A STUDY OF THE CONSTANCY AND VARIABILITY
OF VARIOUS PHASES OF GROWTH
IN THE PRIMARY GRADES

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A STUDY OF THE CONSTANCY AND VARIABILITY OF VARIOUS PHASES OF GROWTH IN THE PRIMARY GRADES

THESIS

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

One of the most important problems in education is that of predicting what children will do from one year to another in all phases of their development. Involved in this is also the possibility of predicting success in life from success in school. However, the present study is concerned only with the problem of prediction of school achievement in intellectual, academic, and social growth. If the school can use measurements which give a good approximation of a child's subsequent possibilities, it is clear that it has at its disposal very essential information which should be useful in helping plan a child's school career and in guiding teachers and parents in anticipating the child's ultimate outcome. A signal advance in the possibilities of prediction has been achieved with the recent publication of the results of Lewis M. Terman's follow-up study of approximately 1,700 gifted children.[1] In this study, Terman was able to show that in

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[1]Lewis M. Terman, "Psychological Approaches to the Biography of Genius," Science, XCII (October, 1940), 299.

approximately seventy-five per cent of the cases of bright children in the third grade it was possible to predict that, in adult life, they would make outstanding contributions to society.

The study by Terman has given additional emphasis to the validity and reliability of intelligence tests. At the present time, when studies from some sources are claiming to cast doubt upon the validity of intellectual measurements, it is important that data bearing on this problem be gathered and studied intensively.[2]

Source and Scope of the Data

The study at hand has two main purposes: (1) a survey of the constancy of the results of four years of group intelligence testing in three schools of Denton, Texas: the Robert E. Lee School, the Sam Houston School, and the Teachers College Demonstration School; and (2) a study of the variability of academic and social growth in one elementary school grade.

In many educational policies there is the problem of whether superior or inferior growth is primarily a general or a specific matter. If a child who is superior in one phase of growth is quite likely to be generally superior

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[2]George D. Stockard and Beth L. Wellman, "Environment and the I. Q.: the Validity of Testing," Twenty-ninth Yearbook of the National Society for the Study of Education, pp. 429-431.

in other desirable traits, the school could be more certain in its policies with respect to pupil promotion and guidance. If, on the other hand, a child's growth pattern is much more specific than it is general, schools and parents would have very few reliable cues to go by in anticipating a child's future. There is also involved a consideration of the factors of general versus specific development and of the extent to which maladjustment in one area of life may result in maladjustment in other areas. It may be that intellectual or academic inferiority results in social inferiority and failure. Likewise, social inferiority may have serious repercussions on academic success and the use of mental ability.

However, it is not the purpose of the investigation herein reported to answer these specific questions, but rather to present data bearing upon the general versus specific development. If it can be shown that the children who are high in one phase of growth are also generally high in others, whereas those who are low in one phase are also generally low, then educators would know that this is the sort of thing to expect rather than the opposite. It is with this question of constancy and variability of various phases of growth that the present thesis is concerned.

Organization of Material

Chapter I presents the introduction, which states the purpose of the study, the source and scope of the data, and the method of procedure. A review of data of some of the literature of authors on similar subjects is given in Chapter II. Chapter III contains a report on a study of intellectual growth during the first four grades of the elementary school. Chapter IV is a comparison of specific and general growth; and Chapter V gives the summary, findings, and conclusions.

CHAPTER II

A REVIEW OF SOME RECENT INVESTIGATIONS IN REGARD TO CONSTANCY AND VARIABILITY OF VARIOUS PHASES OF GROWTH IN YOUNG CHILDREN

Within recent years a number of investigations have been made in regard to the constancy and variability of growth in young children. Educators have found it necessary to understand some kind of measurement in order to determine the progress made by students, to evaluate procedures, to provide appreciation for learning, to stimulate interest and growth, and to provide a basis for the continuous revision of the curriculum. It is obvious that without some attempt to determine what is accomplished and how it is accomplished, there can be no basis for making decisions or intelligent planning.

Regardless of the form that evaluation or testing has assumed, it is merely the measuring of certain qualities either directly or indirectly. The qualities to be measured in growth are those involving changes brought about in students; what these changes are, and the extent of the changes. The evaluation of the ways and means utilized and the

determination of the actual changes are reciprocal processes which should occur simultaneously.

Standardized tests have been largely used in these investigations. These tests are for diagnosing reading conditions, measuring progress, comparing groups, and assisting in making classifications. There was a tendency at first, in the use of these tests, to utilize the "cross-sectional" method in experimentation. In this method, comparison is made of different groups of children of different ages, often of successive ages. These tests usually cover a short period of time and often comprise only one test. Various factors, it is apparent, may influence these tests: the emotional condition of the children, the immediate environment, the technique of testing employed by the teacher, and the degree of understanding possessed by the children regarding the test.

Recently, however, the "longitudinal" approach to the study of human development has been widely used. By this method the same group of children is followed for a period of time, sometimes years, and successive tests are given. Goodenough evaluates this method:

> There can be no doubt that the former method [longitudinal] lends itself to the study of many problems which the latter [cross-sectional] is poorly suited, that by using the same group of children from year to year, certain types of sampling errors are automatically excluded, and what is of chief importance for our present consideration, it becomes possible to employ techniques

> that are truly experimental in nature, since the effect of an artificially interpolated condition can be studied in terms of responses both before and after its occurrence.[1]

With the introduction of the "longitudinal" method of testing, a series of experiments began in different sections of the country. One of the most publicized of these investigations was that conducted by the Iowa Child Welfare Research Station from 1934 until 1940. The central theme of the various studies comprising the total investigation was the measurement of child intelligence, and the changes which occur in it.

The first studies by the Iowa Child Welfare Research Station were begun in 1917, when Baldwin undertook to measure the relation between physical and mental development.[2] The Stanford-Binet Tests were used in a program of repeated measurements extending over a period of four years. A wide fluctuation in the intelligence quotients reported caused the investigator to regard the Stanford Revision of the Binet scale as unsuitable as a means of measuring mental growth. Nevertheless, for various reasons, the studies were continued, and other investigators came to believe that the fluctuations recorded fell into meaningful patterns,

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[1]Florence L. Goodenough, "Some Special Problems of Nature-Nurture Research," Thirty-ninth Yearbook of the National Society for the Study of Education, p. 367.

