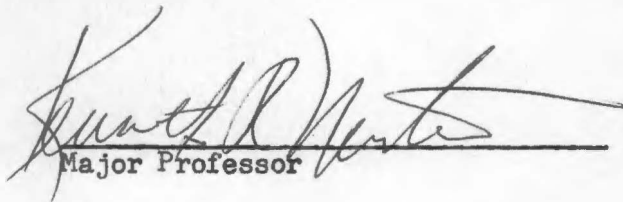


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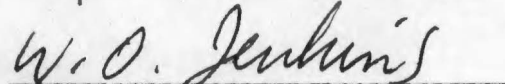
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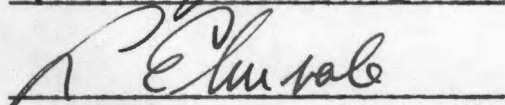
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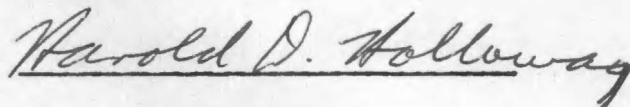

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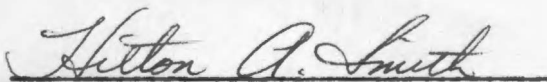








Accepted for the Council:


Dean of the Graduate School

AN INVESTIGATION OF THE EFFECTIVENESS OF EDUCATIONAL PLACEMENT
OF MENTALLY RETARDED CHILDREN IN A SPECIAL CLASS

A Dissertation
Presented to
the Graduate Council of
The University of Tennessee

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by
Kenneth Warren

June 1962

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CHAPTER I

INTRODUCTION

The number of Special Education classes for the educable mentally retarded has increased tremendously during the past several years. Implicit within this expansion is the assumption that for the educable mentally retarded such placement offers an environment superior to any other type of placement. In this environment the child is expected to gain greater benefits academically, socially, and perhaps even emotionally. There is some evidence to support this belief, but there have been few studies investigating the differences that result from placing a child in a special class rather than retaining him in a regular class.

The present attempt to offer schooling to all the children of all the people to the full extent of their potential is indeed a far cry from the conditions that existed in this country during parts of the previous century. It has been only approximately one hundred years since the first compulsory school attendance law in the United States was enacted by the Massachusetts legislature requiring children between the ages of eight and fourteen to attend school for not less than twelve weeks each year. Eventually all the states enacted compulsory attendance laws, but many "exceptional" children were excluded from the laws up until the time of World War II. Among the various handicapped children, the mentally handicapped were the last to be accepted into the schools (Bowers, 1954). Presently, all the states have enacted legislation dealing with special education and almost all have provided financial reimbursement for such placement (Erickson, 1958).

The increasing number of classes and the increasing number of children in such classes are naturally increasing the overall cost of the educational program. Thus it is important that we have a more thorough understanding of these classes, the children that are in them, and the results of placement within these classes. An over-view of the work that has been done in this area will be given before proceeding with the current study and its findings.

Related Literature

The mentally deficient now are not so likely to be treated as outcasts as was once the case. Cruickshank and Johnson (1958) have adequately traced the social changes that have occurred from the time that the retarded were outcasts until the present when there is a more definite attempt to help them. These changes occurred slowly and were the result of unceasing efforts to gain a better position in life for the less capable persons. Several writers, for example Stevens (1954) and Lynch and Scharf (1958), cite Itard's attempt to train the "Wild Boy of Aveyron" as a definite beginning for the field of special education. Although Itard felt that he was a failure, his interest in this exceptional child generated wide interest in other special children, and by 1842 Seguin had persuaded the authorities to establish the first school for the mentally retarded in Paris.

In the United States, New York is credited with establishing an institutional school in 1851 and erecting the first special building in 1855. The establishment of the Vineland Training School by Henry Goddard

in 1906 was another significant event. The work of Elizabeth Farrell which included the establishment of an "experimental center" for training defectives in 1900, and her help in organizing the International Council for the Education of Exceptional Children in 1922 was also important (Lynch & Scharf, 1957). One name that has remained prominent in the special education field for at least a half century is J. E. W. Wallin who often protests that special programs have existed for a much longer period than most persons realize, but who also insists that the program still needs expanding (Wallin, 1954).

The index of almost any educational journal clearly indicates that many articles are currently being written on the subject of mental retardation. However, it was not until 1941 that the Review of Educational Research saw fit to combine material into one chapter entitled "The Mentally Handicapped" which reviewed the progress of the previous five years (Cutts, 1941). Later articles in this same journal have offered periodical reviews of research and advancement (Hockett, 1944; Kirk & Kolstoe, 1953; Dunn & Capobianco, 1959). Each of these reviews noted the ever increasing literature in the field, but each also emphasized the importance of continuing research and the need for more carefully designed studies. Stevens (1954) reviewed the advancements in this area, especially those of a medical nature, those of a psychological nature, and those related to dealing with the parents of retarded children. Two reports ten years apart dealt with the learning ability of the mentally deficient (McPherson, 1948, 1958). Harrison (1958) dealt primarily with speech and language problems of the retarded child

in his review of eighteen articles. These few reviews clearly indicate the rapid expansion of facilities for the retarded and the resultant increase in the number of related studies.

A survey was recently made of all cities having a population of 100,000 or more. Questionnaires were returned from 98 of the 106 cities in the category and the number of children enrolled in the schools of these cities represents nearly one-fourth of the entire school population of the nation. Nearly all had special aid of some type, but nearly half (forty-eight of the ninety-eight) required the child to have an IQ of 50 or more to receive aid. While most of the schools accepted children as soon as they were school age, i.e., six years old, at least four of the systems would not accept a child who was less than nine years old. On the other hand, twenty-five systems admitted children even before they were six years old (Wallace, 1960). Even with this many classes available, a study a few years earlier indicated that only about one child in five who needed special services was in a specially adapted class (Hill, 1956).

The cost for such an expansive program is, of course, great; but Kidd (1958) reports that the cost of institutional care would be even greater. Also he notes that many of those at the upper end of the retarded range can be properly trained to be satisfactorily employed and, therefore, economically useful citizens. However, he further cautions that such a program should not be undertaken at the expense of the regular school. On the other hand, Hill (1956) warns against educators bogging down in "first things first", i.e., the care for the normal children.

A special committee reporting for the Forty-ninth Yearbook of the National Society for the Study of Education believed that both the normal child and the retarded child profit from the special placement. The handicapped child gets the individual attention that he needs without robbing the normal child of the attention that he deserves, and many teaching practices originally find favor in the special class and then generalize to the regular class. After reaffirming its belief that "all men are created equal" in that all have a right to an education to the limit of their capacity, the committee went on to expound a five point philosophy of special education. The first point emphasized that exceptional children are basically like other children, but cautioned that while recognizing this likeness the special needs must also be discovered. The need for individual instruction for the exceptional child was the second point. Thirdly, diagnostic services must be provided to help understand the child. The fourth point was related to the flexibility of class placement. As a final factor it was stressed that the current emphasis on special classes for the handicapped definitely does not preclude measures for prevention or correction (National Society for the Study of Education, 1950).

Boykin (1957) is one of those who views the "exceptional" as being much like the "normal". However, he then proceeds to list eight different categories of special children. Under the category of mentally deficient he says:

This group includes the following types of children: (1) those whose ability to think abstractly and to handle symbolic material is significantly below the level of most children of their age group

and whose ability to acquire social competency is severely impaired because of failure to develop mentally, (2) those whose mental development is retarded but whose potentialities will enable them to respond to special-education programs, (3) those who require carefully planned, modified, or readjusted programs because they cannot cope with the traditional school curriculum, . . . (p. 42).

Kelly and Stevens (1950) made almost this same statement, and it perhaps characterizes the mentally deficient child as he is viewed by most educators.

The retarded child in order to profit from such special placement must be capable of learning that which is presented to him. The general objective of all classes, both regular and special, is instruction in and acquisition of academic skills. However, this is by far the hardest part of school for the retarded. Other specific objectives which may be included are: (1) personal or emotional adjustment, (2) social adjustment, and (3) economic adjustment. "The mentally handicapped, like other children, should be educated so as to make the greatest use of their abilities to satisfy their own needs as well as the demands of the society in which they are living" (Cruikshank & Johnson, 1958, p. 192).

Stevens (1958) has expanded these objectives somewhat, stating his conclusions in terms of what the learner needs rather than in terms of what the teacher should teach. These are:

1. Learning to maintain a state of physical well-being.
2. Learning to live safely.
3. Learning to understand one's self.
4. Learning to get along with others.
5. Learning to communicate ideas.

6. Learning to use leisure time.
7. Learning to travel and move about.
8. Learning to earn a living.
9. Learning to be a homemaker.
10. Learning to enjoy life through the appreciation of art, dance,
and music.
11. Learning to adjust to the forces of nature.
12. Learning to manage one's money.

Flanagan (1954) states that "the exceptional child has a right to be educated so that he is capable and desirous of contributing to society when he leaves school" (p. 39). In order to do this she cautions that the program must be fitted to the child. That is, while there is enough of a daily routine to give the child a feeling of security, there must be at the same time enough flexibility to allow for special occasions. Goals are established after individual needs and abilities are appraised. Thus there is an attempt to work with the total child; or, as O'Brien (1954) summarized it, the primary concern is the wholesome development of the total personality of each child.

Meeting the needs of the retarded child is often complicated by his own failures. One writer (Stillings, 1959) put it this way:

The average classroom teacher administers to the needs of all her children. Many find the problem of the slow learner a difficult one. . . . Could it be that he has met failure before experiencing success, and therefore, he expects to meet failure again? (p. 26).

Or, again, Williams and Melcher (1953) noted:

Typically, the mentally handicapped, since he has been unsuccessful so frequently in all sorts of competitive situations, may show some of the stigmata of failure in his behavior (p. 12).

Thus the real problem of the mentally handicapped is the degree of protection he will need in order to exist successfully, both in the classroom and in society at large.

One method which affords some degree of protection to the retarded child is the ungraded primary plan. This plan recognizes individual differences by permitting each child to proceed at his own rate. Thus the retarded child is not forced to repeat any part of the school programming. Also the child is not frustrated by being part of a group that is progressing at a much faster rate than he. On the other hand, there are also certain disadvantages to such a system.

(a) Children feel the stigma of assignment to a slow group and parents resent it on their behalf; (b) many teachers are reluctant to accept assignment to a slow group and have had no specific preparation for dealing skillfully with children who have special learning problems (Loomis, 1959, p. 17).

Thus, it becomes apparent that the ungraded plan alone will not solve the problems of educating the retarded.

Any system or plan which singles out the retarded child is apt to encounter parental objections. In fact, parental complaints may often more than offset the values of a special program. Therefore, parental cooperation and understanding is essential. Sarason (1952) devotes several chapters to this problem, offering the major premise that parental cooperation is forthcoming only after they are given ample understanding of both the child and the program being developed for him. Williams and Melcher (1953) have pointed out that any delay in defining the problem will interfere with the work with the parents. Similarly, they feel that an attempt to force the parents to accept a rigidly defined, specific program can be detrimental.

Often, however, the school may feel that the child's needs are best met by leaving him with his age group and giving him a "social promotion" each year. In doing this, several points are usually cited in favor of the plan. Magnifico (1958b) states that the three most used arguments are that a good teacher should be capable of teaching everyone, a child does best with his own age group, and the child must learn to take his place in an adult society with its heterogeneous groups. He feels that none of these are valid and that the educator is merely taking the easy way out for himself in "socially promoting" the child. This is especially true because adjustment does not come automatically by remaining with the same-age group. In fact, as the other children progress at the regular rate the retarded child becomes increasingly different and is soon an outcast. Far from giving the child a chance to develop, Magnifico contends that "social promotion" soon forces the child into the role of the "village idiot." Holmes and Finley (1957) have also questioned the justification of social promotion from a purely statistical basis. Their study of more than 1,200 boys and girls in the seventh and eighth grades indicated that the desired homogeneity for chronological age is simply not obtained.

Certainly the term social promotion is a misnomer, for there is nothing social about this procedure. Age does not make up a social grouping, and it should not make up a societal grouping. Moreover, an outstanding anomaly in a procedure that is allegedly based on "democratic" methods is that ranking a child according to age is just as much a form of segregation as if he were classified according to his IQ, except that segregation by age has far less validity. Whatever the IQ's limitations, at least it is a factor that relates directly to the child's educability, whereas his chronological age has as little to do with his scholastic aptitude as the length of his nose (Magnifico, 1958a, p. 217).

Further, just how valid is the argument that the child must learn to live in an adult world with its heterogeneous groupings? Do not adults tend to seek out those persons with similar interests and ability? If adults seek out persons with similar interests and abilities why should children not do the same? Numerous studies have shown that children do separate themselves according to ability. Barbe (1954) found that nearly all children in grades four through seven tended to select friends who were near their own level intellectually. Only the retarded went outside their own range to select friends, but usually there was no attempt to reciprocate by the child from the higher intellectual group. A rather elaborate study by Johnson (1950) spread over twenty-five classes, five each from grades one through five, gave the children a chance to tell whom they liked and did not like, whom they liked to sit near and did not like to sit near, and with whom they liked to play and did not like to play. His findings were that the retarded were not as accepted as the average child and that the retarded child was more apt to be openly rejected. On a comparative basis the retarded child was eleven times as likely to be rejected as was the average child. The lower the intelligence of the retarded child, the less his acceptance. A similar study by Johnson and Kirk (1950) illustrated that the retarded child was segregated by the other children whether he was in a classroom in a "progressive school" where there was an attempt to get the children to accept everyone or whether he was in a classroom in a regular school. A more recent study by Miller (1956) using standard sociometric techniques continued to show the retarded child at the bottom of the list

both on the basis of popularity and as being wanted as a friend by other children.

