. Five and six-tenths per cent more of the under-achievers than over-achievers have mothers working away from home. Similarly 6.8 per cent more of the under-achievers than over-achievers live with fewer than both parents. It is interesting, although not statistically significant, that 4.69 per cent more of the under-achievers report having a regular time at home to prepare homework, and 2.8 per cent more report having a regular place at home to prepare homework. As other studies have pointed out, this is probably due to the better ability and study habits of the over-achiever, rather than to the time and place of study.

The questions answered by number are grouped together and presented in Table 40. The number of children in the family and their relative age to the student have a close relationship with degree of comparative achievement. The under-achiever reported an average of 2.61 brothers and

TABLE 40

STUDY OF DIFFERENCES BETWEEN THE MEANS OF QUANTITATIVE ANSWERS GIVEN BY UNDER- AND OVER-ACHIEVERS ON THE QUESTIONNAIRE

Questions from Questionnaire	Comparative Achievement		Mean Difference	S.D.	SE_D	t Ratio
	Over	Under				
How many rooms in your home, not counting the bath room?	6.01[a]	5.81	.2	.183	.571	.35
How many brothers and sisters do you have younger than you?	1.01	1.13	.12	1.31	.14	.86
How many older than you?	.99	1.54	.55	1.56	.165	3.33*
How many brothers and sisters?	2.00	2.61	.61	1.25	.133	4.59*
How many school clubs or organizations are you a member of?	1.28	.72	.56	1.1	1.17	.48
How many offices in these do you hold?	.6	.11	.49	1.01	.105	2.06**
How many times a month do you attend Church or Sunday School? Possible answers of 1, 2, 3, and 4 or more.	3.59	3.36	.23	.92	.098	2.35**

TABLE 40--Continued

Questions from Questionnaire	Comparative Achievement		Mean Difference	S.D.	SE_D	t Ratio
	Over	Under				
How many movies a month do you attend?	2.49	2.78	.29	1.99	.217	1.33
How many hours a week do you usually spend watching television?	21.5	23.05	1.55	2.72	.302	5.13*
How many hours sleep a night do you average?	9.0	9.0	0.0	0.0	0.0	0.0
How many different schools have you attended in your life?	3.6	4.1	.5	1.803	.204	2.45**

*Significant at .01 level.

**Significant at .05 level.

[a]While decimals are given these numbers are discrete and exist only as whole numbers; decimals are used for calculating mean differences only.

sisters while the over-achiever reported only two. The under-achievers reported having 1.54 brothers and sisters older, while the over-achiever reported only .99. Both of these had differences significant at .01 level. Although the under-achievers reported an average of .12 more brothers and sisters younger, the difference was not significant. It would appear the under-achiever comes from a larger family, and is one of the younger children in the family.

It might be possible to theorize that the over-achiever spends more recreational time in activities where he is an active participant or leader while the under-achiever is more likely to be an observer, although no conclusion should be drawn. The over-achiever has a higher membership in school organizations, but the difference has no statistical significance. Yet in offices held in these same clubs the over-achievers increase the lead to a difference significant at .05 level. The under-achiever spends 2.72 hours per week more than the over-achiever watching television. This difference is significant at .01 level. If church attendance is a sign of active participation, it could be added to this same theory.

The answers to the question, "How many times a month do you attend Church or Sunday School?" were grouped into the four possible answers of 1, 2, 3, and 4 or more. The over-achievers reported an average attendance of 3.59 while the under-achievers reported only 3.36. The difference was

significant at the .02 level.

The under-achievers report having attended .05 more schools than did the over-achievers. This difference is significant at the .02 level. The other two questions in this category show no statistical difference. The average number of hours sleep per night for both groups was nine hours, and the average number of rooms in the house was six with a difference of only .16 rooms.

Questions concerning the education completed by parents are grouped in Tables 41 and 42. The parents of over-achievers have advanced further in formal education than have those of the under-achievers. The number of students giving this information was smaller than on the other questions because of either a lack of knowledge or a reluctance on the part of the child. Nearly half the fathers of the under-achievers had failed to finish high school while only a third of the fathers of over-achievers had failed to do so. Over a third of the mothers of the under-achievers had failed to finish high school, but only a fifth of the mothers of the over-achievers had failed to do so.