[2]Beth L. Wellman, "Iowa Studies on the Effects of Schooling," Twenty-ninth Yearbook of the National Society for the Study of Education, p. 377.

and that the Stanford-Binet Tests did possess some value in measuring mental growth. In the early program of the preschool, two tests per year had been taken as checks on the validity of an intelligence-quotient test at these ages. Baldwin and Stecher, in The Psychology of the Preschool Child, reported increases in intelligence quotient with re-tests, but did not compare periods of attendance with periods of non-attendance. In the discussion of results they say:

> The later I. Q.'s are in general higher than the first ones, reflecting habituation to experimental conditions, practice, increased facility in the use of language, and mental stimulation resulting from the laboratory activities. In some cases the increase in mental age is so great as to give the impression that the child has actually increased in intelligence. A fairer interpretation would be that the first examination did not actually represent the child's intelligence or that the favorable environment had developed the potential mental ability of the young child. This actual demonstrable increase in mental status is an argument for giving the young child such opportunity for mental growth.[3]

The gain in mental growth thus recorded gave encouragement to further investigations. A fairly large number of studies have been completed, but Wellman says they constitute only a beginning.[4] Tests were made over a period of years from 1921 until 1938 with a group of children

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[3]Quoted from Wellman, op. cit., p. 378.

[4]Ibid., p. 379.

attending the preschool laboratories. Out of 1,285 children enrolled during that time, tests were made of 808 children who attended for at least one regular year, many of them for two or more years. As a general rule, the Stanford-Binet Test, 1916 revision, was used with children aged forty-two months and above and the Kuhlman-Binet Test with children below that age. Several examiners participated in the testing program each school year. These examiners were staff members or research assistants in child psychology, and were experienced in their work. Retesting was not made by the same examiner, in a great many cases, nor was there any attempt to acquaint him with the results of the previous testings. The following table shows the results obtained from the testing on the changes made in the intelligence quotients of the children:

TABLE 1

CHANGES IN INTELLIGENCE QUOTIENT OF 652 CHILDREN OVER A PERIOD OF SEVENTEEN YEARS*

Number of Children Registering Changes	Points of I.Q. Change
1	+43 to +47
1	+38 to +42
9	+33 to +37
19	+28 to +32
24	+23 to +27
55	+18 to +22
72	+13 to +17
108	+ 8 to +12
124	+ 3 to + 7
113	- 2 to + 2
69	- 3 to - 7

TABLE 1 -- Continued

Number of Children Registering Changes	Points of I.Q. Change
31	- 8 to -12
12	-13 to -17
6	-18 to -22
7	-23 to -27
0	-28 to -32
1	-33 to -37

*Table taken from Wellman, op. cit., p. 382.

The data show that the changes ranged from a gain of more than forty points to a loss of more than thirty points. Fifty-three per cent of the children changed eight or more intelligence-quotient points between the fall and spring examinations. The results of these tests created a storm of controversy. This study need not go into this controversy, but Terman's criticism of it is pertinent:

> It is unfortunate that the controversy should have become so exclusively concerned with environmental influences upon the IQ. An obtained IQ is not only subject to chance errors resulting from inadequate sampling of abilities, but also to numerous constant errors, including practice effects, negativism, or shyness, the personal equation of the examiner, and standardization errors in the tests used. For these reasons an obtained IQ, as I have many times pointed out, should never be taken as a final verdict, but only as a point of departure for further investigation of a subject. The great mistake of the Iowa workers is that in practice they use obtained IQ's as though they were always true measures of present ability, regardless of the subject's age and regardless of the limited reliability or validity of the scale employed. Any IQ changes

> observed are accepted as representing true changes in rate of mental growth and are invariably explained in terms of "environmental impacts."[5]

Subsequent investigations in the change of the intelligence quotient of children after they have attended school have tended to support Terman's criticism of the wide changes recorded by Wellman. In order to provide further data for understanding the effect of schooling upon the intelligence quotient, Thorndike and others analyzed the Binet retest records that had accumulated in the files of three well-known private schools in New York City: Ethical Culture, Horace Mann, and Lincoln. These records represent retest data on a total of about three thousand children. Over 1,100 of these retests had been given after an interval of at least two and one-half years, and these records were the ones used for the analyses. The tabulation of the data shows that 1,167 children's retest records were analyzed. In School A, with 294 pupils, the mean difference in the intelligence quotients was only ∕1.40; in School B, the mean difference was ∕6.17; while in School C, it was ∕0.65.[6] The experimenters offer these comments on the results of the study:

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[5]Lewis M. Terman, "Personal Reactions of the Committee," Twenty-ninth Yearbook of the National Society for the Study of Education, p. 400.

[6]E. L. Thorndike, C. W. Fleming, G. Hildreth, and M. Stanger, "Retest Changes in the IQ in Certain Superior Schools," Twenty-ninth Yearbook of the National Society for the Study of Education, p. 355.

> We have studied the Binet retest results from these schools that, it seems safe to say, would be generally considered by educators to be superior schools. In no one of these did we find cumulative evidence in IQ related to the length of time spent in the school environment. In two of the schools (A and C) the gains were too small to be even statistically significant. In the third appreciable gains were found, but they appeared as well at the end of one year as at the end of five or six years. Nothing in our data or our knowledge of the schools gives us any clear reason why the results in School B differed from those in the other schools.[7]

Other studies have verified the evidence with regard to the constancy of the intelligence quotients of children. Many studies have found that the intelligence quotient is essentially constant over the age range controlled by the Stanford-Binet scale.[8] Boynton says that even the best mental test is not a perfect measuring instrument, and that we cannot expect repeated testings of the same individual on any intelligence test to give precisely the same results.[9] The amount of change which must be allowed for in a test-retest is expressed by the "probable error." In the 1937 Stanford-Binet, the probable error of calculated intelligence quotients is about three points. A change of intelligence quotient from ninety-five to ninety-eight or ninety-two (or even a greater change) does not involve, then, any actual change in a child's mental ability. He is still classified within the normal range.

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[7] Ibid., p. 359.

[8] Henry Garrett, Great Experiments in Psychology, p. 27.

[9] Paul L. Boynton, Intelligence: Its Manifestations and Measurements, p. 45.

Iteration of the Stanford-Binet Test upon the same child after an interval of one year or less will rarely show an intelligence-quotient variation from the initial value of more than three or four points. When the time interval between the test and the retest is longer than a year, variations in intelligence quotient may be as much as five or ten points; but this degree of change is seldom observed.[10]

Many studies have been made with regard to the constancy of the intelligence quotients of children who are feeble-minded or of inferior intelligence. Minogue studied the problem of the constancy of the intelligence quotient in a group of 441 feeble-minded children. When these children entered an institution, a test was made of their intelligence quotients; they were retested later at intervals of from two to ten years. Table 2 on the following page shows Minogue's results in tabular form.

The data show that the changes made in the intelligence quotients of the children over the period of time were small. The conclusion was reached that an intelligence quotient is constant if it does not change more than five points over a period of time.

Cattell analyzed the changes of intelligence quotients in 1,183 individuals of superior intelligence, with

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[10]Garrett, op. cit., pp. 27-30.