Is intelligence this important to even the young child or are there other reasons for these rejections? Most reports indicate that personality factors are perhaps most important. Magnifico (1958a) notes that the slow learner finds himself lost as the material gets tougher. Soon he becomes confused and frustrated. This frustration may lead him to take out his aggression on the other children, and thus it is his behavior or misbehavior that eventually leads to his rejection. As he is rejected, he loses the pleasure that comes with having a certain status in the classroom. Bedoian (1954), however, contended that attempts to help the slow child become more popular in the regular classroom usually only succeeded in causing his popularity to suffer more. If this be the case, it is easy to see how pupils in the slower groups in regular classrooms could easily feel inferior and ostracized as reported by Luchins and Luchins (1948).

A preliminary study has shown that adults who were placed in special classes as children did not become victims of this vicious cycle and were much better prepared for life, educably, socially, and vocationally.

The social skills, even more than the vocational skills, cannot be taught to the mentally handicapped in the regular classes, because the needs of the average students differ so drastically from those of the handicapped students, especially in the formative years. They must be separated during childhood and adolescence in order that they may live together peaceably during adulthood (Magnifico, 1958a, p. 137).

This failure to adjust automatically to the regular classroom is best understood when it is realized that the intellectually retarded child is usually retarded in other areas as well. For example, his dexterity, rhythm, various motor skills, etc., are all below normal. Thus there is no compensation as so many would wish to believe (Howe, 1960). For these reasons Hill (1959) has endorsed the idea of placing the various special education programs under extremely broad classifications so as to offer such services as will best benefit each child.

There is no accurate estimate of the number of children available for these classes, since no real studies of the number of retarded children have been made. Ferguson (1957) cited estimates varying from as low as one per cent up to approximately four per cent of the population before reporting his own findings which indicated that 3.2 per cent of the children in a large metropolitan area were eligible for special class placement. In another large city survey it was established that nearly two of every three children in the special ungraded classes came from the lower socio-economic areas (Wallin, 1958). Noting that the increasing complexity of society is pushing more people into the retarded or "disabled" ranks, Masland, Sarason, and Gladwin (1958), reported that approximately 143,000 mentally subnormal children are born annually in the United States. Of the 4,200,000 children born annually, 3 per cent, or 126,000, will never reach the mental age of twelve years; 0.3 per cent, or 12,600, will never reach the mental age of seven years; and 0.1 per cent, or 4,200 will remain completely helpless imbeciles unable to care for their own needs. The first group is the one primarily considered for special class placement.

Most reports have indicated that more boys than girls are found in the ranks of the retarded. No exact figures have been reported for special classes, but the percentages are probably comparable to performance on standardized intelligence tests and admissions to institutions for the mentally deficient. Lewis (1945) reporting on the administration of the Kuhlmann-Anderson Test to over 9,000 children in grades four through eight in thirty-six states indicated that twice as many boys as girls achieved IQ's between 70 and 79, and three and one-half as many boys as girls achieved IQ's below 70. In New York State in 1951 considerably more males than females were listed as first admissions to the state institution. For those below five years of age the ratio was 142.4 boys to 100 girls. For ages five through nine the figures were 168.9 to 100, and for ages ten through fourteen there were 148.2 boys for each 100 girls (Malzberg, 1953).

It was stated earlier that the special class is presumed to provide a superior environment to that of the regular class.

"Environment" is undoubtedly a construct covering a wide range of factors. For years a bitter battle raged as to the relative importance of heredity versus environment. A recent review (McCandless, 1952) notes that the present view is one of an interaction of heredity and environment, indicating that the two are inseparable. However, nearly all social class research has shown that the lower socio-economic groups have lower IQ's. It is not possible to determine just how much a poor environment retards the progress of an infant or child. A number of studies or reports of extremely "poor" environments have shown that

extensive retardation results. Spitz (1945, 1946), reported a drop from above average intelligence to a retarded level of intellectual functioning for infants who failed to be stimulated by their environment. This effect on functioning eventually caused the infant to completely withdraw and to evidence little attempt to advance or to improve (Spitz & Wolf, 1946). These findings were consistent with Ribble's (1943, 1944) contentions that insufficiently stimulated infants either regress or even fail to develop at all. Levy (1947) noted that even during the first year of life it is possible to measure differences in the progress of an infant who fails to receive adequate guidance and a normal infant. Expanding on this concept of the effects of an inadequately stimulating environment, Gesell and Armatruda (1941) comment: "This is not to say that it produces mental deficiency; but it does produce symptomatic syndromes which are severe enough to make diagnoses difficult. . . ." (p. 81). However, there is some reason to believe that these effects may be offset if a better environment is encountered later but still during early childhood. Dennis and Najarian (1957) studied infants and children in a foundling home very similar to the ones in the previous studies. They found that whereas the infants scored significantly below average, the children in the age ranges from four and one-half to six years scored at the lower end of the average range. However, these older children seemed to be more retarded in speech than would be immediately evident from their test scores.

At least two investigators have reported the effects of the non-stimulating environment that once existed in the eastern Kentucky and

Tennessee mountains. Hirsh (1928), arguing for the importance of hereditary factors in mental retardation, found that children at the beginning school age were functioning near the lower end of the average range intellectually and that there was a gradual decrease in the tested IQ's of the children as they increased in age. In fact, the nearly 3,000 children in his study showed a mean IQ at the ages of five and six of 86.6 while the thirteen year olds showed a mean IQ of only 73.1. A similar study by Wheeler (1932) in two rural, mountainous counties of East Tennessee during the 1929-30 school year demonstrated almost identical findings. There was a constant decrease from an almost normal IQ of 95 for the six year old children to a definitely retarded IQ of 72 for the fifteen year old children. A follow-up report ten years later (Wheeler, 1942) noted several environmental changes such as better roads, school buses, industrial plants, larger consolidated schools, and better teacher preparedness. While there was still a decreasing IQ with an increase in age, the drop was not so severe. The average IQ at every age level showed a definite improvement during the ten year interval. The smallest gain was 6.5 IQ points at the sixteen year level, and the largest gain was 13.9 IQ points at the eleven year level. Most of the gains were around ten IQ points. These studies dealt with gross changes in the entire community. Changes also result from merely changing the school environment. Worbois (1942) reported on rural children from similar communities who attended one-room schools as compared to those attending consolidated schools. Over a period of one or two years those children in the consolidated group showed an increase in IQ as measured

by the Stanford-Binet. Those in the one-room school had at best a slight change or often a definite decrease. Therefore, it was found that a significant difference was apparent.

Many changes in IQ's were reported in the previous paragraphs; therefore, a legitimate question might concern the constancy of IQ, especially the IQ of a mentally retarded child. Collmann and Newlyn (1958) reporting on 182 children who were retested within one year said: ". . . using the Terman-Merrill (Form L) Revision of the Binet Scale for groups of retarded children and keeping the examiner constant, there is a high degree of agreement between test and retest after a year's interval" (p. 308). Such changes as were found were exceedingly small. Extreme changes were a nine-point rise by two children and a six-point decrease by five children. Bradway (1944) managed to retest a number of normal children after a ten year lapse and found a remarkable consistency over this period.

All studies of special classes for the retarded seem to lead back to the same kinds of questions. What are the purposes of these special classes? What gains should the students make? How are the students to be found? When should the children be placed in the special classes? And many more questions that are still not only unanswered, but some important questions that have undoubtedly remained unasked.

A real problem often encountered is the discovery of students for the special class. Jolles (1955) has suggested several factors that point to a child's probably belonging in a special class. First, these children usually fail the first grade once or possibly even twice;

second, they rarely get an A or even a B; third, they fail to show much special ability; and fourth, they are not listed as being alert or creative. He notes, however, that the individual teacher's evaluation of the child is a poor method for selecting students for special placement since so many teachers do not know the real meaning of special education and tend to refer misfits, single subject failures, etc. Group testing will catch nearly all the eligible children; but poor interpretations, inappropriate test populations, and inadequate administration too often negate the results. Individual testing is by far the best selective device but is exceedingly expensive. Also, individual testing will miss the children who are not adequately screened and referred for such an evaluation.

Slutzky, Justman, and Wrightstone (1953) complained that psychologists spend too much time on routine psychometric tests. They found that with children between the ages of eight and ten years five items from the Stanford-Binet, Form L, were sufficient to get a good view of the child's functioning. These items were: six year level item 3; seven year level items 3 and 5; and eight year level items 1 and 6. If the child failed to pass at least three of the five items, he should be considered a potential for a special class. Birch (1955) has suggested that if time is a factor, as it usually is, the short form of the Binet should be used so as to permit more time for other evaluations. This suggestion followed a study of a wide variety of retarded children. After reviewing the records of 500 full scale Binets and rescoring the abbreviated scale only, Spaulding (1945) found that there was little

change in distribution and no change in the way the results would be interpreted. "In general, it may be concluded that the abbreviated scale of the Revised Stanford-Binet is a valid instrument for the measurement of intelligence of mentally defective children" (p. 88).

The Binet has been mentioned frequently in this discussion. Just how valuable is this particular test? Terman and Merrill (1937) claimed that, "The extreme accuracy of the scales at the lower IQ levels will be gratifying to those who make frequent use of the test. . ." (p. 47). Further, this particular scale contains tests of comprehension, absurdities, word naming, drawing designs, memory of digits, giving differences and similarities, defining abstract terms, etc. It makes use of both verbal and performance tasks without an excess of verbal items at the lower levels. Not only are the scores consistent, but there is little practice effect even when the test is repeated after a brief interval. Finally, subjects with lower IQ scores show less variability on retest than do normal subjects.

Psychological testing is now commonplace, but it has not always been so. A relatively complete history of the mental testing movement, along with a critique of most of the standard tests, was compiled by Stoddard (1943) while Goodenough (1949) not only reviewed the growth of mental testing but also gave added attention to attitudes toward retarded children. Stoddard has criticized the old concept that "intelligence is what an intelligence test measures", noting that it has little usefulness. He has, in turn, offered a more complete definition.

Intelligence is the ability to undertake activities that are characterized by (1) difficulty, (2) complexity, (3) abstractness, (4) economy, (5) adaptiveness to a goal, (6) social value, and (7) the emergence of originals, and to maintain such activities under conditions that demand a concentration of energy and a resistance to emotional forces" (p. 4).

This definition is especially good when the demands that are made on the child in school are considered. On the other hand, Jordan (1958) has noted that many people who were "incompetent" in school gain more competency once they are in a more routine situation where they are not forced to make decisions for themselves.

A recent review (Dunn & Capobianco, 1959) indicated that while the terms used in the literature are confusing, a certain degree of standardization is being achieved. "Mental retardation" is being used as a generic term covering a wide range of physical and psychological syndromes having a certain common denominator, namely subnormal intellectual development which is usually defined as an IQ less than 75 or 80. "Mentally deficient" is reserved for those who as adults will be "socially incompetent" also. Benoit (1959) noted that mental retardation implies a functional disorder and suggested a new definition of retardation with an intrapersonal and psychological point of reference and with emphasis on behavioral deficits.

Most definitions have in some way included a reference to IQ; but as "IQ" has become a more common term, it has taken on so many meanings that it often has no meaning and is a confusing term within its own right. Heber (1958) has, therefore, suggested a substitution of standard deviation scores for IQ as a technical improvement. However, it

seems evident that this change would soon have all the flaws of an IQ score, plus others that would arise from misunderstandings inherent in deviation scores. As if there were not enough confusion surrounding IQ, Doll (1957) lists four different IQ's. The first of these IQ's is the usual intelligence quotient which is perhaps too heavily weighted toward the academic and which, at best, is merely an indication of a potential. The inner quest providing a motivating power and setting up the aspirations and goals for the child is the second IQ. The third, the ideal qualities, maintain a balance between the first two IQ's and permit an inner tranquility. The innate quirks, although mentioned last, provide the most obstacles to advancement and are most likely to cause the retarded child to be punished by a teacher who is especially concerned with academic advancement. A child who is handicapped in any one of these four IQ's will usually have difficulty in school.

The upper limit of the retarded range, that is an IQ of 75 or 80, has been mentioned previously. The minimum IQ level, below which a retarded child cannot be expected to make academic gains from special class placement, is also important. Most states set the lower limit at 50. A few even drop as low as 45, and a few set the limits at 55 or 60. These are now under rather close scrutiny.

Evidence is accumulating, however, which will undoubtedly require a redefinition of the lower limiting intelligence quotient, for it appears that children with IQ's between 50 and 60 have characteristics more nearly comparable to a lower group than to those with whom they have traditionally been classified" (Cruickshank & Johnson, 1958, p. 5)

Factors other than IQ do, of course, enter into a child's performance in school. This point would probably be accepted by everyone

engaged in training children. Even the ordinary man on the street realizes that he performs better when he has a real interest in an activity and when he is assured of a reward for successfully completing the task. In one of the first reports on level of aspiration and success, Sears (1940) found that as a rule a person sets his next goal slightly above his present success. If, however, this goal is not reached in a reasonable time, the goal is lowered. Thus the successful, self-confident child would be expected to look forward to more success. The failure, on the other hand, probably would not expect success. The retarded child would, therefore, soon find himself encountering repeated failures in a regular classroom and soon stop striving for success since he really does not expect to succeed. Bice (1960) reported that if the competition for the retarded child is more nearly his own level, such as it would be in a special class, he will compete more readily while having fewer feelings that he is a failure.

A number of studies have been completed where obvious success or failure has been a variable. Lantz (1945) set up a situation using selected items from the Binet to establish the child's IQ. Then she played a game with the child, giving him a chance to win a prize. The game was rigged so that one-half the children won and one-half failed to win. Later the child was retested with the similar item from the alternate form of the test. She concluded that:

The intervening experiences of success or failure on the ball game has influenced responses on the mental tests given. Success has proven a stimulant, with the average number of successful responses increased, although not significantly beyond expectancy. Failure, however, has proven a successful depressant, inhibiting the ability to respond in a retest situation (p. 21).