Seventeen per cent more of the fathers and thirteen per cent more of the mothers of over-achievers had finished two years of college than had the fathers and mothers of under-achievers. This difference was significant at .01 level. Similarly twenty-one per cent more of the over-achieving students expected to finish two years of college

TABLE 41

AMOUNT OF EDUCATION COMPLETED BY PARENTS, AND EDUCATIONAL EXPECTATIONS OF STUDENTS BY COMPARATIVE ACHIEVEMENT LEVELS FROM QUESTIONNAIRE

Achievement Level	No.	6th Grade	9th Grade	12th Grade	2 Year College	4 Year College	More Than College	Per Cent Not Completing 12th Grade	Per Cent Completing 2 Year College
What was the highest grade in school completed by your father?									
Over	152	11	35	55	13	25	13	30	34
Average	153	18	31	60	13	22	9	32	29
Under	155	25	50	50	8	16	6	48	19
What was the highest grade in school completed by your mother?									
Over	164	8	24	78	27	25	2	20	33
Average	155	9	33	64	16	28	5	27	32
Under	169	18	41	76	13	15	6	35	20
How far do you expect to go in school?									
Over	172	0	0	25	22	125	0	0	85
Average	144	0	1	32	18	93	0	1	77
Under	185	0	9	58	42	76	0	5	64

TABLE 42

DIFFERENCE BETWEEN UNDER- AND OVER-ACHIEVERS IN EDUCATIONAL ACCOMPLISHMENT OF PARENTS AND IN EDUCATIONAL EXPECTATIONS OF THE STUDENT

	Comparative Achievement		Per Cent Difference	$\sigma_{D\%}$	t Ratio
	Over	Under			
Per Cent of Fathers with 2 or More Years of College	36	19	17	5.1	3.33*
Per Cent of Mothers with 2 or More Years of College	33	20	13	4.8	2.71*
Per Cent of Students Who Expect to Complete 2 or More Years of College	85	64	21	4.5	4.67*

*Significant at .01 level.

than did the under-achievers. This difference was significant at .01 level.

In summary the relationship between the interest of the parent in the school and the comparative achievement of the child is reflected in the significant difference shown in answer to the questions on P.T.A. membership and on attendance of the parent at school functions.

Teachers are apparently able to recognize the student who is not achieving up to expectancy, as the reports show a significant difference in the number of failures between the

under- and over-achievers. A relationship between living with both parents and over-achievement is noted. It is interesting to note that the over-achiever is less likely to have a time and place to study at home; this is possible due to a lesser need because of better study habits and ability.

The under-achievers come from larger families, and have more older brothers and sisters, while the number of younger brothers and sisters shows no statistical significance. The under-achiever has attended more schools, probably as a result of more moves on the part of the family. The over-achiever spends less time watching television, participates more in church activities, and holds more offices in school organizations than the under-achiever. These points seem to indicate the over-achiever's greater interest in participating in social activity rather than in merely observing.

There is a distinct relationship between the amount of education of the parents and the degree of comparative achievement of the student. There is similarly a relationship between the educational expectations of the student and his comparative achievement.

CHAPTER V

SUMMARY OF FINDINGS AND RECOMMENDATIONS

The Findings

Intelligence and Achievement of the Population Studied

There were 3806 students in the eighth grade of the Oklahoma City School System at the time of the study. Individual schools varied in the amount of information available on each student. This was due both to the transient nature of certain communities and to the relative adequacy of administrative and guidance personnel of each school. The mean Intelligence Quotient as measured by the California Test of Mental Maturity was 104.8. The mean anticipated grade placement based on intelligence, chronological age, and placement was 8.7, or six school months above the norm.

The measured test achievement was at the national grade placement norm of 8.1 but fell six school months short of the possible achievement as predicted by anticipated grade placement. The individual schools with the highest mean I.Q.'s more nearly approached their anticipated achievement, while the schools with lowest mean I.Q.'s fell the furthest

below their anticipated achievement.

The population studied was unequally divided between the three intelligence levels. Forty and four-tenths per cent of the population had I.Q.'s of 110 and above. Forty-five and nine-tenths per cent had I.Q.'s of 90 to 109. Only 13.7 per cent had I.Q.'s of 89 and below. This inequality in distribution of the three intelligence levels is reflected in the distributions within the three comparative achievement levels.

The students were about equally divided by sexes: 50.3 per cent females and 49.7 per cent males.