TABLE 2

CONSTANCY OF THE INTELLIGENCE QUOTIENTS OF MENTAL DEFECTIVES*

Phases of Constancy	Number	Per Cent
Intelligence quotient constant (five points or less of difference)....	316	71.7
Gain in intelligence quotient (more than five points difference).....	21	4.8
Loss in intelligence quotient (more than five points difference).....	104	23.6
Case of greatest gain.....	21 pts.	
Case of greatest loss.....	23 pts.	

*Table taken from Floyd L. Ruch, Psychology and Life, p. 165.

intelligence quotients of eighty or above, over a period of six years.[11] Various groups of her total population showed average difference between the testings ranging from 0.5 to 5.0 intelligence-quotient points. The superior children gained slightly, whereas the duller children lost in intelligence quotients between the tests. Cattell concluded that there is a tendency for high and low intelligence quotients to draw apart; more constancy and less variability were observed in the children of the high intelligence-quotient group than in those who had low intelligence quotients.[12]

[11]Ruch, op. cit., p. 165.

[12]Ibid.

Ruch says that these results reviewed here are typical of those obtained by more than a dozen studies based on thousands of subjects. The writer, then, feels safe in assuming that the intelligence-quotient measurement of children on the average does not change materially over the age range covered by the Stanford-Binet Scale. These findings will be used as criteria for the evaluation of the data presented in the following chapter.

In the study of the growth of individuals, there are other factors to be considered besides the extent of the changes, if any, in the intelligence of a person over a period of time. One of the most interesting of these factors is the relationship of intelligence to personality; that is, is the person with a high, not necessarily superior intelligence-quotient rating a well-adjusted personality, well-liked by his fellow students and by his teachers? Some interesting studies have been conducted along this line. Witty made a study of fifty gifted children for a period beginning in 1924-1925 and continuing up until 1940, the date of the publication of his study.[13]

The group of fifty children was selected from the entire school population of Grades III to VII in Kansas City, Missouri. All children whose ratings placed them

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[13]Paul Witty, "A Genetic Study of Fifty Gifted Children," Twenty-ninth Yearbook of the National Society for the Study of Education, p. 401.

above the ninety-ninth percentile on the National Intelligence Test were given the Stanford-Binet examination, and on this basis forty-one children with intelligence quotients of 140 or above were selected for the study. Nine other children with similar high intelligence-quotient ratings were added from neighboring school systems in three Kansas towns.

At the time the study was begun, the average chronological age of the group was ten years, five months. There were twenty-six boys and twenty-four girls. Two children of the group were unavailable for re-examination in 1929-1930, and three of the group could not be used in 1933-1934. Substitutions were made of the same age, sex, race, general family background, and intelligence quotient as the children whom they replaced. Data were obtained also from a control group (intelligence quotients of ninety to 110), paired with the gifted according to age, race, and sex.

In 1924-1925, data were procured for each child by the use of the following tests and measurements:

1. National Intelligence Test, Scales A and B, Form I.
2. Stanford Revision of the Binet-Simon Intelligence Test.
3. Stanford Achievement Examination, Advanced, Form A.
4. Overstatement tests.
5. A test of play interests and activities.
6. Physical measures and records of physical development.

7. Home information forms.
8. Extensive school histories and records.[14]

During the months of April, 1929, and May, 1933, follow-up investigations included study of the children in the following respects:

1. Physical development and health.
2. School record.
3. General information.
   a. Social and moral traits.
   b. Activities in and out of school.
   c. Abilities, talents, and interests.
   d. Future plans.[15]

Data were secured for both gifted and control groups in 1930-1931, while in 1933-1934, information was obtained only for the gifted children. Some of the outstanding conclusions gained from the study follow:

> 1. The gifted child was apparently well adjusted to school life. This was clear in his "liking" for academic work, in his ready participation in various activities, and in the favorable attitude of his classmates toward him.
> 2. The interests of the children reflect their general superiority. Versatility and vitality of interest characterize them. The children engage in the same number of play activities as the control group, though the gifted are somewhat more solitary and sedentary in their play.
> 3. In ratings of character and in scores of objective tests, the typical gifted child surpassed the average child in the control group.
> 4. Follow-up data covering ten years show that the gifted child maintained his superior mental ability.[16]

Follow-up studies of the past decade show that the children with a high intelligence-quotient rating maintain

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[14] Ibid., p. 402. [15] Ibid. [16] Ibid., p. 409.

this rating on mental tests with a very high degree of reliability. The relationship that this high intelligence-quotient rating has on other phases of growth has been studied by Terman and Owen in a follow-up test in California of subjects who as children tested 140 intelligence quotient or higher. When liberal allowance had been made for regression of found scores, practically all of the children at the time they were tested belonged in the top one per cent of the generality of California school children. The mean intelligence quotient of the entire group was approximately 150.

When a retest was made of the subjects six years after the first tests were made, the following findings were formulated regarding the social status of the subjects:

> 1. Children above 140 IQ are not as a group characterized by intellectual one-sidedness, emotional instability, lack of sociability or of social adaptability, or other types of mal-adjusted personality.
> 2. In practically every personality and character trait such children average much better than the general school population.
> 3. In social intelligence ratings, social interests, and play activities, gifted children as a group are either normal or superior.
> 4. In the character traits measured by the Raubenheimer-Cady tests the typical gifted children of nine years are on a par with unselected children of thirteen or fourteen years.[17]

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[17]Lewis M. Terman and Melita Owen, "Status of the California Gifted Group at the End of Sixteen Years," Twenty-ninth Yearbook of the National Society for the Study of Education, p. 67.

In regard to intellectual growth of these subjects, the findings were:

> 1. School achievement as a rule continues through high school and college to be in line with the IQ originally found in 1921-1922.
> 2. Subject failures in high school are practically never incurred by children of this grade of intelligence.
> 3. Gifted children of the senior high school year test on the average above the 90th. percentile of the general run of high-school seniors on the Iowa High-School Content Examination, or from 1.5 to 2.0 S. D.'s above the mean of high-school seniors in general.[18]

After 1928, there was no systematic follow-up study of these subjects until 1936. At that time questionnaires were sent to as many of the subjects, or their relatives, as could be located to secure information regarding their later development. Approximately 1,400 out of some 1,500 subjects originally tested were located, and these were sent information blanks asking for the following information: formal schooling since 1928, academic degrees, graduation honors, scholarships and assistantships, college activities, student earnings, plans for further education, occupational history after leaving school, earned income, occupational goals, avocational interests, health, disappointments, failures, family data, marriage, and certain other data. Another blank was sent to a parent or near relative calling for information on the subject's

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[18] Ibid., p. 68.

physical and mental health, intellectual promise, special abilities, social traits, desirable and undesirable traits of personality, interest in the opposite sex, occupational success, ambition and drive, marriage, and other data.