A similar study (Gordon & Durea, 1948) found that if children were discouraged during a retest on the Binet by being told after every item that they were not doing very well, they did significantly more poorly than did controls who were retested under usual conditions. On the other hand, a study of the Goodenough Draw-a-Person test with retarded children found that if children were given candy for "doing better" on the fourth of four trials and then retested a month later without candy, there was no significant difference between trials (Hunt & Patterson, 1957).

A number of studies or opinions have been reviewed above which relate to the establishment of special classes. Some of these demonstrated that the mentally retarded child needs extra assistance. Others demonstrated that the environment does have an effect on the child's achievement. Still others added to the belief that retarded children learn a habit of failure and, therefore, continue to fail at each new task encountered. Thus it would seem important to discover what happens to the retarded child when he is placed in the special class. The purpose of the present study was to determine the effectiveness of placement in a special class insofar as academic achievement is concerned.

Other studies have been conducted that are comparable to the present study. However, one important difference which seems crucial is that the experimental subjects and control subjects in this study were matched as soon as the experimental subjects entered the special class. Thus it was possible to observe any differences as they occurred rather than in a post facto manner. One of the earliest studies (Bennett, 1932)

reported was a comparison of fifty retarded children who had been in special classes for approximately two years with fifty retarded children who had never been in special classes. This particular study was more an attempt to describe than to explain. Two major findings of this study appear to be important at this time. The first stated, "In all the school achievement tests there is a significant difference of the means in favor of the grade group" (p. 33), while the second noted, "There is a zero difference in the mean raw scores of the two groups on the MacQuarrie Test of Mechanical Ability" (p. 34). This would indicate that while the children in regular classes gained more with regard to strictly academic material, the children in the special and the regular classes continued to make equivalent gains in motor functioning. Bennett was quick to point out that one of the major flaws in her study was the failure to equate the children before special placement was made and noted that there were probably certain selective factors which placed the lower children in the special classes originally.

Perhaps one of the most controversial studies in this entire area was reported by Schmidt (1946). This was a study of 322 children, 220 females and 102 males, ages twelve to fourteen with IQ's between 27 and 69 who were placed in special adolescent centers. Their matched controls remained in regular classes. According to Schmidt, after five years every member of the experimental group showed a gain in IQ with gains ranging from 9 to 60 IQ points and a mean gain of 25.2. On the other hand, the control group had changes ranging from a loss of 22 IQ points to a gain of 4 IQ points with a mean loss of 3.6 points. Thus there was

no overlap in changes since the maximum gain for any control subject was four points while the minimum gain for an experimental subject was nine points. Further, at the climax of the study eleven of the experimental subjects were within the "normal" range, and one was at the "high normal" range. Gains of 30 or more IQ points were made by 40.6 per cent of the experimental subjects. These gains appear to be phenomenal since Schmidt reportedly used teaching procedures common to all good teachers in working with the experimental group. However, Schmidt never released her actual data, and for this reason her results cannot be verified.

Two pertinent studies have been conducted in Tennessee. Hawkins (1953) reported on gains made by a group of eighteen children during their first year in a special class. She administered three different forms of the Metropolitan Achievement Test to these children; the first at the beginning of the school year, the second near the middle of the year, and the last shortly before the school year ended. Each of the eighteen children in this study showed some gain during the year with regard to arithmetic, language, and vocabulary usage. One of her conclusions stated, "The over-all results of the study indicated that mentally retarded children gain more educationally, intellectually, socially, and emotionally in a Special Class for mentally retarded than they do in a regular classroom" (p. 69). It is easy to see how such a conclusion could be reached for the child who gained 1.9 grades during the year. But only six of the eighteen gained as much as 1.0 grades during the year, and one gained only 0.2 grades which would leave room for some doubt as to the gains actually made. Also, since there was no

control group, it is difficult to evaluate adequately the gains made.

The other study made in Tennessee is not as directly related to the present study since it dealt with severely retarded children; that is, children with IQ's below 50. Dunn (1958) found that children in this range, which is usually referred to as trainable, evidenced no more gains in the special classes than were made by control subjects matched for IQ and age who remained in the home.

Kirk (1952; 1958) hypothesized that mental and social development can be accelerated if children are given maximum educational opportunities at the formative years of three, four, and five. Supporting this hypothesis, he says:

Studies on preschool children indicate that favorable changes in intellectual growth may be accomplished more readily with young children than with older children. It is possible that rigidity and stereotyped behavior developed during the preschool years may be too difficult to change by cultural and educational advantages at a later age (1952, p. 694).

In order to test this belief he designed an elaborate, long range study using children with IQ's between 45 and 80, the usual limits for retarded children in educable classes. During the three to five years covered by the study, he attempted to compare and contrast the mentally retarded who did and who did not receive special training. While it was found that the improved environment provided by the school was usually helpful, Kirk felt that beyond a certain deprivation level in the home, the school environment was not a sufficient change to prove beneficial. He concluded that within limits children from "adequate" homes show an increase in intelligence scores whenever they start to school; therefore, preschool is perhaps of value, but it is not essential.

Similar findings regarding the value of preschool training were reported by Holloway (1954) who used four groups of five year olds, half of whom were from homes which were above average socio-economically, and half from below average homes. Using both the Primary Mental Abilities Test (Primary) and the Wechsler Intelligence Scale for Children, he found significant IQ gains for all except one group on the PMA and for all groups on the WISC during a one year kindergarten program. These findings were incidental to the main part of his study but are important enough to warrant consideration. Since both Kirk and Holloway found increases in the IQ scores during an initial school-like situation, it would perhaps be safe to assume that the IQ score obtained by a pre-school child is likely to be lower than the score obtained by the same child after he has attended school. Bradway's (1944) conclusion supports this assumption. She found that test-retest reliability is low if a child is tested before he starts school and again after he is in junior high school. Thus the interpretation of preschool test scores is most difficult.

Retesting 107 children with IQ's between 50 and 81 who had been in special classes for periods ranging from seven months to nine years five months, Hill (1948) concluded that they showed little change insofar as IQ was concerned. A change no greater than seven points, either up or down, was shown by 72 per cent of the group; and the mean variation for the entire group was a loss of 0.33 IQ points. Thus if it had been expected that these children's IQ's would show improvement with special class placement, the expected results were definitely not achieved.

Two recent studies, covering a large number of children and measuring a large number of factors, demonstrated contradictory results insofar as academic advancement is concerned. Blatt (1958) concluded that while there was no significant difference in scores on an achievement test for retarded children in a special class and those in a regular class, the trends were such that he could safely state that those in special classes improved more in a two year period than did those in a regular class. Directly opposed to his are the findings of Cassidy and Stanton (1959) that those remaining in a regular class were academically superior to those in a special class ($p=.01$). However, they note that both those in the regular class and those in the special class were achieving well below expectancy for their mental age.

This review has surveyed a number of studies concerning special education, with emphasis on the children who are placed in these classes and some of the hopes for such classes. However, it must be remembered that these classes must not be permitted to become a dumping ground that is set up to relieve the regular classroom teacher of all the misfits. The classes must adhere to their primary goal of educating the retarded child. A few comments on the current status of special education will close this section.

Eichorn (1959) has cautioned that the special class with its many advantages is definitely not a panacea.

Many educators contend that special classes give mentally retarded children a chance to become useful citizens--a better chance than children would have in regular grades. Yet special classes are not a cure-all. However noble the spirit that moves educators and others to create special classes, they are no panacea.

The mere establishment of special classes does not solve the problem of preparing retarded children to take their place in society (p. 37).

Helping the retarded child take his place in society is often a difficult task. If the child is to be socially adequate and eventually economically competent, he must be detected and diagnosed early, and subsequently given a long period of training. Garrison (1953) has said:

Throughout all areas of special education great emphasis is being placed on early finding and referral. As the theory is put into practice the educational implications are evident. Instead of being "pointed down" programs should be started "down" at the primary and preschool levels and "pointed up" toward goals and objectives. Planned developmental, constructive, "ongoing" programs should take the place of unplanned rehabilitative, or isolated programs. Early finding helps the child in learning early to live with, and in spite of, his handicaps. It allows early rejection of faulty habits, concepts, and attitudes. And, it provides for a sequential building of skills, habits, concepts, and attitudes that promote "effective and affective living" (pp. 554-555).

The special class is set apart and has a different program from the regular classroom. Yet their programs are similar.

Among the general educational principles which also have pertinence for the retarded child, a major one is that learning by "doing" is important; that concrete materials and actual experiences are significant especially for young children. Other generally accepted principles applying specifically to the retarded are: that academic subjects should be presented to the limit of the child's capacity to learn them and make use of them, but that greater emphasis should be placed on "practical" types of subject matter--manual skills, home economics, crafts, and the like.

A sound educational plan for the educable retarded provides for: more attention to physical health, socializing experiences, and a multiplicity of learning experiences of a concrete sort plus delay in introducing formal academic work until the child has reached an appropriate mental age and hence developed a "readiness" level for this work. Such a plan as provides for attention to the development of favorable attitudes, good work habits, and desirable personality traits (Blodgett & Warfield, 1959, p. 61).

Few individuals would deny that special education classes with their many special benefits and special programs have been of some value to the retarded child. But, as Erickson (1958) has pointed out, much research is needed in this area to determine just what effects such placement has on the academic and social progress of the child.

While there is an abundance of material describing practices in the education of the mentally retarded, there is a paucity of research that provides conclusive answers to the problems of special education. There seems to be general agreement on the philosophy, goals, curriculum and methods of special education. The procedures for screening and placement are generally uniform.

Considerable controversy exists in the areas of class organization, social and academic effects of segregation, and the age and ability range to be included in the school programs.

Only through continued study and research with the cooperation of all agencies in the fields of education, psychology, medicine, and social agencies can we hope to resolve these points of controversy and achieve an adequate program for the mentally retarded (pp. 306-307).

The Problem

Psychologically evaluating suspected mentally retarded children to determine their eligibility for placement or continuance in special classes became a part of the experimenter's responsibility during his years as a graduate student at the University of Tennessee. After evaluating a number of children, both before they were placed in the special class, and after two or three years in the special class, many questions concerning the entire program came into focus. An attempt to find the answer to at least a few of the questions provided a basis for the study to be presented.

Primarily this study was designed to investigate the effectiveness of Educable Mentally Retarded (EMR) classes as measured by changes that occur in achievement test scores during the first year of such placement. Believing that it is entirely possible for the effectiveness of EMR classes to be selective in nature, it was hoped that the investigation would be prepared to:

1. Determine which students benefit most from such placements and how such benefits can be predicted.
2. Evaluate the effects of early placement in such classes as opposed to later placement.
3. Determine any change in test scores that might result from such placement.

Also, it was hoped that this investigation would supply additional information that will be helpful in arriving at a more orderly procedure for the establishment of EMR classes.

The hypotheses in this study were:

1. The achievement test scores of retarded children in EMR classes will not differ significantly from achievement test scores of matched retarded children in regular classes.
2. The IQ test scores of retarded children in EMR classes will not differ significantly from IQ test scores of matched retarded children in regular classes.
3. There will not be a significant difference in achievement test scores of children placed in EMR classes at various age levels and after various amounts of previous school experience.

CHAPTER II

PROCEDURE AND METHODS

A total of twenty-four experimental subjects was used in this study. These were children who had been placed in an EMR class for the first time during the 1959-60 school years. The twenty-four control subjects were children who were eligible for EMR placement, but who were retained in a regular class during the entire school year. These groups were divided into three subgroups of eight subjects each. Subgroup I previously had one year (or preferably less) of regular classroom work; subgroup II previously had either two or three years of regular classroom work; and subgroup III previously had four or more years of regular classroom work. Each of the experimental subjects was matched against a control subject with regard to sex, IQ, age, and number of years in school. Additional efforts were made to obtain children from approximately equal socio-economic environments and from similar type schools. In order to guard against the subjects' receiving preferential treatment from their teachers, the true purpose of the study was withheld from the individual classroom teacher until the study was completed. A battery of tests was administered to each subject near the beginning of the school year and again near the end of the school year. The change score from the initial administration until the second administration was used as a measure of improvement.

Selection of the Subjects

Originally the investigator had hoped that the study could be conducted in several school systems in East Tennessee; but due to time limitations and the fact that all testing was done by the investigator, the final study was conducted only in Knox County. The special education program in Knox County had been in existence for some time, and twelve EMR classes were available at the time the study began. Also, the school system had a Guidance Supervisor who had previously evaluated a number of children for possible EMR placement. These test results were made available to the investigator. In addition, the Director of Special Education had in her possession a list of names that had been referred for evaluation for possible EMR placement but who had not been evaluated. Both these sources offered a beginning for the selection of subjects for both the experimental and control groups.

The special education program in the Knox County schools was expanding as this study began. Ordinarily the Director of Special Education had a backlog of children who had been evaluated and found to be eligible for EMR placement. Therefore, she was able to determine how many children would be entering the previously established classes and also determine where new classes should be established. At the time this study began, there were seventeen children immediately available who met all the established criteria for inclusion in the study. Thus the investigator found it necessary to evaluate a number of additional children who met the established criteria and who were attending schools

from which EMR placement would be possible in order to select the remainder of the experimental subjects. Actually only seven more experimental subjects were needed; but, to be assured of a sufficient number of subjects in case any were lost from the study, twelve additional subjects were chosen. Two of the seventeen originally available were dropped from the study when they were evaluated for the first time by this investigator and found to have IQ's of 83 and 85. Another was dropped because he had missed two years of school due to illness and it was not possible to find a control subject of equivalent age who had so few years of previous school attendance. Finally, it became necessary to drop a fourth member of the original group when it was not possible to find a matching control subject within a reasonable period of time. The fifth "extra" experimental subject was never used since he was not needed. Thus the final experimental group consisted of thirteen children who were previously approved for EMR placement and eleven children who were placed in the EMR class only after being evaluated by this investigator.