Correlations between Predicted and Actual Achievement

Two measures of potential achievement were used: intelligence as shown in the I.Q. from the California Test of Mental Maturity, and Anticipated Achievement computed from intelligence, chronological age, and actual school grade placement. Two measures of achievement also were used: the grade point average for one year's school work, and the standardized test grade placement as measured by the California Achievement Test. Both measures of potential achievement were about equal when predicting achievement as measured by standardized tests having correlations of .83 and .82 respectively. The measures of potential achievement were both much less effective in their prediction of achievement as measured by grade point average, but still about equal with

correlations of .44 and .43.

The correlation of .026 between intelligence and the difference of measured from anticipated achievement for all eighth grade students was so low as to be practically zero.

A Prediction Formula

Because of the low correlation (.44) of school marks with our methods of predicting potential achievement, and of a correlation of only .59 with measured achievement, a more efficient method or formula for prediction of grades is presented. The partial coefficient of correlation of grade point average and intelligence when measured achievement is held constant is -.102. The partial coefficient of correlation of grade point average and measured achievement when intelligence is held constant is .50. Using partial and multiple correlation the following formula for the prediction of grade point average (X_3) from general intelligence (X_1) and measured achievement (X_2) is

$$X_3 = .033X_2 - .0065X_1 + 3.09 \pm .539$$

Since future academic success can be predicted much more accurately in the form of test measured achievement than grade point average, it was selected as the measure of academic success to be used for the study of levels of comparative achievement.

Comparison of the Intelligence Levels of the Eighth Grade Population

In order to attempt to find an answer to the question of which level of intelligence is profiting most from the public schools, the measured achievement of the high, average, and low intelligence groups was studied. The total eighth grade population was divided into high (I.Q. 110 and above), average (I.Q. 90-100), and low (I.Q. 89 and below) intelligence groupings. The difference between mean difference of measured achievement from predicted achievement of the high and average groups showed no statistically significant difference, while the difference between the mean difference of the low and the other two groups was significant at the .01 level. It may be concluded that the high and average intellectual students are both profiting from their education, but that the lower intellectual group is falling significantly behind.

Study of Comparative Achievement Levels

The purpose of this study was to consider not achievement only but achievement in its relationship to ability. The difference of each student's measured achievement from his anticipated achievement in tenths of a school year was made. Over-achievers were defined as those students with a difference of one and one-half standard deviations, or more, above the mean, and under-achievers the same

deviation or more below. This one and one-half deviations figured to be one and two-tenths school years. The over-achiever group is then the approximate seven per cent of students whose achievements furthest exceed their expectations. The under-achiever group is the approximate 7 per cent of students whose achievements fall furthest below their expectations. The average-achiever group is the approximate 7 per cent who most nearly approximate expectation.

There was a direct positive relationship among degree of comparative achievement, measured school grade placement, and grade point average. There was a similar but inverse relationship with chronological age and days absent. Table 43 presents a summary of these figures.

Thus it may be concluded that the over-achievers have a higher standardized test achievement and grade point average, are younger in age, and have fewer absences than the average- and under-achievers. The differences between the over- and under-achievers are significant at the .01 level.

A significantly high percentage of the under-achievers come from the lower intelligence grouping. A high percentage of the average-achievers is found in the higher intelligence grouping. A high percentage of the over-achievers is found in the average intelligence grouping.

TABLE 43

MEANS OF ACADEMIC CHARACTERISTICS BY LEVELS OF ACHIEVEMENT

Items	Comparative Achievement Levels		
	Over-Achievers	Average-Achievers	Under-Achievers
Intelligence Quotient	103	109	102
Measured Achievement School Grade Placement	9.3	8.4	6.7
Chronological Age in Months	160.9	162.6	166.3
Grade Point Average	3.2	2.8	2.1
Days Absent	5.04	6.68	8.71

These factors are influenced by the comparatively equal ceiling limits of the two measures restraining the higher intellectual group from having measured achievement higher than anticipated achievement.

The sex difference between the over- and under-achievers is most distinctive. The over-achievers are seventy-five per cent female and only twenty-five per cent male while the under-achievers are only twenty-eight per cent female and seventy-two per cent male.