Ninety-six per cent of the people questioned answered the questionnaire. Those who were tested in 1922 in the elementary schools, about three quarters of the entire group, had a median age of twenty-six in 1938; the 1922 high-school subjects had a median age of thirty-two. The group, it was thought, was sufficiently mature to give some indication of the kind of men and women gifted children become. The following findings were reported from this follow-up study:

1. Forty-three, or three per cent, of the subjects had died: twelve by accident, twenty from natural causes, five by suicide, and six from causes unknown.

2. Nearly ninety per cent of the boys and eighty-five per cent of the girls had gone to college; nineteen out of twenty boys graduated from college; nine out of ten girls graduated.

3. Sixteen per cent of the boys and twenty per cent of the girls who graduated from college were elected to honor societies.

4. Twelve per cent of the three hundred boys who had completed graduate work in college by 1938 had received the

Ph.D. degree, thirteen per cent the M.D. degree, twenty-five per cent a degree in law, twenty-three per cent an M.A. degree, five per cent a degree in engineering, and two per cent a degree in architecture.

Terman and Owen have this summary comment on the general accomplishment of the group:

> Although a considerable proportion of the subjects have not lived up to their ability, the accomplishments of the group as a whole have been as good as could reasonably have been expected, considering that most of its members are still under thirty years of age. At least half the boys are launched on promising careers and several are already nationally or internationally known. The group includes novelists, short-story writers, poets, a sculptor, a gifted musical composer, and several scientists who have published important researches. With few exceptions creative intellectual productivity is confined to males. The females, once they have completed their formal education, seek their life satisfactions in other things than intellectual pursuits.[19]

In the present study, along with the study of the constancy of a child's intelligence quotient, attention is given to some of the factors present in the experiments described by Witty and Terman. The present investigation, however, does not deal with a superior group of children, but seeks to evaluate the reactions of a normal group of children over a successive period of years. Many of the problems of Witty's experiment have been utilized in this one, notably: the degree to which a child who is high in

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[19] Ibid., p. 73.

one measurement, especially in social growth as evaluated by both teachers and friends, is high in other measurements, such as intelligence and scholastic achievements. Chapter IV gives attention to this phase of the study.

CHAPTER III

A STUDY OF INTELLECTUAL GROWTH DURING THE FIRST FOUR GRADES OF THE ELEMENTARY SCHOOL

The purpose of this investigation is to discover whether a child is consistently high or consistently low in his intellectual growth, or whether he has a tendency to be high in one grade and low in another. Attention will be given also to changes in the child's intelligence quotient, and the difference, if any, between grades.

In all, seventy-four children were studied. Fifty-one cases of first-grade children who remained in school through the second grade were included in the first phase of the investigation. These children were given the California Test of Mental Maturity in both the first and second grades in the month of March. In the second phase of the study, fifty-eight cases of second-grade children who remained in school through the third grade were analyzed. These children, while in the second grade, had been given the California Test of Mental Maturity, and were now given the Kuhlman-Anderson Tests in the third grade. The third

phase of the study dealt with fifty-two cases of third-grade children who remained in school through the fourth grade. They were given the Kuhlman-Anderson Tests in both the third and fourth grades. Thirty-three of the children studied attended the first, second, third, and fourth grades, and consecutive tests of these were obtained. Seventeen of the children attended three grades during the time the tests were conducted, and the remaining children were studied over a period of two years, some of them in the first and second grades and the others in the third and fourth grades.

The results of all of the intelligence tests in the four grades are given in Table 3. This table shows the intelligence score for each child over the period of study, the average intelligence score, the average differences, and the differences in the intelligence quotients between the years, together with the differences between the children's intelligence quotients in the first grade in the beginning of the study and later in the fourth grade. The data for all of the grades are presented in this one table, but the discussion takes up the variations between the grades separately.

Variations of the Intelligence Quotients between the First and Second Grades

In the first grade, the children's intelligence quotients ranged from 152 to seventy-one, while in the second

TABLE 3

THE CONSECUTIVE INTELLIGENCE QUOTIENTS OF A GROUP OF CHILDREN IN THE FIRST, SECOND, THIRD, AND FOURTH GRADES, RESPECTIVELY, AS DETERMINED BY THE CALIFORNIA TEST OF MENTAL MATURITY AND THE KUHLMAN-ANDERSON TESTS

California Test of Mental Maturity		Kuhlman-Anderson Tests		Averages	Difference between Years			Average Differences	Differences between Years 1 ∕ 4
Grades					1∕2	2∕3	3∕4		
1st.	2d.	3d.	4th.						
140	118	111	114	121	-22	- 7	∕ 3	8	-26
123	112	119	129	121	-11	∕ 7	∕10	7	∕ 6
104	118	110	114	112	∕14	- 8	∕ 4	6.5	∕10
106	95	106	107	104	-11	∕11	∕ 1	5.75	∕ 1
..	82	89	94	88	..	∕ 7	∕ 5	4	..
..	..	92	90	91	..	..	∕ 2	1	..
86	86	88	87	87	0	∕ 2	- 1	.75	∕ 1
96	93	95	98	96	- 3	∕ 2	∕ 3	2	∕ 2
120	109	103	..	111	-11	- 6	..	5.66	..
103	93	108	..	101	-10	∕13	..	7.66	..
152	144	128	132	139	- 8	-16	∕ 4	7	-20
123	137	119	133	128	∕ 4	-18	∕14	9	∕10
..	..	112	113	..	..	..	∕ 2	1	..
132	140	113	..	128	∕ 8	-27	..	11.66	..
107	90	108	102	102	-17	∕18	- 6	10.25	- 5
113	129	112	107	115	∕16	-17	- 5	9.5	- 6
..	..	98	99	..	..	..	∕ 1	.5	..
117	105	108	124	114	-12	∕ 3	∕16	7.75	∕7
..	90	91	..	91	..	∕ 1	..	.5	..
124	114	116	114	117	-10	∕ 2	- 2	3.5	-10
118	103	108	114	111	- 5	∕ 5	∕ 6	4	- 4
..	87	107	..	97	..	∕20	..	10	..
..	134	119	127	127	..	-15	∕ 8	7.66	..
..	..	120	123	122	..	..	∕ 3	1.5	..
..	..	109	104	107	..	..	- 5	2.5	..
111	106	110	114	110	- 5	∕ 4	∕ 4	3.25	∕ 3
79	94	94	..	89	∕15	0	..	5	..