The control subjects were selected from schools where it was known that they could not be placed in EMR classes for various administrative reasons; for example, no room was available within the school for an EMR classroom, transportation could not be arranged to another school with an EMR classroom, or some similar reason. The number of children from these schools who had been referred previously for evaluation was insufficient to provide all the needed subjects. Therefore, it became necessary to seek out other children. All of the schools

routinely administered group achievement tests to all children, and a quick review of these test scores provided additional names for consideration. A review of the child's cumulative record and a discussion with his teacher concerning his current achievement served as further screening devices. Finally, those children who seemed to be the most likely prospects were administered the Stanford-Binet Intelligence Scale, Form L. If he was found to be eligible for EMR placement and if he could be adequately matched with an experimental subject, the child was then administered the remainder of the test battery.

The selection of the final forty-eight subjects required approximately ten weeks. In order to secure the needed number of subjects, it was necessary to evaluate eighty-nine children at least partially. The reasons for failing to include five of the subjects have been given previously. Three of the children evaluated as possible experimental subjects were dropped because their IQ was above the maximum for EMR placement. Of the thirty-three children who were at least partially evaluated for use as control subjects, one moved away from the county early in the study, fifteen had IQ's above the legal maximum for EMR placement, and the other seventeen could not be matched for various reasons. It should be noted that several children referred for evaluation were rejected because their history indicated either physical or emotional problems that were possibly interfering with their academic advancement.

Criteria for Matching

The four major factors considered in matching each pair of subjects were sex, IQ, age, and number of years of school attendance. The two secondary factors were socio-economic status and type of school attended. Most previous studies have found that there are more boys than girls in EMR classes. This study proved to be no exception. Only three of the twenty-four experimental subjects were girls; two in the youngest group and one in the oldest group. Matching on this variable presented no difficulty. The investigator thought it essential to match on this variable in order to avoid any possibility that one sex might make greater gains in an EMR class than did the other.

Terman and Merrill (1937) reported that the reliability for the Stanford-Binet Scale is very high, but at the same time cautioned that the probable error would vary with the IQ. For IQ's within the usual EMR range they reported a maximum probable error of 2.60 and a standard deviation of 3.85. On the other hand, the investigator has been accustomed to hearing his colleagues refer to their testing as being accurate within five IQ points. For this reason, it was decided that each pair of subjects should have a difference in IQ of not more than five points. It was possible to meet this criterion with twenty-three pairs. However, time limitations forced the investigator to use one pair who had an IQ difference of six points. The final twenty-four pairs of subjects had IQ differences as follows: two pairs had no difference, six pairs differed by one point, four pairs differed by two points, two pairs

differed by three points, seven pairs differed by four points, two pairs differed by five points, and one pair differed by six points. Differences no greater than these were assumed to be unimportant.

Matching on age was a crucial factor since changes that might occur due to differences in age at time of placement was one of the hypotheses under consideration. Determining maximum age differences to be permitted for the pairs was also an arbitrary decision on the part of the investigator. An attempt was made to secure pairs as nearly the same age as possible, and a maximum age difference of six months finally proved possible. The initial testing covered a period of more than two months; therefore, it was necessary to calculate age differences on two different bases--date of birth and time of initial testing. More than half the pairs were not more than two months different in age, and only two pairs were as much as six months different.

Closely associated with age was the number of years the children had attended school. At first glance, it would appear that if children were of approximately the same age they would, naturally, have attended school for the same number of years. This is not so! Nearly all school systems have arbitrarily established a date before which the child's birthdate must occur if he is to be enrolled at the beginning of the school year. In the system in which this study was conducted this date is December 31. A first grade class may have some children who are at least eight months beyond their sixth birthdate, and, at the other extreme, children who are at least four months away from their sixth birthdate. Thus age alone was not a sufficient matching factor, and the

number of years of previous attendance in a regular classroom had to be considered. Needless to say, each pair was precisely matched on this variable. A summary of the matching is presented in Table I.

Matching pairs on any one of the four previously mentioned variables would have been no difficulty at all. However, matching on all four proved to be a much more difficult task than had been anticipated. Because of the overwhelming predominance of boys in the experimental group, the investigator had no choice but to search for a like number of boys in the control group. Thus a large number of prospective control subjects were eliminated because they were girls. Adding the second variable, the IQ, increased the problem slightly; but there was an abundance of retarded children readily available. However, as previously indicated, a large number of children above the EMR eligible range were tested because of their lack of achievement in class. The variables of age and number of years in school further complicated matters.

The two other variables, socio-economic status and type of school attended, were somewhat related and proved to be less a problem than the four primary variables. A rough estimate of the child's socio-economic status was made from the occupation of the child's father and/or mother. Nearly all the children came from the upper-lower or lower-middle socio-economic strata, with the possibility that two or three might have been in the upper-middle bracket. The socio-economic level of children within a given school was relatively constant since all the children came from the immediate area. Type of school was related to socio-economic factors

TABLE I

SEX, NUMBER OF YEARS IN SCHOOL, AGE, AND IQ OF THE SUBJECTS AT THE BEGINNING OF THE STUDY AND AGE AND IQ DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Sex	Number of Years in School	Age			IQ		
			E	C	D	E	C	D
1	M	1	7- 3	7- 9	6	70	74	4
2	M	1	7- 3	7- 5	2	75	76	1
3	F	0	6- 6	6- 8	2	59	61	2
4	M	0	5-11	5-11	0	77	72	5
5	M	0	6- 1	6- 0	1	78	78	0
6	F	0	6- 5	6- 3	2	70	71	1
7	M	0	6- 7	6-10	3	75	73	2
8	M	1	7- 9	7-10	1	67	70	3
9	M	2	7-11	8- 2	3	68	73	5
10	M	2	8- 9	9- 1	4	75	73	2
11	M	2	8- 4	8- 2	2	72	76	4
12	M	3	8- 9	8-11	2	70	66	4
13	M	3	9- 6	9- 8	2	67	71	4
14	M	3	9-10	9- 8	2	68	72	4
15	M	3	10- 2	9-10	4	68	64	4
16	M	2	7-11	8- 1	2	78	80	2
17	M	5	11- 3	11- 7	4	67	66	1
18	F	7	13- 5	13- 7	2	50	53	3
19	M	4	10- 9	10- 9	0	68	74	6
20	M	4	10- 5	10- 1	4	62	66	4
21	M	4	10-10	11- 3	5	59	59	0
22	M	5	10-10	10- 5	5	77	78	1
23	M	6	12- 7	13- 0	5	70	71	1
24	M	5	12- 7	12- 6	1	66	67	1

in that all schools except one were beyond the suburban area but still not in the strictly rural area. A total of six schools with EMR classes and seven schools without EMR classes were included in the study. Admittedly, the matching on these last two variables was rather inexact, but they appeared to be equated so far as the investigator was concerned.

Tests and Test Description

In order to determine the changes made by the subjects in each type of class, a battery of psychological and achievement tests was administered. The battery was chosen with the hope that a sufficient amount of information could be gained for each subject to enable the investigator to answer the questions raised. The battery included the Stanford-Binet Intelligence Scale, Draw-a-Person, Bender-Gestalt Design Test, Hunter-Pascal Concept Formation Test, and California Achievement Test. At the time of the second evaluation, each subject's teacher rated him on a behavior scale which was constructed especially for this study.

Stanford-Binet Intelligence Scale

The Stanford-Binet Intelligence Scale in its various forms provides an excellent measure of the functioning intellectual level for an individual. The nature of its construction readily permits the measurement of intellectual functioning from a mental age of two years upward. Thus it is an adequate instrument for use with mentally retarded children within the age range included in this study. Further, its reliability is high and there is little effect on the score due to any practice

gained from previous testing. Its inclusion of a variety of tasks permits each person to be evaluated with regard to both his strong points and his weak points intellectually. The fact that the test is individually administered prevents the child's getting help from anyone else and also prevents his being disturbed by the presence of another child. Another advantage of individual administration is the increased rapport that the examiner may gain with the child under such conditions. The test was administered and scored according to the procedure described by Terman and Merrill (1937).

Draw-a-Person

The child's drawing of a person is an excellent test of visual-motor functioning as well as a test of intellectual functioning. Also, by requesting that the child draw a person rather than specifically stating that he draw a man, it is possible to gain some information about the child's feelings about himself and his personality structure. This test has the advantages of being relatively non-threatening to the child and it can be completed quickly. The scoring methods devised by Goodenough (1926) were used to establish the mental age and the resultant IQ for each child's drawing. All scoring was done by the investigator. Use of the test as a personality measure is widespread, and a number of rationales for evaluation have been advanced. Swensen (1957) reviewed the work in this area; and, using his summary as a basis, the investigator evaluated each drawing. This personality evaluation of each drawing was, at best, incomplete since this study was designed primarily to study academic changes and not personality changes.

Bender-Gestalt Design Test

The Bender-Gestalt Design Test provided still another measure of visual-motor functioning as it is related to mental age level. The original normative data was provided by Bender (1938) and provided examples of the type performance expected by children at the various age ranges. Pascal and Suttell (1950) provided an objective scoring procedure for use with adults, but by extrapolation the method can also be used with children. This test also has the advantages of being non-threatening and can be completed quickly. As is the case with the previously mentioned tests, it is individually administered, giving the examiner a chance to evaluate each child with regard to his approach to a task, his ability to follow instructions, and his use of a pencil during a paper-and-pencil task. A person who was adequately experienced with the Pascal-Suttell procedure scored the tests without having any other knowledge of the subjects. Since Pascal has warned that this scoring procedure might not be adequate with extreme cases such as mentally retarded children, judges were used to rank the subject's performances. These rankings were within groups; that is, the first performance of the experimental subjects, the second performance of the experimental subjects, the first performance of the control subjects, and the second performance of the control subjects. None of the judges were familiar with the subjects nor were they aware of the subjects' performance on other tasks. Two of the judges were advanced graduate students in clinical psychology who had made extensive use of the Bender-Gestalt test, and the other judge was a college student who had no previous experience with the test.

Hunter-Pascal Concept Formation Test

The Hunter-Pascal Concept Formation Test was included in the study in order to study the attentive capacity, the cortical efficiency, and the problem solving ability of each subject. This test is based on the ability of the subject to solve alternation problems, or, in the case of the child who has not yet reached the mental level necessary to solve such problems, the ability to delay a response. The ability to complete the task successfully is related to the mental age of the subject but goes beyond this in measuring his ability to perform at an abstract level and to develop concepts. Pascal and Jenkins (1959) have demonstrated that the test measures the efficiency of cortical functioning; therefore, it can be assumed to be related to the ability to make academic progress. The test was administered and scored in the manner described by Pascal and Jenkins (1957, 1959).

California Achievement Tests

Two forms of the California Achievement Tests were used. The Lower Primary, Form W was used with subgroups I and II; and the Upper Primary, Form W with subgroup III. This complete battery contains separate reading, arithmetic, and language tests; tests for the three most important academic areas. In fact, the use of this battery permits a survey of nearly all academic endeavors of the retarded child. Its thoroughness is its primary advantage; but in a study such as this one, the fact that each test or even each subtest may be taken independently of any other portion of the battery is of almost equal importance. The

decision to use tests at two levels of difficulty was based on the spread of mental ability in the subjects. Most of the children in the two younger sub-groups were at approximately the indicated grade placement for usage of the lower primary form. On the other hand, several children in the older sub-group were placed in grades at a higher level than is indicated for the upper primary form; but in no case did their mental age indicate that they should have been placed above the fourth grade. This battery of tests was administered and scored in the usual manner (Tiegs & Clark, 1957a; 1957b).

Other Measures

Other studies have indicated that retarded children often become a behavior problem, especially if forced to remain in the regular classroom. The investigator used a list of behaviors found most often in the other studies he surveyed in order to construct his own rating scale. This scale was presented to the teacher when the child was tested the second time; that is, when he was tested near the end of the school year. The teacher thus had an opportunity to have observed the child for almost a full school year before rating him. The rating was on a four-point scale; least, below average, above average, or most; as compared with other children in his classroom. The rating of average was avoided to force the rater to make a choice. Also, by comparing the child only with the others in his classroom, each child was judged only for his usual reactions in his usual environment. To gain the most complete cooperation possible from each teacher and to assure complete

confidentiality, the teacher placed only the child's code number which was given her by the examiner and not his name on the rating sheet. This rating was not scored but served to indicate how the child behaved in comparison to his peers. A copy of this form is included in the appendix.

Each teacher was requested to complete a brief form to give the investigator some information about her own training and background. This was done to insure that the teachers in the special classes were not greatly different from the teachers in the regular classes. Anonymity was insured, and the teacher did not have to put her name on the data sheet. A copy of this form is also included in the appendix.

Testing Conditions

All testing was done in the school which the subject attended, with one exception to be explained later. The children were seen individually by the investigator as he explained to them that he had some tasks which he would like for them to perform. Each child was assured that the investigator was not affiliated with the school and that the child's performance would not be a basis for any grades that he might receive. If the child appeared hesitant, the investigator would converse with him about something else and then return to the matter at hand. No child interviewed refused to cooperate. The testing occurred outside the usual classroom so that the child might be alone with the investigator and not be distracted by other children.

All tests, except the California Achievement Tests which were administered last, were administered individually. Time limitation forced the investigator to "group" administer the California Achievement Tests on four occasions, but no "group" contained more than two children. Thus, for all practical purposes, all children received individual attention during testing. Testing conditions per se were not always ideal but were always adequate. Chairs were available so that the subject might be comfortably seated, writing surfaces were available at a reasonable height, and outside interferences were held to a minimum.

The tests were presented in the following order: the Binet, Draw-a-Person, Bender-Gestalt, Hunter-Pascal, and California. The length of time needed to complete the battery varied from two to four hours, depending on the ability of the child, with the median time being approximately three hours. For this reason, no child was given the complete battery without at least one rest period. Often the child would be tested completely in one day; or, just as often, testing might be spread over two or three days. The younger children usually required more rest periods than did the older children.