Characteristic Differences Revealed by Teacher Rating Scales

A total of 628 teacher rating scales were distributed with 87 per cent returned. The returns by comparative achievement levels were similar, ranging from 88 per cent for the under-achievers to 85 per cent for the over-achievers. There were seven characteristics upon which the teacher was asked to rate the student. There were five possible ratings on the scale ranging from low on the left to high on the right. On each of the seven characteristics the teachers rated the over-achievers higher, the average-achievers next and the under-achievers lowest with differences statistically significant at the .01 level on all seven characteristics. The characteristics rated are the following:

1. Industry (Work habits and attitudes)
2. Initiative (Motivation)
3. Cooperation (Peer relationship)
4. Responsibility (Dependability)
5. Self-confidence (Attitude toward self)
6. Emotional Stability
7. Seriousness of Purpose

Corresponding significant differences are found between levels of intelligence and between sexes. These may be partially explained by the small number of students in the lower intellectual grouping of the population studied,

by the relationship between comparative achievement and intelligence, and by relationship between comparative achievement and sex.

Habits and Environment Revealed by Questionnaire

The distribution of 628 questionnaires and the 83 per cent return are the same as on the rating scale.

The interest of the parent in the school is closely related to the comparative achievement of the child. Sixty-two and nine-tenths per cent of the parents of over-achievers are members of the P.T.A. while only forty-one and one-tenth per cent of the parents of the under-achiever are members. Seventy-two and nine-tenths per cent of the parents of the over-achievers have attended a function of some sort at the school while only fifty-five per cent of the parents of the under-achievers have attended. Both of these differences are statistically significant at the .01 level.

Home conditions influence the comparative achievement of the student as shown by the following relationships: The under-achievers come from a larger family and are one of the younger children in the family. The under-achievers report an average of 2.61 brothers and sisters with 1.54 older while the over-achievers report an average of only two brothers and sisters and only .99 older. The under-achievers spend an average of 2.72 more hours per week watching television than do the over-achievers. Differences are signifi-

cant at the .01 level.

The parents of over-achievers have advanced further in formal education than have those of the under-achievers. Seventeen per cent more of the fathers and thirteen per cent more of the mothers of over-achievers have finished two years of college than have fathers and mothers of the under-achievers. Similarly twenty-one per cent more of the over-achievers expect to finish two years of college than do the under-achievers.

The more regular attendance of the over-achievers at Church or Sunday School is significant at the .02 level. The under-achievers attending .05 more schools than the over-achievers is significant at the .02 level. Teachers are shown to be able to recognize the under-achieving student since 23.5 per cent of the under-achievers report failures to promote while only 2.4 per cent of the over-achievers report failures. The difference is significant at the .01 level.

Although showing no statistical significance some interesting trends are shown. More of the mothers of under-achievers work away from home, and more of the under-achievers are living with fewer than two parents. The under-achievers belong to fewer clubs and hold far fewer offices in them. More under-achievers have a regular time and place at home to do school work.

Conclusions and Recommendations

A primary concern of this study is to measure achievement and to compare it with potential achievement. The students are found to be working up to the national norm of measured achievement, but six school months below their possibility based upon predicted achievement. No attempt is made to appraise various teaching methods or practices. Therefore, the only recommendation that could be made is that a prediction of anticipated achievement be made for each class and each pupil and then the instruction be directed towards the attainment of that anticipated achievement.

Complete test data needed for use for this study were available on only seventy-one and one-tenth per cent of students. Other information was similarly deficient. In order to make more efficient use of and develop the natural resources of the mental ability of the youth of America, scientific predictive methods must be used. The educator must be adequately trained and proficient in the use of these methods and sufficient money and time must be allowed for the implementation of these methods in every school and classroom.

The study of the characteristics relating to achievement is only another step in the understanding of the problem. Further study must continue. This or any other set of characteristics will not fit any one child nor should the

child be expected to conform to any set pattern. Teachers, counselors, and administrators should practice guidance and counseling techniques that will permit them to understand and assist each individual student. Education is an individual matter.

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APPENDIX A

STUDENT QUESTIONNAIRE

We would like for you to help us gain a better understanding of students, and what makes them like they are. The information you give will not affect your grade or school standing in any way, but will help in the understanding of all students and their problems. Please answer every question fully and honestly. Each question is important. Fill in the information requested in the following blank spaces, or put an X in the square in front of the correct answer.

Student's Name _____ School _____

Home Address _____

1. Sex ☐ Boy ☐ Girl.

2. Are you living with? ☐ your mother, ☐ stepmother, ☐ neither of these.

3. Are you living with? ☐ your father, ☐ stepfather, ☐ neither of these.

4. How many rooms are in your home, not counting the bath room?
   ☐ 1, ☐ 2, ☐ 3, ☐ 4, ☐ 5, ☐ 6, ☐ 7, ☐ 8, ☐ 9, ☐ 10, ☐ more than 10.