TABLE 3 -- Continued

California Test of Mental Maturity		Kuhlman-Anderson Tests		Averages	Difference between Years			Average Differences	Differences between Years 1 ≠ 4
Grades									
1st.	2d.	3d.	4th.		1≠2	2≠3	3≠4		
..	99	108	122	110	≠ 9	≠14	..	7.66	..
84	78	96	80	85	- 6	≠18	-16	10	- 4
..	..	91	96	94	..	..	≠ 5	2.5	..
..	..	104	106	105	..	..	≠ 2	1	..
..	75	90	..	83	..	≠15	..	7.5	..
93	115	95	..	101	≠22	-20	..	14	..
..	95	112	..	104	≠17	..	..	8.5	..
117	113	109	119	115	- 4	- 4	≠10	4.5	≠ 2
115	116	113	122	117	≠ 1	- 3	≠ 9	3.25	≠ 7
..	110	118	114	114	..	≠ 8	- 4	4	..
105	98	104	102	102	- 7	≠ 6	- 2	3.75	..
100	110	110	..	107	≠10	..	..	3.33	..
..	..	101	104	103	..	..	≠ 3	1.5	..
101	101	97	..	100	0	- 4	..	1.33	..
86	88	89	..	88	≠ 2	≠ 1	..	1	..
..	..	105	99	102	..	..	- 6	3	..
108	107	112	..	109	- 1	≠ 5	..	2	..
107	101	107	115	108	- 6	≠ 6	≠ 8	5	≠ 8
95	92	103	113	101	- 3	≠11	≠10	6	≠18
119	117	113	109	115	- 2	- 4	- 4	2.5	-10
..	95	99	..	97	..	≠ 4	..	2	..
..	..	83	70	77	..	..	-13	6.5	..
123	117	103	117	115	- 6	-14	≠14	8.5	- 6
113	114	113	..	113	≠ 1	- 1	..	.66	..
..	..	114	116	115	..	..	≠ 2	1	..
86	84	..	..	85	- 2	..	..	1	..
71	61	69	..	67	-10	≠ 8	..	6	..
117	123	117	118	119	≠ 6	- 6	≠ 1	3.25	≠ 1
117	123	123	126	122	≠ 6	0	≠ 3	2.25	≠ 9
92	84	..	100	92	..	..	..	..	..
101	90	87	105	96	-11	- 3	≠18	8	≠ 4
85	72	..	..	79	-13	..	..	6.5	..
101	101	107	108	104	0	≠ 6	≠ 1	1.25	≠ 7
..	113	115	112	113	..	≠ 2	- 3	1.66	..
111	110	115	..	112	- 1	≠ 5	..	2	..

TABLE 3 -- Continued

California Test of Mental Maturity		Kuhlman-Anderson Tests		Averages	Difference between Years			Average Differences	Differences between Years 1 ≠ 4
Grades					1≠2	2≠3	3≠4		
1st.	2d.	3d.	4th.						
92	90	107	103	98	- 2	≠17	- 4	5.75	≠11
..	112	108	..	110	- 4	..	..	2	..
99	103	106	114	106	≠ 4	≠ 3	≠ 8	3.75	≠15
117	103	124	119	116	-14	≠21	- 5	10	≠ 2
132	111	122	116	120	-21	≠11	- 6	9.5	-16
88	88	..	..	88	0	..	..	0	..
102	90	..	..	96	-12	..	..	6	..
105	106	..	..	106	≠ 1	..	..	.5	..
105	94	..	..	100	≠11	..	..	5.5	..
109	108	104	97	105	- 1	- 4	- 7	3	-12
83	91	89	90	88	≠ 8	- 2	≠ 1	2.75	≠ 7
..	86	92	96	91	..	≠ 6	≠ 4	3.33	..
..	..	94	85	90	..	..	- 9	4.5	..
..	95	95	98	96	..	0	≠ 3	1	..
107	109	109	116	110	≠ 2	0	≠ 7	2.25	≠ 9

grade the intelligence-quotient range was from 144 to sixty-one. Four cases remained entirely constant. Thirty-one cases between grades one and two were minus; that is, the intelligence quotient was lower in the second grade than in the first. Sixteen cases between grades one and two were plus. The total number of minus points was 258, while the total number of plus points was 120. The average minus

change was 8.32; the average plus change, 7.5. The total average change was 7.91, while the total median change was 6.0. These results, on the whole, are in line with the general findings on the constancy of the intelligence quotient.

The first-grade scores had a strong tendency to be higher than the second-grade scores.

Variations of the Intelligence Quotients between the Second and Third Grades

Fifty-eight cases of second-grade children were available for testing in the third grade. They were given two tests: the California Test of Mental Maturity in the second grade and the Kuhlman-Anderson Tests in the third grade.

In the second grade, as shown in Table 3, the children's intelligence quotients ranged from 144 to sixty-one. In the third grade the range was from 128 to sixty-nine. Five cases remained entirely constant. Twenty were minus, and thirty-three were plus. The total number of minus points was 183; the total number of plus points, 274. The average minus change was 9.15; the average plus change, 8.3. The total average change was 8.72, while the total median change was 6.0.

These findings show that the tendency between the second and third grades was for the intelligence quotient to lower. The amount of change between the two grades

is a little higher than that reported in most of the studies referred to in the second chapter of this thesis.

Variations of the Intelligence Quotients between the Third and Fourth Grades

Fifty-two cases of third-grade children, who remained in school through the fourth grade, were available for testing. They were given the Kuhlman-Anderson Tests in both the third and fourth grades.

In the third grade, the children's intelligence quotients ranged from 128 to sixty-nine, while the range in the fourth grade was from 133 to seventy. No case remained entirely constant. Eighteen were minus; thirty-four, plus. The total number of minus points was one hundred, while the total number of plus points was 207. The average minus change was 5.55; the average plus change, 6.08. The total average change was 5.81, while the total median change was 4.5.

Unlike the tendency between the second and third grades, the tendency between the third and fourth grades was for the intelligence quotients to rise. It will be noted that the amount of change between the third and fourth grades was less than between the first two grades. This may be due to the fact that the children in grades one and two were given the California Test of Mental Maturity and those in the third and fourth grades, the Kuhlman-Anderson

Tests. Since these tests are not the same, there might be a question as to whether the two different tests adequately measure the same qualities in each group. It could be possible that one test is a little easier than the other.

Variations of the Intelligence Quotients between the First and Fourth Grades

Thirty-three cases who remained in school the entire four years from the first grade through the fourth grade were studied. Their intelligence quotients ranged from 139 to eighty-five. Twelve cases were minus; twenty-one were plus. The total number of minus points was 122, while the total number of plus points was 140. The average minus change was 10.16; the average plus change was 6.56. The total average change was 8.41, and the total median change was 7.5.