The one exception to most of the above statements occurred in the testing of experimental subject number six in subgroup III. This subject lived outside the transportation area for the school which he attended and was dependent upon his father for transportation to school. The father became unemployed approximately two weeks before the end of the school year and stopped bringing his son to school. The investigator had begun the final testing with the subject the day before he stopped school.

When the subject did not return before the end of the school year, his parents were contacted; and they gave permission for the testing to be completed in their home. Thus it was possible to test all subjects completely in the study.

Statistics

Non-parametric statistics were used in this study because of the nature of the data. The original analysis was of differences in change scores. That is, changes in scores from first testing to second testing were derived, and then differences in the change scores for each pair were determined. The Binomial Expansion technique was used to evaluate the consistency of the differences between experimental and control subjects. The probability of the resulting split was then established (Jenkins, 1956). Since consistency alone is an incomplete analysis, the magnitude of the differences was computed according to the Matched-Pair Rank Test devised by Wilcoxon (1945). The relation between the several measures was determined by the Phi Coefficient.

CHAPTER III

RESULTS

Stanford-Binet Intelligence Scale

The Binet mental age (MA) scores for both the experimental and control subjects are presented in Table II. Also included are the change scores from the first administration to the second administration. A positive number for the change score indicates an increase in mental age, while a negative number indicates an actual decrease in mental age. The last column of the table gives the difference between change scores for the matched pair. A positive number indicates a greater improvement on the part of the experimental subject, while a negative number indicates that the control subject made a greater gain than did the experimental subject with whom he was matched. The IQ's obtained, the changes from the first to the second administration, and the differences between changes are presented in Table III.

An examination of the results indicated that thirty-four of the forty-eight subjects showed an increased IQ on the second administration, five showed no change, and only nine showed a decreased IQ. As previously indicated, a change of five points is usually considered to be within the margin of error for the test. Only one of those showing a decrease had a change greater than five points, while twenty-three of those showing an increase had a change of five points or more. Even disregarding those who showed no change, increases such as those shown are significant

TABLE II

STANFORD-BINET MENTAL AGE, CHANGES BETWEEN THE FIRST AND SECOND
ADMINISTRATION, AND DIFFERENCES IN CHANGES BETWEEN
EXPERIMENTAL AND CONTROL SUBJECTS

Subject	<u>Experimental</u>			<u>Control</u>			<u>Difference</u>
	First	Second	Change	First	Second	Change	E-C
1	5- 1	5- 2	0- 1	5- 9	6- 8	0-11	-0-10
2	5- 5	6- 4	0-11	5- 8	6-10	1- 2	-0- 3
3	3-10	5- 3	1- 5	4- 1	5- 1	1- 0	0- 5
4	4- 7	6- 2	1- 7	4- 3	5- 6	1- 3	0- 4
5	4- 9	6- 0	1- 3	4- 8	5-10	1- 2	0- 1
6	4- 6	5- 4	0-10	4- 5	5- 4	0-11	-0- 1
7	4-11	6- 7	1- 8	5- 0	5- 9	0- 9	0-11
8	5- 2	5-10	0- 8	5- 6	6- 6	1- 0	-0- 4
9	5- 5	6- 4	0-11	6- 0	7- 0	1- 0	-0- 1
10	6- 6	7- 6	1- 0	6- 8	7- 0	0- 4	0- 8
11	6- 0	6- 4	0- 4	6- 2	6- 4	0- 2	0- 2
12	6- 2	6- 6	0- 4	5-11	6- 6	0- 7	-0- 3
13	6- 4	7- 2	0-10	6-10	8- 4	1- 6	-0- 8
14	6- 8	7- 0	0- 4	7- 0	7- 8	0- 8	-0- 4
15	7- 0	7- 0	0- 0	6- 4	7- 2	0-10	-0-10
16	6- 2	6- 6	0- 4	6- 6	6-10	0- 4	0- 0
17	7- 6	8-10	1- 4	7- 8	8- 0	0- 4	1- 0
18	6- 8	7- 0	0- 4	7- 2	9- 2	2- 0	-1- 8
19	7- 4	7- 8	0- 4	8- 0	8- 8	0- 8	-0- 4
20	6- 6	7- 2	0- 8	6- 8	8- 6	1-10	-1- 2
21	6- 5	7- 0	0- 7	6-10	7- 4	0- 6	0- 1
22	8- 4	8- 8	0- 4	8- 1	9- 0	0-11	-0- 7
23	8-10	8- 2	-0- 8	9- 2	9- 8	0- 6	-1- 2
24	8- 4	8- 2	-0- 2	8- 4	11- 0	2- 8	-2-10

TABLE III

STANFORD-BINET IQ SCORES, CHANGES BETWEEN FIRST AND SECOND
ADMINISTRATION, AND DIFFERENCES IN CHANGES BETWEEN
EXPERIMENTAL AND CONTROL SUBJECTS

Subject	<u>Experimental</u>			<u>Control</u>			<u>Difference</u>
	First	Second	Change	First	Second	Change	E-C
1	70	66	- 4	74	81	7	-11
2	75	81	6	76	86	10	- 4
3	59	74	15	61	70	9	6
4	77	95	18	72	86	14	4
5	78	90	12	78	89	11	1
6	70	76	6	71	78	7	- 1
7	75	93	18	73	78	5	13
8	67	70	3	70	78	8	- 5
9	68	74	6	73	81	8	- 2
10	75	81	6	73	73	0	6
11	72	71	- 1	76	73	- 3	2
12	70	70	0	66	68	2	- 2
13	67	71	4	71	81	10	- 6
14	68	68	0	72	75	3	- 3
15	68	65	- 3	64	69	5	- 8
16	78	77	- 1	80	79	- 1	0
17	67	75	8	66	66	0	8
18	50	51	1	53	67	14	-13
19	68	68	0	74	76	2	- 2
20	62	65	3	66	80	14	-11
21	59	62	3	59	62	3	0
22	77	76	- 1	78	82	4	- 5
23	70	62	- 8	71	72	1	- 9
24	66	64	- 2	67	85	18	-20

($P=.01$) and indicate that there was definitely an improvement in IQ from the first administration to the second administration when both the experimental and control subjects are combined into one group.

An examination of the results for the various subgroups indicated differences between subgroups in the number of subjects showing gains in IQ from the first administration to the second. Combining both the experimental and control subjects within each subgroup showed that in the youngest group, subgroup I, fifteen of the sixteen made higher IQ's the second time. Such a change is highly significant ($P=.0002$). For subgroup II half the subjects showed an increase while half showed no increase or a loss. Subgroup III showed eleven subjects with increases, a change that approaches significance ($P=.105$). Breaking these results down further indicated that in subgroup I seven of the eight experimental subjects showed increased IQ's ($P=.035$), and all of the control subjects showed an increase ($P=.004$). Subgroup II showed no difference for either the experimental or control subjects. In subgroup III nearly all of the significance came from the control segment where seven of the eight showed increases ($P=.035$) while only four of the eight experimental subjects showed an increase.

The change scores were greater for the control group for both MA and IQ. The binomial expansion indicated that this difference approached significance with regard to IQ ($P=.076$). It was not significant for MA although the difference also approached significance ($P=.115$). On the other hand, the Wilcoxon Matched-Pair Rank Test indicated that the magnitude of differences for MA were significant ($P=.05$), but the

differences for IQ were insignificant. Thus, while there was a tendency for the control subjects to show greater improvement than the experimental subjects, the general trend of the differences was insignificant when both direction and magnitude of change was considered.

Draw-A-Person

The MA scores for the Draw-a-Person derived by use of the Goodenough scoring method for both the experimental and control subjects are presented in Table IV. Also included are the change scores from the first administration to the second administration. Positive or negative change scores have the same meaning as those for the Binet. The difference between change scores is shown in the last column with the positive or negative number having the same meaning as previously indicated. The IQ's obtained, the changes, and the differences between changes are presented in Table V. Since the IQ's were not matched on this test, it was felt that more information concerning changes could be obtained from percentage change scores than from raw change scores. The percentage change scores and differences in these changes are presented in Table VI.

An examination of the results indicated that thirty of the subjects showed an increased IQ on the second administration while eighteen showed a decrease. An increase by this number of subjects is not significant. However, if the increase is considered by groups rather than for the total number of subjects, the number of experimental subjects showing an increase approached significance ($P=.076$), while the number of control subjects showing an increase remained below significance ($P=.271$).

TABLE IV

DRAW-A-PERSON MENTAL AGE, CHANGES BETWEEN THE FIRST AND SECOND
ADMINISTRATION, AND DIFFERENCES IN CHANGES BETWEEN
EXPERIMENTAL AND CONTROL SUBJECTS

Subject	<u>Experimental</u>			<u>Control</u>			<u>Difference</u>
	First	Second	Change	First	Second	Change	E-C
1	4-0	4-6	0-6	5-3	7-0	1-9	-1-3
2	4-0	4-9	0-9	5-9	6-6	0-9	0-0
3	4-6	5-3	0-9	4-6	5-0	0-6	0-3
4	3-9	6-9	3-0	3-6	6-3	2-9	0-3
5	5-0	6-3	1-3	5-9	6-6	0-9	0-6
6	4-6	5-3	0-9	5-6	5-3	-0-3	1-0
7	4-9	5-0	0-3	4-0	6-6	2-6	-2-3
8	5-6	5-9	0-3	5-0	7-3	2-3	-2-0
9	6-9	7-0	0-3	6-6	6-6	0-0	0-3
10	6-0	7-6	1-6	7-6	8-3	0-9	0-9
11	6-9	7-0	0-3	7-3	8-0	0-9	-0-6
12	6-3	6-0	-0-3	5-0	6-3	1-3	-1-6
13	6-9	7-3	0-6	8-0	5-6	-2-6	3-0
14	6-6	6-6	0-0	8-3	8-6	0-3	-0-3
15	6-0	7-0	1-0	7-3	6-9	-0-6	1-6
16	6-3	7-0	0-9	7-3	8-0	0-9	0-0
17	4-9	6-3	1-6	6-3	7-0	0-9	0-9
18	5-9	7-3	1-6	10-9	8-0	-2-9	4-3
19	8-3	9-0	0-9	6-0	8-9	2-9	-2-0
20	6-3	6-0	-0-3	7-9	7-6	-0-3	0-0
21	5-9	6-3	0-6	8-9	8-0	-0-9	1-3
22	7-0	8-3	1-3	6-9	7-0	0-3	1-0
23	6-9	6-9	0-0	9-3	8-0	-1-3	1-3
24	8-0	11-0	3-0	10-6	11-0	0-6	2-6

TABLE V

DRAW-A-PERSON IQ SCORES, CHANGES BETWEEN THE FIRST AND SECOND
ADMINISTRATION, AND DIFFERENCES IN CHANGES BETWEEN
EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental			First	Control		Difference E-C
	First	Second	Change		Second	Change	
1	55	57	2	68	85	17	-15
2	55	61	6	78	82	4	2
3	69	74	5	68	69	1	4
4	63	104	41	59	97	38	3
5	82	90	8	96	99	3	5
6	70	75	5	88	77	-11	16
7	72	69	- 3	59	88	29	-32
8	71	69	- 2	64	87	23	-25
9	85	81	- 4	80	75	- 5	1
10	69	81	12	83	86	3	9
11	81	79	- 2	89	90	1	- 3
12	71	64	- 7	56	66	10	-17
13	71	72	1	83	53	-30	31
14	66	63	- 3	85	83	- 2	- 1
15	59	65	6	74	65	- 9	15
16	79	82	3	90	92	2	1
17	42	53	11	54	58	4	7
18	43	53	10	80	58	-22	32
19	77	80	3	56	77	21	-18
20	60	54	- 6	77	71	- 6	0
21	53	56	3	78	68	-10	13
22	65	72	7	65	64	- 1	8
23	54	52	- 2	71	60	-11	9
24	64	84	20	84	85	1	19

TABLE VI
 DRAW-A-PERSON IQ PERCENTAGE CHANGE SCORES AND
 DIFFERENCES IN PERCENTAGE CHANGES BETWEEN
 EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental	Control	Difference E-C
1	3.6	25.0	-21.4
2	10.9	5.1	5.8
3	7.2	1.5	5.7
4	65.1	64.4	0.7
5	9.8	3.1	6.7
6	7.1	-12.5	19.6
7	- 2.8	49.2	-52.0
8	- 2.8	35.9	-38.7
9	- 4.7	- 6.3	1.6
10	17.4	3.6	13.8
11	- 2.5	1.1	- 3.6
12	- 9.9	17.9	27.8
13	1.4	-36.1	37.5
14	- 4.5	- 2.4	- 2.1
15	10.2	12.2	22.4
16	3.8	2.2	1.6
17	26.2	7.4	18.8
18	23.3	-27.5	50.8
19	3.9	37.5	-33.6
20	-10.0	- 7.8	- 2.2
21	5.7	-12.8	18.5
22	10.8	- 1.5	12.3
23	- 3.7	-15.5	11.8
24	31.3	1.2	30.1

An examination of the subgroups indicated a difference between subgroups with regard to IQ increases. Subgroup I had thirteen of the sixteen subjects having a higher IQ on the second administration. This change is fairly significant ($P=.011$). The changes for both subgroups II and III were definitely insignificant. Separating the experimental and control subjects for subgroup I showed seven of the eight control subjects improved ($P=.035$) while only six of the experimental subjects improved ($P=.144$). No other subgroup is worthy of mention.

The binomial expansion indicated that the differences in change scores approached significance with regard to IQ percentage change ($P=.076$) with the experimental group showing the greatest gain, but were not significant for MA although the difference approached significance ($P=.115$). On the other hand, the Wilcoxon Matched-Pair Rank Test indicated that the magnitude of difference for both IQ and MA was insignificant, being only slightly different from chance.