5. What is your father's occupation? _____

6. Does your mother work away from home? ☐ Yes, ☐ No, What occupation? _____

7. Are either of your parents members of the P.T.A.?
   ☐ Yes, ☐ No.

8. How many times this year have your parents attended a function of any sort at the school? ☐ None, ☐ Once, ☐ 2, ☐ 3, ☐ 4, ☐ 5, ☐ 6, ☐ 7 or more.

9. What was the highest grade in school completed by your father?
   ☐ 6th, ☐ 9th, ☐ 12th, ☐ 2 year college, ☐ College, ☐ More than college.

10. What was the highest grade in school completed by your mother?
    ☐ 6th, ☐ 9th, ☐ 12th, ☐ 2 year college, ☐ College, ☐ More than college.

11. How far do you expect to go in school?
☐ 9th, ☐ 12th, ☐ 2 year college, ☐ College.

12. How many close friends do you have in school?
☐ 0, ☐ 1, ☐ 2, ☐ 5, ☐ 8, ☐ 10 or more.

13. How many brothers and sisters do you have younger than you? _____

14. How many older than you? _____

15. Are you a twin? ☐ yes, ☐ no.

16. How many different schools have you attended in your life?
☐ 2, ☐ 3, ☐ 4, ☐ 5, ☐ 6, ☐ 7, ☐ 8, ☐ 9, ☐ 10, ☐ 11 or more.

17. How many school clubs or organizations are you a member of? _____

18. How many offices in these do you hold?
☐ 0, ☐ 1, ☐ 2, ☐ 3, ☐ 4, ☐ 5 or more.

19. Do you have a regular place at home to prepare school homework? ☐ Yes, ☐ No.

20. Do you have a regular time at home to prepare school homework? ☐ Yes, ☐ No.

21. Have you ever been double promoted? ☐ Yes, ☐ No.
Failed to be promoted? ☐ Yes, ☐ No.

22. How many times a month do you attend church or Sunday school? _____

23. How many movies a month do you attend? _____

24. How many hours a week do you usually spend watching television? _____

25. How many hours sleep a night do you average? _____

THANK YOU

APPENDIX B

R A T I N G S C A L E

STUDENT _____ SCHOOL _____ DATE _____

Please rate this student by placing a large 'X' in the division of the scale which you consider most appropriate. In rating students the student should be considered in comparison with those of his own age and grade level, not with adults. This is a five point rating scale with the right hand side of each scale indicating the more desirable qualities. The explanation of each group is given as suggestions only. The per cent of all students that should be considered to be in each division is listed at the top of each division.

7%	24%	38%	24%	7%
INDUSTRY (Work habits and attitudes)				
Seldom works even under pressure.	Needs extra pressure to undertake much work.	Works reasonably well, if motivation exists.	Prepares assigned work regularly.	Seeks additional work.
INITIATIVE (Motivation)				
Retiring; unwilling to assume responsibility.	Conforms, seldom initiates.	Shows leadership occasionally.	Consistently self-reliant.	Born leader, actively creative.
COOPERATION (Peer relationship)				
Obstructive to others.	Indifferent, self-centered, often in difficulty.	Gets along reasonably well with most people.	Usually can be counted on to work well with others, occasional difficulty	Works exceptionally well with others.

Obstructive to others.	Indifferent, self-centered, often in difficulty.	Gets along reasonably well with most people.	Usually can be counted on to work well with others, occasional difficulty.	Works exceptionally well with others.
RESPONSIBILITY (Dependability)				
Unreliable, unstable, irresponsible.	Careless, requires much supervision.	Usually dependable.	Can be trusted to carry out most tasks well without supervision.	Assumes responsibility, needs no supervision.
SELF-CONFIDENCE (Attitude toward self)				
Has no self-confidence.	Occasionally seems confident, but usually seems not to believe in himself.	Confident about half of the time.	Usually seems confident, but occasionally lack of self-confidence is evident.	Seems absolutely sure of himself.
EMOTIONAL STABILITY				
Flighty, or temperamental.	Usually somewhat temperamental, but at times well composed.	Is happy or depressed as conditions warrant.	Usually well composed but sometimes flighty.	Always well poised and self-possessed.
SERIOUSNESS OF PURPOSE				
Purposeless.	Seems to have a purpose at times, but often wavers.	Normally purposeful.	Seems to have definite purpose.	Distinctly has definite purposes.

Name of rating teacher _____ How long have you known child? _____ Months