The data show that over the four-year period the prevailing tendency was for the intelligence quotients to fall. This may be due to the California test's giving too high intelligence quotients in the beginning. Other investigators have reported that the California Test of Mental Maturity is too easy. The results of these tests are in line with those of other studies reviewed in the previous chapter, which show that the intelligence quotients do not change more than seven points, on the average. Hence, it

may be concluded that if intelligence-quotient tests are well administered in the first grade, one can assume that a fair approximation of the child's ability to learn through the elementary school may be gained by testing. Furthermore, the data indicate that if a child is high in his intelligence-quotient rating, he, under normal conditions, will remain consistently high in succeeding tests.

Correlation Coefficients between Intelligence Quotients of Successive Grade Levels

Another source of data on the constancy of the intelligence test scores is available in correlations, which were run between intelligence quotients in successive years. Using forty-eight cases, the writer obtained a correlation of $\neq.76 \pm.04$ between scores for the second and third grades when all three schools were combined. Between the third and fourth grades in the Robert E. Lee School a correlation of $\neq.78 \pm.07$ was found. For the relationship between the third and fourth grades in the Teachers College Demonstration School, the obtained r was $\neq.87 \pm.04$, while in the Sam Houston School the r was $\neq.71 \pm.08$. All of these correlations are sufficiently high to warrant the conclusion that the intelligence quotients showed a considerable degree of constancy over the years studied.

CHAPTER IV

A COMPARISON OF SPECIFIC GROWTH AND GENERAL GROWTH

The purpose of these data is to answer the following questions: (1) Are the children who are high in one measurement high in all measurements, as a general rule? (2) Is the child who is high in mutual friendships also high in teacher rating? (3) If he is high in intelligence-quotient rating, is he also high in scholastic achievement? (4) Are those pupils who are highest in social status also highest in intelligence and other measures? (5) Does popularity have any relation to intelligence? (6) Are the children who are best liked by their playmates also best liked by their teachers?

The investigation herein reported is based upon the records of fifty-eight third-grade children in the Robert E. Lee School, the Sam Houston School, and the Teachers College Demonstration School, Denton, Texas. These children were studied on the basis of social growth by pupil choices, social attainment by teacher rating, intellectual growth, and academic achievement. Table 4 presents the findings on all four of these tests, but each phase will be discussed separately.

TABLE 4

THE DECILE SCORE OF EACH CHILD IN SOCIAL GROWTH BY PUPIL CHOICES, SOCIAL ATTAINMENT BY TEACHER RATING, INTELLECTUAL GROWTH, ACADEMIC ACHIEVEMENT, TOTAL DECILE RATING, AND DECILE VARIATION FROM SOCIAL GROWTH

Social Growth by Pupil Choices	Social Attainment by Teacher Rating	Intellectual Growth	Academic Achievement	Total Decile Rating	Decile Variation from Social Growth
10	10	10	8	38	2
9	8	10	7	34	4
2	1	8	7	18	12
8.5	4	6	4	22.5	11.5
6.5	1	3	4	14.5	11.5
1.5	1	4	1	7.5	3.5
6	4	3	8	21	7
2	1	5	6	14	8
5.5	5	8	4	22.5	4.5
6.5	6	10	7	29.5	4.5
8.5	7	10	10	35.5	4.5
2	1	6	6	15	9
10	10	8	9	37	3
1	2	5	4	12	8
3.5	3	8	3	17.5	5.5
3	4	4	2	13	3
6	6	9	10	31	7
6	3	8	8	25	7
4	2	5	2	13	5
6	6	10	9	31	7
5	10	10	10	35	15
4	2	8	1	15	9
5	5	9	7	26	6
7.5	7	10	9	33.5	4.5
8.5	5	5	2	20.5	13.5
7	9	6	6	28	4
8.5	10	8	10	36.5	3.5
4	3	8	5	20	6
7	7	5	4	23	5
5.5	9	7	9	30.5	8.5
9.5	4	7	5	25.5	12.5
9	6	9	7	31	5
9.5	8	9	10	36.5	2.5

TABLE 4 -- Continued

Social Growth by Pupil Choices	Social Attainment by Teacher Rating	Intellectual Growth	Academic Achievement	Total Decile Rating	Decile Variation from Social Growth
3	3	6	3	15	3
2	5	3	4	14	6
6.5	3	4	1	14.5	11.5
4.5	4	5	1	14.5	4.5
4	8	7	8	27	11
8	3	7	6	24	8
9.5	7	7	8	31.5	6.5
4.5	2	4	3	13.5	4.5
4.5	5	6	3	18.5	3.5
8.5	6	8	8	30.5	3.5
7	4	9	9	28	6
5	4	8	4	21	5
9.5	8	6	6	29.5	8.5
6.5	2	7	4	19.5	7.5
3.5	6	6	7	22.5	8.5
3	1	5	5	14	6
7.5	2	7	6	22.5	7.5
8.5	10	8	9	35.5	2.5
5	6	7	4	22	4
3.5	3	6	7	19.5	6.5
7.5	8	8	8	31.5	1.5
10	7	5	9	31	9
7	3	1	3	14	14
4	6	8	6	24	8
8	6	8	9	31	3

The children were given ten normal, life-like, choosing situations during the year, involving mutual friendships such as having their pictures taken together, the giving of Christmas presents and Valentines, selecting a seating companion, choosing partners for social events, and the choice of a playmate to go home with after school.

They were scored on the basis of the following scale: one equals five, two equals four, three equals three, four equals two, five and above equals one. Every time a child was chosen first by one of his classmates he received a score of five. If chosen second, he received four points, and so on in descending order. All children chosen in fifth place or farther down the scale were given the score of one. Thus the children who were chosen first most often received high scores, and the ones who were chosen from fifth place on down the line received low scores.

The scores of the fifty-eight children on social growth by pupil choices were listed from the highest down to the lowest and were arranged into deciles with ten as the highest position and one as the lowest. The first column in Table 4 presents these data.

The second column in Table 4 presents the data on the social attainment of the children through teacher rating. In this investigation each child was rated by his teacher on the following personality traits: accuracy, adaptability, alertness, calmness, cheerfulness, considerateness, courage, energy, independence, neatness, obedience, originality, persistence, promptness, sincerity, stability, sociability, tact, thrift, and versatility.

The scoring of the teacher-rating scale was as follows: If a child was only average in accuracy, he was given a

rating of 0. If he was better than average but not outstanding, he received a rating of +1. If he was one of the most accurate pupils and quite commendable for his accuracy, he was given a +2 rating. If the child was below average, but not dangerously low, he received a -1 rating. If he was very low and dangerously lacking in a quality, he received a rating of -2. A child's total personality score was the algebraic sum of these evaluations. From these scores his social attainment, according to the teacher rating, was secured.