Bender-Gestalt Design Test

The Bender-Gestalt Design Test scores as determined by the Pascal-Suttell scoring procedure for both the experimental and control subjects are presented in Table VII. Change scores from the first to second administration and differences between change scores are also included. For reasons mentioned previously, the change scores were converted to percentage change scores and are presented in Table VIII. The scoring procedure for this test yields low scores for an adequate reproduction of the designs; therefore, a negative change would indicate an improved

TABLE VII

BENDER-GESTALT DESIGN TEST SCORES, CHANGES BETWEEN THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES IN CHANGES BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental			First	Control		Difference E-C
	First	Second	Change		Second	Change	
1	236+	172	-64+	160	127	-33	-31+
2	221	192	-29	127	131	4	-33
3	204	201	- 3	214	175	-39	36
4	211	208	- 3	236	211	-25+	22+
5	187	160	-27	231	209	-22	- 5
6	192	197	5	219	175	-44	39
7	236+	236	- 0+	236+	175	-61+	61
8	191	129	-62	164	151	-13	-49
9	222	165	-57	225	138	-87	30
10	130	66	-64	85	53	-32	-32
11	138	143	5	93	103	10	- 5
12	143	109	-34	158	112	-46	12
13	123	112	-11	166	104	-62	51
14	103	70	-33	85	54	-31	- 2
15	189	145	-44	105	92	-13	-31
16	166	206	40	117	104	-13	53
17	130	128	- 2	67	67	0	- 2
18	187	199	12	63	33	-30	42
19	63	62	- 1	87	68	-19	18
20	150	157	7	86	36	-50	57
21	148	176	28	105	145	40	-12
22	69	73	4	78	51	-27	31
23	73	109	36	82	66	-16	52
24	47	53	6	52	82	30	-24

TABLE VIII

BENDER-GESTALT DESIGN TEST PERCENTAGE CHANGE SCORES
AND DIFFERENCES IN PERCENTAGE CHANGES BETWEEN
EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental	Control	Difference
			E-C
1	-27.1	-20.6	- 6.5
2	-13.1	3.1	-16.2
3	- 1.5	-18.2	16.7
4	- 1.4	-10.6	9.2
5	-14.4	- 9.5	- 4.9
6	2.6	-20.1	22.7
7	0.0	-25.8	25.8
8	-32.4	- 7.9	-24.5
9	-25.7	-38.7	13.0
10	-49.2	-37.6	-11.6
11	3.6	10.8	- 7.2
12	-23.8	-29.1	5.3
13	- 8.9	-37.4	28.5
14	-32.0	-36.5	4.5
15	-23.3	-12.4	-10.9
16	24.1	-11.1	35.2
17	- 1.5	0.0	- 1.5
18	6.4	-47.6	54.0
19	- 1.5	-21.8	20.2
20	4.7	-58.1	62.8
21	18.9	38.1	-19.2
22	5.8	-52.9	58.7
23	49.3	-19.5	68.8
24	12.8	57.7	-44.9

performance. Four of the original test performances were deemed unscorable. Since the poorest score on a performance that was scorable was 236, Dr. Pascal suggested that a score of 236/ be given these four that were otherwise unscorable. Because a decreased score indicates an improved performance, the sign before the difference score has the opposite meaning of those for the two tests previously discussed; that is, a negative sign indicates a greater improvement by the experimental subject while a positive number indicates a greater improvement by the control subject.

Since there was some question as to the suitability of the scoring system for subjects such as these, the performances were ranked by three independent judges. The rankings of these judges, along with the rank as determined by the scoring method, are presented in Table IX. The coefficient of correlation (Rho) between the rankings from scores and the rankings for each independent judge was calculated. For the first administration to the experimental subjects, correlations of .89, .88, and .86 were found. For the second administration to the experimental subjects, the correlations were .88, .91, and .88. For the first administration to the control group, the correlations were .84, .92, and .60. For the second administration to the control group, the correlations were .87, .88, and .83.

The Bender-Gestalt test is primarily a test of motor functioning; therefore, the scores would be expected to improve as children mature. Improvement was shown by thirty-five of the forty-eight subjects, a change that was significant ($P=.02$). Subgroup I showed the greatest

TABLE IX

BENDER-GESTALT DESIGN TEST RANK FOR EACH SUBJECT
AS DETERMINED BY SCORING AND BY THE JUDGES

Subject	<u>Experimental</u>								<u>Control</u>							
	Score	<u>First</u>			Score	<u>Second</u>			Score	<u>F rst</u>			Score	<u>Second</u>		
		CW	TL	CD		CW	TL	CD		CW	TL	CD		CW	TL	CD
1	1.5	1	1	1	9	8	8	6	9	7	9	13	10	15	15	9
2	4	7	6	3	7	9	6	7	11	11	8	15	9	7	11	7
3	6	5	3	4	4	1	2	4	6	2	6	3	4	5	7	4
4	5	3	5	5	2	5	1	9	1.5	1	1	1	1	1	1	1
5	10.5	9	7	7	11	13	10	10	3	4	4	6	2	4	4	3
6	7	4	4	6	6	6	3	3	5	5	5	4	4	3	2	5
7	1.5	2	2	2	1	7	4	2	1.5	8	2	2	4	6	5	2
8	8	10	17	12	15	18	16	13	8	3	3	5	6	2	3	6
9	3	6	8	11	10	4	9	5	4	9	7	16	8	14	12	12
10	17.5	12	16	17	22	22	17	21	18.5	18	19	7	21	17	17	15
11	16	16	15	18	14	12	12	17	15	14	18	8	14	10	10	23
12	15	17	11	20	18	15	20	14	10	12	10	12	11	8	6	11
13	19	14	18	14	17	19	22	15	7	13	11	14	12.5	16	14	16
14	20	22	21	16	21	21	19	20	18.5	19	21	20	20	21	22	21
15	9	18	14	15	13	16	15	11	13.5	10	13	21	15	9	9	13
16	12	8	10	8	3	2	7	1	12	6	12	11	12.5	13	8	8
17	17.5	13	9	10	16	17	18	12	22	16	23	10	18	18	16	10
18	10.5	11	12	9	5	11	13	8	23	20	17	17	24	22	23	22
19	23	23	23	22	23	23	24	24	16	21	15	19	17	19	19	20
20	13	19	19	19	12	14	11	16	17	24	22	24	23	24	20	24
21	14	15	13	13	8	3	5	18	13.5	17	16	18	7	12	13	17
22	22	20	20	21	20	20	21	22	21	22	20	9	22	23	24	18
23	21	21	22	23	19	10	14	19	20	15	14	22	19	11	18	24
24	24	24	24	24	24	24	23	23	24	23	24	23	16	20	21	19

gain with fourteen of the sixteen improving ($P=.002$). Subgroup II did almost as well with thirteen improving ($P=.011$). On the other hand, less than half the subjects of subgroup III improved. In subgroup I both the experimental and control groups had seven subjects showing improvement ($P=.035$ for each). Six experimental and seven control subjects improved in subgroup II ($P=.144$ and $.035$ respectively). In subgroup III not only did neither group show a significant number improving, the number of experimental subjects doing more poorly was almost significant ($P=.144$).

The binomial expansion indicated that the difference in change scores was not significant ($P=.271$). With regard to magnitude, the Wilcoxon Matched-Pair Rank Test indicated that there was a significant difference in favor of the control group ($P=.05$). However, considering both the direction and magnitude of change, there is no difference in the improvement of the two groups.

Hunter-Pascal Concept Formation Test

The Hunter-Pascal Concept Formation Test scores for both the experimental and control subjects are presented in Table X. Also presented are the change scores from first to second administration and the differences between change scores. Percentage change scores were also computed for this test and are presented in Table XI. On this test, as on the Bender-Gestalt previously mentioned, the lower the score the better the performance. Therefore, a negative change score represents an improvement, and a negative number in the difference column indicates that the experimental subject showed a greater improvement.

TABLE X

HUNTER-PASCAL CONCEPT FORMATION TEST SCORES, CHANGES BETWEEN THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES IN CHANGES BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental			First	Control		Difference E-C
	First	Second	Change		Second	Change	
1	251	250	- 1	250	199	-51	50
2	242	218	-24	246	240	- 6	-18
3	251	250	- 1	250	250	0	- 1
4	238	240	2	250	234	-16	18
5	236	210	-26	218	234	16	-42
6	250	250	0	271	250	-21	21
7	242	250	8	253	246	- 7	15
8	232	250	18	252	250	- 2	20
9	252	244	- 8	238	226	-12	4
10	244	246	2	226	206	-20	22
11	250	238	-12	250	240	-10	- 2
12	242	244	2	251	234	-17	19
13	254	234	-20	198	232	34	-54
14	251	238	-13	242	234	- 8	- 5
15	250	250	0	234	164	-70	70
16	250	246	- 4	251	208	-43	39
17	251	240	-11	236	236	0	-11
18	251	238	-13	220	228	8	-21
19	250	178	-72	251	240	-11	-61
20	238	244	6	222	214	- 8	14
21	250	246	- 4	242	242	0	- 4
22	224	220	- 4	234	208	-26	22
23	244	234	-10	240	244	4	-14
24	242	236	- 6	242	218	-24	18

TABLE XI

HUNTER-PASCAL CONCEPT FORMATION TEST PERCENTAGE CHANGE SCORES
AND DIFFERENCES IN PERCENTAGE CHANGES BETWEEN
EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental	Control	Difference
			E-C
1	- 0.4	-20.4	20.0
2	- 9.9	- 2.4	- 7.5
3	- 0.4	- 0.0	- 0.4
4	0.8	- 6.4	7.2
5	-11.0	7.3	-18.3
6	- 0.0	- 7.7	7.7
7	3.3	- 2.8	6.1
8	7.8	- 0.8	7.0
9	- 3.2	- 5.0	1.8
10	0.8	- 8.8	9.6
11	- 4.8	- 4.0	- 0.8
12	0.8	- 6.8	7.6
13	- 7.9	17.2	-25.1
14	- 5.2	- 3.3	- 1.9
15	0.0	-29.9	29.9
16	- 1.6	-17.1	15.5
17	- 4.4	0.0	- 4.4
18	- 5.2	3.6	- 8.8
19	-28.8	- 4.4	-24.4
20	2.5	- 3.6	6.1
21	- 1.6	0.0	- 1.6
22	- 1.8	-11.1	9.3
23	- 4.1	1.7	- 5.8
24	- 2.5	- 9.9	7.4

The binomial expansion indicated that there was no significant difference in the change scores and, in fact, the direction of differences was very near chance ($P=.419$). Similarly, the Wilcoxon Matched-Pair Rank Test indicated no significant difference when magnitude was considered. Therefore, there was definitely no significant difference in the improvement of the two groups. However, it should be noted that thirty-three of the forty-eight subjects showed an improvement; a change that is significant ($P=.05$) and which was expected due to the increased ability of the subjects. An examination of the results by subgroups indicated that only subgroup II had a sufficient number showing improvement to be significant ($P=.038$). Only the control subjects for subgroup II and the experimental subjects for subgroup III had a sufficient number showing improvement to be significant with the probability value being .035 for each.

California Achievement Tests

The California Achievement Tests scores for both the experimental and control subjects are presented in Table XII through Table XVIII. Change scores and differences in change scores are also included. These tests are all scored in the usual manner; therefore, a positive change score indicates an improvement, and a positive difference score indicates that the experimental subject made a greater improvement than did the control subject. Scores given for all the subtests except Letter Recognition are in terms of grade level, while those given for Letter Recognition are raw scores.

TABLE XII

CALIFORNIA ACHIEVEMENT TEST READING VOCABULARY SCORES, CHANGES BETWEEN
THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES IN CHANGES
BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental			First	Control		Difference E-C
	First	Second	Change		Second	Change	
1	1.2	1.3	0.1	1.3	1.5	0.2	-0.1
2	1.2	1.4	0.2	1.3	2.4	1.1	-0.9
3	1.0	1.4	0.4	1.3	1.7	0.4	0.0
4	1.1	1.4	0.3	1.1	1.4	0.3	0.0
5	1.2	1.3	0.1	1.0	1.3	0.3	-0.2
6	1.0	1.4	0.4	1.0	1.4	0.4	0.0
7	1.3	1.7	0.4	1.1	1.5	0.4	0.0
8	1.2	1.4	0.2	1.3	1.5	0.2	0.0
9	1.2	1.9	0.7	1.3	1.8	0.5	0.2
10	2.3	3.5	1.2	1.7	2.1	0.4	0.8
11	1.6	1.4	-0.2	1.9	2.6	0.7	-0.9
12	1.6	1.8	0.2	1.4	1.8	0.4	1.4
13	1.5	1.5	0.0	1.9	3.0	1.1	-1.1
14	1.3	1.7	0.4	1.6	2.3	0.7	-0.3
15	1.4	1.4	0.0	1.4	1.6	0.2	-0.2
16	1.3	1.5	0.2	3.0	4.2	1.2	-1.0
17	2.0	2.1	0.1	3.1	2.0	-1.1	1.2
18	1.5	2.1	0.6	4.0	4.8	0.8	-0.2
19	1.8	1.8	0.0	4.1	4.2	0.1	-0.1
20	1.5	1.6	0.1	3.8	3.8	0.1	0.0
21	1.5	1.3	-0.2	2.0	2.3	0.3	-0.5
22	2.6	2.4	-0.2	2.6	3.8	1.2	-1.4
23	3.3	3.0	-0.3	4.7	4.5	-0.2	-0.1
24	1.9	2.4	0.5	2.4	2.7	0.3	0.2

TABLE XIII

CALIFORNIA ACHIEVEMENT TEST READING COMPREHENSION SCORES, CHANGES
BETWEEN THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES
IN CHANGES BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	<u>Experimental</u>			<u>Control</u>			<u>Difference</u>
	First	Second	Change	First	Second	Change	E-C
1	0.0	1.8	1.8	1.7	1.8	0.1	1.7
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	1.8	1.8	-1.8
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	1.3	1.3	-1.3
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	1.3	1.3	1.3	0.0	-1.3	2.6
8	0.0	1.3	1.3	0.0	0.0	0.0	1.3
9	0.0	1.9	1.9	2.1	1.9	-0.2	2.1
10	2.1	2.1	0.0	1.3	1.9	0.6	-0.6
11	0.0	1.7	1.7	2.5	2.0	-0.5	2.2
12	2.2	1.8	-0.4	0.0	1.8	1.8	-2.2
13	0.0	0.0	0.0	2.0	1.9	-0.1	0.1
14	1.8	1.3	-0.5	2.0	1.3	-0.7	0.2
15	1.9	1.8	-0.1	0.0	2.4	2.4	-2.5
16	0.0	1.3	1.3	2.0	2.1	0.1	1.2
17	1.8	2.5	0.7	2.5	2.1	-0.4	1.1
18	2.1	2.0	-0.1	3.5	3.9	0.4	-0.5
19	2.2	2.4	0.2	2.3	3.9	1.6	-1.4
20	1.9	1.5	-0.4	2.7	3.0	0.3	-0.7
21	1.1	1.8	0.7	2.0	2.0	0.0	0.7
22	2.0	2.6	0.6	3.0	3.1	0.1	0.5
23	3.2	3.6	0.4	3.5	4.0	0.5	-0.1
24	2.1	2.6	0.5	2.6	2.8	0.2	0.3

TABLE XIV

CALIFORNIA ACHIEVEMENT TEST ARITHMETIC REASONING SCORES, CHANGES
BETWEEN THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES
IN CHANGES BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	<u>Experimental</u>			<u>Control</u>			<u>Difference</u>
	First	Second	Change	First	Second	Change	E-C
1	0.0	1.3	1.3	1.7	1.3	0.4	0.9
2	0.0	1.4	1.4	1.5	1.9	0.4	1.0
3	0.0	0.0	0.0	0.0	1.3	1.3	-1.3
4	1.2	1.4	0.2	0.0	1.1	1.1	-0.9
5	1.2	1.4	0.2	1.0	1.1	0.1	0.1
6	0.0	1.4	1.4	0.0	1.4	1.4	0.0
7	1.2	1.6	0.4	0.0	1.1	1.1	-0.7
8	1.2	1.4	0.2	1.3	1.8	0.5	-0.3
9	1.3	1.7	0.4	2.0	1.9	-0.1	0.5
10	2.7	3.4	0.7	1.7	2.6	0.9	-0.2
11	1.5	1.5	0.0	2.2	2.0	-0.2	0.2
12	1.7	2.0	0.3	1.0	1.2	0.2	0.1
13	1.6	2.2	0.6	2.4	2.5	0.1	0.5
14	1.2	1.4	0.2	2.3	2.5	0.2	0.0
15	1.3	1.5	0.2	1.6	1.5	-0.1	0.3
16	1.5	1.4	-0.1	2.7	3.0	0.3	-0.4
17	2.6	2.6	0.0	2.4	1.4	-1.0	1.0
18	1.6	2.1	0.5	4.3	4.9	0.6	-0.1
19	2.1	2.1	0.0	2.6	4.3	1.7	-1.7
20	1.4	1.2	-0.2	3.3	3.5	0.2	-0.4
21	0.0	0.0	0.0	2.2	2.2	0.0	0.0
22	1.1	2.3	1.2	3.3	3.5	0.2	1.0
23	3.0	4.1	1.1	3.8	5.2	1.4	-0.3
24	2.7	2.9	0.2	2.9	3.8	0.9	-0.7

TABLE XV

CALIFORNIA ACHIEVEMENT TEST ARITHMETIC FUNDAMENTALS SCORES, CHANGES
BETWEEN THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES
IN CHANGES BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	<u>Experimental</u>			<u>Control</u>			<u>Difference</u>
	First	Second	Change	First	Second	Change	E-C
1	0.0	1.9	1.9	0.0	1.9	1.9	0.0
2	0.0	1.4	1.4	1.1	1.8	0.7	1.3
3	0.0	1.0	1.0	0.0	1.0	1.0	0.0
4	0.0	1.7	1.7	0.0	1.0	1.0	0.7
5	1.0	1.7	0.7	0.0	0.0	0.0	0.7
6	0.0	1.2	1.2	0.0	1.0	1.0	0.2
7	0.0	1.4	1.4	0.0	1.2	1.2	0.2
8	0.0	1.5	1.5	0.0	1.0	1.0	0.5
9	1.4	1.0	-0.4	2.2	1.9	-0.3	-0.1
10	2.8	3.8	1.0	2.5	2.8	0.3	0.7
11	0.0	1.5	1.5	2.6	2.3	-0.3	1.8
12	2.2	2.3	0.1	1.0	1.4	0.4	-0.3
13	1.7	2.3	0.6	2.9	3.6	0.7	-0.1
14	1.2	2.0	0.8	2.6	3.0	0.4	0.4
15	1.2	1.6	0.4	2.3	2.3	0.0	0.4
16	0.0	1.5	1.5	4.4	4.8	0.4	1.1
17	2.0	1.9	-0.1	2.8	3.0	0.2	-0.3
18	1.3	1.5	0.2	4.4	6.0	1.6	-1.4
19	2.7	3.3	0.6	6.0	5.5	-0.5	1.1
20	2.7	1.4	-1.3	4.1	4.1	0.0	-1.3
21	1.5	1.4	-0.1	2.1	2.4	0.3	-0.4
22	3.1	3.9	0.8	3.4	3.7	0.3	0.5
23	5.6	6.0	0.4	4.8	4.8	0.0	0.4
24	3.3	3.7	0.4	3.6	3.7	0.1	0.3

TABLE XVI

CALIFORNIA ACHIEVEMENT TEST ENGLISH MECHANICS SCORES, CHANGES BETWEEN
THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES IN CHANGES
BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	<u>Experimental</u>			First	<u>Control</u>		<u>Difference</u>
	First	Second	Change		Second	Change	E-C
1	0.0	1.7	1.7	1.4	1.6	0.2	1.5
2	0.0	1.4	1.4	1.7	2.2	0.5	0.9
3	0.0	0.0	0.0	1.6	1.6	0.0	0.0
4	1.0	1.3	0.3	0.0	1.3	1.3	-1.0
5	1.3	1.6	0.3	1.1	1.3	0.2	0.1
6	1.5	1.4	-0.1	0.0	1.0	1.0	-1.1
7	0.0	1.3	1.3	1.3	1.4	0.1	1.2
8	1.5	1.6	0.1	1.4	1.5	0.1	0.0
9	1.6	1.8	0.2	1.8	1.7	-0.1	0.3
10	2.0	3.6	1.6	1.3	1.9	0.6	1.0
11	1.8	2.0	0.2	1.7	1.9	0.2	0.0
12	1.9	1.9	0.0	1.5	1.4	-0.1	0.1
13	1.8	1.9	0.1	2.8	3.3	0.5	-0.4
14	1.4	1.7	0.3	1.8	2.7	0.9	-0.6
15	1.7	1.8	0.1	1.8	1.8	0.0	0.1
16	1.5	1.4	-0.1	2.4	3.0	0.6	-0.7
17	1.7	1.9	0.2	1.9	2.2	0.3	-0.1
18	2.6	1.8	-0.8	3.4	3.7	0.3	-1.1
19	2.0	2.2	0.2	2.4	3.7	1.3	-1.1
20	2.7	1.8	-0.9	3.6	3.9	0.3	-1.2
21	2.2	1.8	-0.4	2.1	2.5	0.4	-0.8
22	2.0	2.2	0.2	3.5	3.7	0.2	0.0
23	3.7	3.8	0.1	3.9	3.9	0.0	0.1
24	2.7	2.7	0.0	4.0	4.4	0.4	-0.4

TABLE XVII

CALIFORNIA ACHIEVEMENT TEST SPELLING SCORES, CHANGES BETWEEN THE FIRST
AND SECOND ADMINISTRATION, AND DIFFERENCES IN CHANGES BETWEEN
EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental			Control			Difference E-C
	First	Second	Change	First	Second	Change	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	1.7	1.7	0.0	0.0	0.0	1.7
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	1.7	1.7	0.0	0.0	0.0	1.7
5	0.0	1.5	1.5	0.0	0.0	0.0	1.5
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	1.7	1.7	1.7	2.5	0.8	0.9
10	4.1	5.0	0.9	2.8	1.4	-1.4	2.3
11	0.0	0.0	0.0	2.5	3.3	0.8	-0.8
12	1.0	1.7	0.7	0.0	0.0	0.0	0.7
13	0.0	1.4	1.4	3.5	3.7	0.2	1.2
14	0.0	0.0	0.0	1.4	1.4	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	4.6	5.0	0.4	-0.4
17	1.4	1.7	0.3	2.2	2.2	0.0	0.3
18	2.5	1.6	-0.9	5.9	6.0	0.1	-1.0
19	1.4	0.0	-1.4	6.0	5.8	-0.2	-1.2
20	0.0	0.0	0.0	5.0	5.3	0.3	-0.3
21	0.0	0.0	0.0	1.4	1.6	0.2	-0.2
22	1.4	0.0	-1.4	2.7	3.1	0.4	-1.8
23	2.5	3.1	0.6	5.0	5.4	0.4	0.2
24	2.7	2.6	-0.1	2.5	2.5	0.0	0.1

TABLE XVIII

CALIFORNIA ACHIEVEMENT TEST LETTER OR WORD RECOGNITION SCORES, CHANGES
BETWEEN THE FIRST AND SECOND ADMINISTRATION, AND DIFFERENCES
IN CHANGES BETWEEN EXPERIMENTAL AND CONTROL SUBJECTS

Subject	Experimental			First	Control		Difference E-C
	First	Second	Change		Second	Change	
1	6	12	6	12	20	8	- 2
2	6	4	- 2	11	21	10	-12
3	6	5	- 1	4	9	5	- 6
4	4	23	19	1	14	13	6
5	6	20	14	3	10	7	7
6	5	10	5	0	6	6	- 1
7	6	16	10	2	11	9	1
8	13	10	- 3	4	14	10	-13
9	15	24	9	23	21	- 2	11
10	24	24	0	24	24	0	0
11	11	13	2	22	24	2	0
12	20	23	3	14	17	3	0
13	23	24	1	24	23	- 1	2
14	21	18	- 3	23	24	1	- 4
15	13	14	1	22	20	- 2	3
16	8	11	3	24	24	0	3
17	9	22	13	17	17	0	13
18	14	18	4	25	25	0	4
19	19	18	- 1	25	19	- 6	5
20	14	15	1	20	19	- 1	2
21	13	17	4	25	21	- 4	8
22	18	19	1	24	22	- 2	3
23	16	15	- 1	17	24	7	- 8
24	18	25	7	23	22	- 1	8

Only two of the seven subtests showed any significant differences between the two groups. The experimental subjects almost showed a significantly greater advancement in Arithmetic Fundamentals. The binomial expansion gave a probability value of .076, while the Wilcoxon Matched-Pair Rank Test indicated that the magnitude of difference was fairly significant ($P=.025$). The control subjects, on the other hand, did better on Reading Vocabulary according to both the binomial expansion ($P=.076$) and the Wilcoxon Matched-Pair Rank Test ($P=.07$). On all the other subtests except Letter Recognition, where the binomial expansion showed a tendency for the experimental subjects to do better ($P=.115$), the differences were very near chance.

An evaluation of the various subgroups indicated that nearly all had a significant number showing improvement or that the number was near significance. Notable exceptions were evident for the Reading Comprehension subtest and the Spelling subtest; both of which had many zero scores. On both the Reading Vocabulary and the English Mechanics subtests the experimental subjects of subgroup III showed only chance insofar as improvement was concerned; i.e., four subjects improved and four did not. The control subjects for both subgroups II and III had less than half their number improving on Letter or Word Recognition. None of the other subtests had half or more than half of the subjects for a subgroup failing to show improvement.

Other Measures

Results of the teacher's ratings of the subjects will not be presented in tabular form but will be discussed in Chapter IV. Although

the ratings did not lend themselves to any type of scaling or to statistical analysis, comparisons across pairs and between the two groups showed very few differences.

The subjects in the study were taught by a total of twenty-six different teachers, nineteen in regular classes and seven in special classes. Information concerning the teachers' background is given in Table XIX. Statistical analysis did not seem appropriate for this data. However, an inspection of the data indicated that the teachers of the two groups were comparable. The only exception was the tendency of the special education teachers (experimental group) to have a larger proportion with advanced degrees. All teachers except one readily made the ratings and gave the information requested. Even this one who was reluctant finally gave the information concerning her training and marked the items on the rating sheet which she felt were "applicable to my students"; that is, items which did not reflect anti-social behavior.

Correlations of the Various Tests with the Binet

The Phi Coefficient of correlation for each of the tests with the Binet was computed. This coefficient was computed for each administration for each group, and the coefficients are presented in Table XX. In order to dichotomize the various scores, the grand median was used. In several cases it was necessary to arbitrarily place subjects in the low or high group when there were tie scores around the median. This was done by placing the subjects with the smallest code number in the low group and those with larger code numbers in the high group. For example,

TABLE XIX
BACKGROUND DATA OF THE TEACHERS WHO TAUGHT
THE SUBJECTS IN THE STUDY

		Number of Teachers	
		Experimental	Control
Total		7	19
Grade taught	1	not applicable	4
	2		4
	3		4
	4		0
	5		5
	6		1
	7		1
Training			
	No college degree	3	8
	BA or BS	1	10
	Degree plus advanced training	3	1
Years of teaching			
	Less than 5	3	3
	5-10	1	4
	10-15	1	4
	More than 15	2	8
Elementary education courses completed			
	0- 5	2	2
	6-10	5	17
Special education courses completed			
	0- 5	5	19
	6-10	2	0
Child development or psychology courses completed			
	0- 5	5	14
	6-10	2	5

TABLE XX
CORRELATION OF THE VARIOUS TESTS USED WITH
THE STANFORD-BINET INTELLIGENCE SCALE

Test	<u>Experimental</u>		<u>Control</u>	
	First	Second	First	Second
Draw-a-Person	.33	.33	.67	.50
Bender-Gestalt Design Test	.50	.67	.50	.50
Hunter-Pascal Concept Formation Test	.00	.33	.50	.33
California Achievement Test				
Reading Vocabulary	.67	.50	.83	.50
Reading Comprehension	.83	.50	.67	.67
Arithmetic Reasoning	.50	.50	.83	.67
Arithmetic Fundamentals	.67	.33	.83	.83
English Mechanics	.67	.67	.83	.67
Spelling	.67	.17	.67	.50
Letter or Word Recognition	.67	.33	.50	.33

if subjects number eight, thirteen, seventeen, and twenty-one were tied at the median, subjects eight and thirteen would arbitrarily be placed in the low group and subjects seventeen and twenty-one in the high group.