In measuring the intellectual growth of the children, the writer employed their intelligence tests. A scale was set up for evaluating these tests, and again decile points were used. For example, a child ranging in his intelligence quotient from 121 to 125 was given a decile rank of ten; one ranging eighty or below was given a decile rank of one. The rating scale is shown in Table 5.

The children were given the Stanford Achievement Test, and the scores were listed from the highest to the lowest and arranged in deciles ranging from ten to one. These scores are presented in the fourth column of Table 4.

A child's total decile score was obtained by finding the sum of these four scores: (1) social growth by pupil choices, (2) social attainment by teacher rating, (3) intellectual growth, and (4) academic achievement.

TABLE 5

DECILE RANK OF INTELLIGENCE-QUOTIENT RANGES

I. Q.	Decile Rank
121-125	10
116-120	9
111-115	8
106-110	7
101-105	6
96-100	5
91- 85	4
86- 90	3
81- 85	2
80 or below	1

In order to find the variability between these different scores, the social growth score decided through pupil choices was set up as a standard of reference. The difference between this score and each of the other scores was totaled, and the result was the variability score. For example, if the social growth score, the unit of measurement, was six, and the other scores were three, eight, and eight, respectively, the variability score would be seven. There was a difference of three points between the social attainment score and the measuring unit, a difference of two points between the intellectual growth score and the measuring unit, and the same between the academic achievement score and that of the measuring unit. The differences totaled seven points.

Table 6 shows the method used in determining comparisons of the amount of variability in the children's

TABLE 6

TOTAL DECILE SCORES AND THE DECILE VARIABILITY SCORES OF EACH CHILD IN EACH ONE FOURTH*

Total Decile Scores	Decile Variations from Social Growth	Total Decile Scores	Decile Variations from Social Growth
38	2	22.5	11.5
37	3	22.5	7.5
36.5	2.5	22.5	4.5
36.5	3.5	22.5	8.5
35.5	4.5	22	4
35.5	2.5	21	7
35	15	21	5
34	4	20.5	13.5
33.5	4.5	20	6
31.5	6.5	19.5	7.5
31.5	1.5	19.5	6.5
31	9	18.5	3.5
31	5	18	12
31	3	17.5	5.5
31	7	15	9
31	7	15	3
30.5	3.5	15	9
30.5	8.5	14.5	11.5
29.5	8.5	14.5	4.5
29.5	4.5	14.5	11.5
28	6	14	14
28	4	14	8
27	11	14	6
26	6	14	6
25.5	12.5	13.5	4.5
25	7	13	5
24	8	13	3
24	8	12	8
23	5	7.5	3.5

*This table is, in reality, a two-column table; but it was set up in this form with the permission of the chairman of the Graduate Council.

scores. The total decile scores were listed from the highest to the lowest and arranged into quarters with fifteen cases in the extreme quarters (fourth and first) and fourteen cases each in quarters two and three. Quarter four presents the highest decile scores; quarter one, the lowest. By arranging the cases into quarters it was possible to compare the children in the upper quarter with those in the lower quarter and from this comparison to determine the amount of variability in their scores. By this method one could see whether the children with the highest total decile scores had the least amount of variability. The following table shows the comparison of the quarters in respect to central tendency and variability.

TABLE 7

CENTRAL TENDENCY AND VARIABILITY OF EACH ONE FOURTH

Quarters	Score Range	Score Average	Score Median	Decile Variation Average	Decile Variation Median
Fourth..	38-31	33.9	34	4.9	4
Third...	31-23	27.2	27.5	7.1	7
Second..	22.5-17.5	20.5	20.75	7.3	6.75
First...	15-7.5	13.5	14	7.1	6

An analysis of the data presented in Table 7 shows that the children in quarter four with a range of seven points had the highest total decile score and the lowest

amount of variability. The average decile score was 33.9, slightly less than the median, thirty-four. The total decile variation score was 4.9, the median, four. These data indicate that the children in quarter four were uniformly high in all of their measurements. Out of the highest possible decile score, forty, the median score was thirty-four. The average variation score of 4.9 and the average mean score of four show that these children varied less than the average children in other measurements reviewed in Chapter II.

Quarter three, with a range of eight points, had the widest range of any group of the children studied. The total decile score average was 27.2; the median, 27.5. These were considered below the possible forty decile score that it was possible for the children to make. The average decile variation score was 7.1, while the median was seven. This was a higher variation than that shown in quarter four. It should be understood that this means that the upper fourth was, on an average, approximately three deciles more homogeneous in total growth than was the third quarter.

The total decile score range in quarter two was five points, the least range of any of the quarters. The total decile score average was 20.5, while the median was 20.75; this was a low score. The decile variation score average

was 7.3, and the variation median score was 6.75. This group does not differ significantly from the third quarter in so far as variability is concerned.

Quarter one, with a range of 7.5 points in decile scores, had a very low total decile average score of 13.5; the median was fourteen. The average decile variability score was 7.1, while the median was six. In comparing the data presented in the upper quarter with those of the three lower quarters, one reaches the following conclusions: The decile variation scores show that the variation increases in the three lower quarters over the upper one, but that there are no important differences between the three lower groups. There is not a great deal of difference in the range of their scores, but there is a steady decrease in the average of their scores. In the upper quarter, the total decile score average is 6.7 more than that for quarter three. Quarter three is 6.7 more in its decile score average than quarter two, and quarter one is still seven points lower than the preceding quarter. Between quarter four and quarter one, there is a difference of 20.4 points in the average decile scores. This shows how great is the superiority of the more capable pupils over the weaker ones.

In order to make still another comparison of the children's growth, the writer compiled Table 8. In this table the child's total social status score, based upon the

TABLE 8

TOTAL SOCIAL STATUS PER CENT SCORES, TOTAL DECILE SCORES, AND DECILE VARIABILITY SCORES ARRANGED INTO QUARTERS TO SHOW RELATIONSHIP BETWEEN SOCIAL STATUS AND OTHER MEASURES

Total Social Status Per Cent Scores	Total Decile Scores	Decile Variability Scores	Total Social Status Per Cent Scores	Total Decile Scores	Decile Variability Scores
.1335	37	3	.0385	26	6
.1251	38	2	.0375	29.5	4.5
.101	25.5	12.5	.0365	31	7
.099	31	9	.036	35	15
.0961	35.5	4.5	.0359	37	11
.0889	34	4	.0357	22.5	4.5
.074	36.5	2.5	.0329	20	6
.0693	35.5	2.5	.0316	19.5	7.5
.0607	17.5	5.5	.0302	14.5	11.5
.0601	22.5	11.5	.0297	21	5
.0594	29.5	8.5	.0297	22	4
.0574	31.5	6.5	.029	13	5
.0554	22.5	7.5	.0286	30.5	8.5
.0548	23	5	.026	18	12
.0547	36.5	3.5			
			.0257	14	14
.0546	20.5	13.5	.0237	14	8
.0514	30.5	3.5	.0237	22.5	8.5
.051	25	7	.0217	19.5	6.5
.0495	31.5	1.5	.021	13	3
.0487	31	5	.0204	15	9
.0471	33.5	4.5	.0198	24	8
.0455	31	3	.0198	18.5	3.5
.0453	14.5	11.5	.0188	15	3
.0435	24	8	.0163	14	6
.0435	28	6	.0158	13.5	4.5
.0417	28	4	.0146	15	9
.0407	31	7	.0138	14	6
.0397	21	7	.0132	12	8
.0391	14.5	4.5	.0096	7.5	3.5

number of times he was chosen in ten choosing situations by his classmates, was converted into per cents and arranged into quarters with the corresponding total decile scores and the decile variation scores. There were fifteen cases each in the extreme quarters, four and one, and there were fourteen cases each in quarters two and three. Four was the highest quarter; one, the lowest.

The quarter arrangement of these scores makes it possible to compare the children in the upper quarter with the children in the lower quarters in order to determine whether children who ranked highest in social status also ranked highest in teacher rating, intellectual growth, and academic achievement. In the following table a comparison is made of social status quarters in respect to the total decile and decile variability scores as worked out in Table 8.

TABLE 9

THE DECILE SCORE RANGE, AVERAGE, MEDIAN, AND VARIATION SCORE AVERAGE, AND VARIATION SCORE MEDIAN OF EACH ONE FOURTH

Quarters	Decile Score Range	Decile Score Average	Decile Score Median	Decile Variation Score Average	Decile Variation Score Median
Fourth..	38-17.5	30.4	31.5	5.8	5
Third...	33.5-14.5	26	28	6.1	5.5
Second..	35-13	23.5	22.5	7.6	6.5
First...	24-7.5	15.4	14	6.7	6.5

The children in the upper quarter in total social status are higher than all the other measurements. The total decile score average for quarter four is 30.4; this is four points higher than quarter three; 6.9 points higher than quarter two; and fifteen points -- almost twice as much -- higher than quarter one. The upper quarter, too, has less variation than the other quarters, the median score being five, while that of the other ranges from 5.5 to 6.5 points. Once again the children rating high in one measurement rate high in all others. There is an evident tendency for the socially popular pupils to be superior in both intellectual and academic attainment and also in teacher rating.

Popularity, according to these data, is evidently related to intelligence and other desirable traits. The children who are well-adjusted socially are more intelligent, achieve more academically, and get along better with their teachers. The children who made the highest scores were consistently high in all of their desirable traits. There was marked stability and less variation between their deciles.

CHAPTER V

SUMMARY, FINDINGS, AND CONCLUSIONS

The purpose of this study was to analyze some data gathered over a period of successive years regarding the constancy of children's intelligence quotients and the relationship of intellectual growth to other phases of growth, including academic achievement, social status, and teacher rating.

In the studies regarding the constancy of intellectual growth, seventy-seven children were studied over a period of four years in school: first, second, third, and fourth grades. All of the children studied were in one or the other of these grades for at least two years; thirty-three of the children studied attended the first, second, and third and fourth grades; seventeen attended three grades; and the remaining twenty-seven attended two grades. The children were given the California Test of Mental Maturity in the first and second grades, and the Kuhlman-Anderson Tests in the third and fourth grades. The results were tabulated and the average intelligence quotient worked out for each pupil. The differences in

intellectual growth between the years were then figured and averaged. Finally, the difference in intellectual growth of the children between grades one and four was computed. These conclusions were reached for this phase of the study:

1. The total median change in intellectual growth between the children in the first and second grades was 7.91; the total median change between the second and third grades was six; the total median change between the third and fourth grades was 4.5; and the total median change between the first and fourth grades was 7.5. These findings are in line with results derived from other studies reviewed in Chapter II.

2. The change in intellectual growth was greater between the first and second grades than it was between the second and third grades and the third and fourth grades.

3. Over the four-year period, the tendency was for the intellectual growth to lower instead of rise.

4. The correlation coefficient between the intelligence quotients of successive grade levels was sufficiently high to warrant the conclusion that the intelligence quotients showed a considerable degree of constancy over the years studied.

The second phase of the study considered the relationship of intellectual growth to other phases of child

development: social status in the opinion of friends and classmates; teacher rating; and academic achievement. This question was asked: Are the children who are high in one measurement generally high in all measurements? In other words, is growth usually specific or general?

In this study, records of fifty-eight third-grade children in the Robert E. Lee School, the Sam Houston School, and the Teachers College Demonstration School of Denton, Texas, were used. These children were studied on the basis of social growth by pupil choices, social attainment by teacher rating, intellectual growth, and academic achievement. The scores of the fifty-eight children on these different phases of growth were listed from the highest to the lowest and were arranged into deciles with ten as the highest position and one as the lowest. These scores were then divided into quarters; the highest scores being placed in the upper quarter and the lowest scores in the lowest quarter. This arrangement permitted a comparison between the scores of the upper and lower groups as well as those of the "in-betweens." An analysis of these scores revealed the following conclusions:

1. The children who had the highest decile scores had the lowest amount of variability in the different phases of growth.

2. The children in the third quarter had the greatest

amount of variability, while the children in the second and first quarters had almost the same amount: 6.75 and 6.0, respectively.

These data show that the children who were high in one measurement were generally high in all measurements and that those low in one were generally low.

Another comparison of different phases of children's growth was made with the child's social status and his scores in the other measurements: intellectual growth, teacher rating, and academic achievement. For this purpose, the social status decile scores were converted into percentages and compared with the total decile scores, and with the mean and median of these scores. The same quarter arrangement was followed as in that previously described in the comparison of variation between measurements. The following conclusions were reached:

1. The children in the upper quarter in total social status were highest in all other measurements, and there was less variation between scores.

2. The children in the lower quarters, two and one, showed more variation than those in the upper quarters.

3. The children in the lower two quarters showed the same amount of variation.

4. Popularity is evidently related to intelligence and to other desirable traits. The pupils who were liked

best by their playmates and friends rated higher in intellectual and other phases of growth than those whose social status was not so favorable.

5. Growth of children in social status, teacher rating, intellectual rating, and academic achievement is usually general and not specific.

The general conclusions to the study may be summarized as follows: Intellectual growth of children has a tendency to be constant and to lower instead of to rise in the primary years. A child who is high in one measurement is consistently high in all other measurements; and the child who is high in social status rating is also high in other measurements. In other words, growth is general instead of specific. Parents and teachers, supplied with these data taken over a period of years, should be better able to aid the children in their school work and in their plans for the future.

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