An examination of the various coefficients indicated that all the measures were related to intelligence or achievement as measured by the Binet, but they also indicated that some additional information was obtained from each. The Hunter-Pascal Concept Formation Test was least correlated with the Binet. Various subtests of the California Achievement Tests were most closely related to the Binet, indicating the similarity in that which the two tests measure.

CHAPTER IV

DISCUSSION AND CONCLUSIONS

Discussion

One of the most outstanding characteristics of nearly all the data was the relatively few significant differences between the experimental and control subjects. In a number of cases there were trends which indicated that the groups were beginning to show a difference, but not so much difference as to be significant. One possible explanation for this is the relatively brief period of time, six or seven months, that elapsed between the first and the second administration of the tests. It seems entirely plausible to assume that few changes occur in the individual child during a single school year, and for this reason it would be unreasonable to expect differences in such small changes to be significant with respect to previously matched pairs. Therefore, one of the most evident observations is that a study such as this should be conducted over a longer period of time. However, be that as it may with regard to length of time to be covered by such a study, several points are worthy of more discussion.

Three hypotheses were stated in null form. The first was:

The achievement test scores of retarded children in EMR classes will not differ significantly from achievement test scores of matched retarded children in regular classes.

The scores on the California Achievement Tests are the ones most directly related to this hypothesis. Unfortunately, many of the subtests of this test proved unsatisfactory since they were too difficult for the

subjects, and a number of zero scores occurred. Where there was a zero score on both the first and the second administration, it was not possible to tell if any gains were made. Thus for subjects with two zero scores on a given subtest it was possible only to conclude that the child still had not reached the minimal scoreable level when the test was administered the second time. However, there was no way of determining any gains that the child might have made in that particular area. On the other hand, there were children who scored zero on the first administration and then did sufficiently well on the second administration to be within the scoreable range. Under such circumstances it does not seem realistic to try to determine just how much gain was made, since it is not possible to say just where the original "zero" score was on the scale. This problem became even more complicated when one member of a pair had a zero score originally and then showed a gain which by simple subtraction would appear greater than the gain made by the other member of the pair who did not have a zero score originally. Changes from zero were treated as if they were absolute, primarily for statistical reasons; and interpretations based on such changes should be approached with caution. The subtests where the zero scores were most numerous were Reading Comprehension, Arithmetic Fundamentals, and Spelling.

A careful evaluation of the results on the achievement tests can lead only to the conclusion that there were no real differences between the two groups of subjects. With the experimental group doing better on one subtest and the control group doing better on one other

subtest, it would seem to be only a matter of chance that such differences were significant. Thus it would seem plausible to accept the first hypothesis and to conclude that no significant differences could be found due to special class placement.

Turning from strictly achievement differences per se to differences in intellectual functioning brings us to the second hypothesis which stated:

The IQ test scores of retarded children in EMR classes will not differ significantly from IQ test scores of matched retarded children in regular classes.

The one test which was most closely related to this hypothesis was the Stanford-Binet Intelligence Scale. An IQ score was also obtained on the drawing of a person. In addition, both the Bender-Gestalt Design Test and the Hunter-Pascal Concept Formation Test, while not yielding IQ scores directly, do, nevertheless, yield scores that are related to mental age. Thus all four of these tests can be viewed as testing this hypothesis.

The data indicated that the control subjects showed a greater gain on the Binet than did the experimental subjects. This seems entirely reasonable since the Binet--in spite of the designers' attempt to avoid such a condition--is academically oriented as is readily seen by the greater emphasis on verbal facilitation that occurs above the six year level. The child in the EMR class usually has less emphasis placed on the strictly academic material and greater emphasis placed on performance type tasks. Except for those subjects in subgroup I there was very little change in the IQ scores of the experimental subjects from the

first to the second administration except on a chance basis. On the other hand, the investigator is unable to account for the rather radical changes of several of the control subjects. There was no reason to suspect that the control subjects would evidence any change since there was nothing unique or different about their school program other than the administration of the tests. Therefore, the changes must go unexplained unless one is ready to question the reliability of the Binet or unless one is ready to admit that the regular class offers more stimulation than the special class.

Both the Bender-Gestalt Design Test and the Hunter-Pascal Concept Formation Test are measures of the planning ability of a person. Few persons would argue with the statement that the ability to organize activities and to plan work in advance are components of intelligence. Therefore, even though these tests do not measure intelligence directly, the performance on either or both of these tests would be an indicator of intellectual functioning. The majority of the children in each group showed improvement on the second administration of each test as would have been expected, but there was no difference between the groups insofar as improvement was concerned. Thus, insofar as these tests were a measure of intelligence, they showed no significant difference between the child who had special class placement and the child who remained in a regular class.

The changes in IQ as computed for the drawings of a person showed more and larger gains for the experimental subjects. If one accepts the commonly held view among psychologists that figure drawings are related

to personality factors in general and to self-concept specifically, then it would seem evident that special class placement has certain emotional values. In this setting, which we assume to be a more adequate environment, the child tends to view himself as a failure less often since he is being presented with more tasks on which he can succeed. Each additional success helps the child to develop a better self-concept, especially if there is no large number of failures occurring at approximately the same time. As he becomes more confident, he becomes more emotionally secure; and this improvement is reflected in his more adequate drawing. The extent of this improvement becomes more apparent when it is noted that eleven of the subjects showed an IQ improvement of five or more points while only two showed decreases this large. Thus we should feel justified in making the assumption that special class placement is emotionally beneficial for the retarded child.

Considering the various tests that gave measures of intelligence, one might conclude that in general there is no difference in IQ change insofar as regular or special classroom placement is concerned. Evidently the child who remains in the regular classroom tends to make slightly more progress academically as is shown by all the tests included in this study, but the amount of difference is certainly not significant. On the other hand, special class placement may be important insofar as emotional factors are concerned. Thus it can be concluded that there is not sufficient evidence to reject the second hypothesis, but that its acceptance is, at best, tentative and is definitely in need of further investigation.

Neither the achievement scores nor the IQ scores were significantly different. Were there, therefore, no differences observed in the study? To answer this question it would seem appropriate to discuss the third hypothesis which stated:

There will not be a significant difference in achievement test scores of children placed in EMR classes at various age levels and after various amounts of previous school experience.

Several ways of approaching an analysis of this hypothesis were apparent. One would have been to use subjects three, four, five, six, and seven of subgroup I; that is, the subjects who were placed in an EMR class their first year in school, and compare them with all the remaining subjects. Another approach would have been to compare subgroup I with both subgroups II and III. Still another approach would have been to use those subjects at the extremes; that is, compare subgroup I with subgroup III. This latter approach seemed most realistic since there often is not sufficient information available concerning a child to make special class placement practical during his first year in school. Therefore, it was decided that all the children in subgroup I would be designated as the ones placed at an early age. The children in subgroup II had either two or three years of previous school experience. Therefore, the investigator questioned whether or not this was a sufficient length of time to cause them to have become discouraged or to perceive the regular classroom as being an inadequate environment. Those children in subgroup III had from four to seven years of previous school experience which was assumed to be long enough to cause them to recognize clearly the fact that they were failures. Thus for purposes of this discussion subgroups I and III were compared.

More of the younger children than older children showed improvement on the strictly academic material and on the intelligence test most directly related to academic success. This would tend to indicate that after a child has been for a number of years in a situation where he is a failure, he begins to think of himself as being unable to make progress. Even after he is switched to a situation where more success is guaranteed, he continues to make very little progress. Also, it would be realistic to assume that even though a child might be functioning at a given level when tested, future advancement cannot be accurately predicted since it is impossible to determine immediately the adequacy of his background in the basic and fundamental academic areas. Thus when such a child is placed in a special class it may often be necessary to spend much of the time strengthening and rebuilding his educational foundation in order to permit additional advancement. On the other hand, if the child is placed in the class at an early age it is usually possible to begin immediately to instruct him in basic academic material, even if it is at a pre-primer level.

Added to the academic advantages that arise from early placement there is evidence that the child makes more advances in planning his work. Further, these younger children also seem to gain more with regard to visual motor coordination which would be so essential in carrying out the performance type tasks for which these retarded children are most often prepared. The results of the subjects' performance was overwhelmingly in favor of early placement. Not only did the older children fail to advance as did the younger children, six of the eight older

subjects did not do as well on the second administration as they did on the first. This possibly indicates that there is such a thing as waiting too long to place a child in a special class; perhaps he reaches a point where both the ability to plan ahead and the visual-motor coordination needed to carry out a plan deteriorates.

With so much of the evidence favoring the placement of children at an early age, the third hypothesis must be rejected. In fact, it appears that one is justified in concluding that the early placement of retarded children in special classes is to be desired. Permitting children to remain for a number of years in the regular classroom before the placement is made seems unfair.

The investigator was especially interested in discovering any factors which might be helpful in predicting success in an EMR class. It was hoped that either the achievement tests or the intelligence tests or both would show that the children did better in an EMR class than in the regular class. Since neither hypothesis one nor two could be rejected in their null form, it becomes difficult to define "success in an EMR class." From the material discussed so far, only one factor stands out as a predictor of success; namely, that the earlier the child is placed in the special class, the more likely he is to succeed.

The investigator checked a number of potential factors which he had previously believed might be important with regard to special class placement. Accepting the idea that the regular classroom does not provide the retarded child with an adequate environment, one might suspect that the child who was beginning to see himself as a failure might

have more success in a special class. Classifying those children who had ten points or more lower IQ's on the Draw-a-Person than on the Binet as failures failed to show any difference in the advancement made by these subjects as compared to other subjects. Another approach using a similar assumption; i.e., that the subjects showing the greatest gain on the Draw-a-Person perhaps made greater gains in other areas, also proved fruitless.

Numerous studies previously cited indicated that retardates with IQ's below 60 usually show little advancement in an EMR class. Unfortunately, there were insufficient subjects in this study with IQ's below 60 to really make an analysis. However, looking at the data would lead one to conclude that the three subjects within this category performed in a manner similar to all other subjects.

In a similar manner, none of the other tests showed enough difference between the subjects' improvement to warrant considering it as having predictive value. This failure to find a test with adequate predictive value may have been due to the choice of tests used in the study. However, the investigator believes that the failure was due almost entirely to the short length of time covered by the study. Therefore, it would seem realistic to conduct a similar study over a longer period of time, since this one year study did little more than point to several developing trends.

One incidental finding does seem worthy of greater study. Fifteen of the sixteen subjects in subgroup I showed gains in IQ when re-tested with the Binet. Such a change as this is highly significant

($P=.0005$). Also, all ten of the subjects who entered school for the first time during the year that this study was being conducted showed IQ gains, with all gains being five points or more. This, too, is highly significant ($P=.001$). When these results are viewed alongside the previously mentioned findings of Holloway (1954), Kirk (1952; 1958), and Bradway (1944), one feels forced to question the use of the Binet with preschool children. It is possible that the Binet is too academically oriented even at the lower age levels. Or it could be that children become "test wise" after a brief period in school and then do better on all tests. Whatever the cause, a more thorough investigation of changes in test scores during the first year of school, or of kindergarten if the child attends, should be undertaken.

The question of educating every child to the full extent of his potential is still one that haunts the investigator. There was some evidence from this study that the older children make less advancement proportionally than do the younger children. Thus there is some doubt as to the continued education of these retarded children with regard to specifically academic material. It would perhaps be more realistic to attempt to prepare them to be economically self-sufficient by placing even greater emphasis on vocational guidance. Under such a plan, academic material would not be completely ignored but would be more directly related to the vocational training. Since these children advance at a slower rate than do normal children, it is possible that they do not reach their intellectual maximum until a later age. If this be the case, then it might be necessary to keep the child in school until well past

the usual age of adulthood if he is to remain until he reaches his potential. Undoubtedly, such a plan would not be feasible, and the cost would be prohibitive. Therefore, even though it probably pleases the general public to tell them that every child will be educated to the full extent of his potential, such a philosophy certainly needs to be evaluated anew.

While discussing costs, this would be a good point to comment on the usual costs of an EMR class. First, the class must, of necessity, be more expensive than a regular class since the pupil-teacher ratio is much less than that of a regular class. Also, in most systems there is usually some extra transportation costs since it is not always possible to have an EMR class in every school. Additional costs are also usually incurred due to the use of extra equipment and supplies that are necessary to give the child the extras that he usually gets in the EMR class. The costs of the original testing for placement and the extra administrative costs cannot be overlooked. When all these costs are added together, it becomes readily apparent that it costs considerably more to operate EMR classes than it does to operate a regular class. If, as was found in this study, the child does not make any greater academic advances in the EMR class than he does in the regular class, can the cost of the EMR class be justified? Before this question can be answered satisfactorily, it would be necessary to study the social advantages of an EMR class, if any, and to study the eventual social and economic adjustment of the retarded child who has had EMR training as compared to the child who has not had this extra training.

The teacher of the special class is undoubtedly one of the most important factors of the entire program. Unless the teacher is capable of doing an adequate job with the child, it is doubtful that much can be accomplished. The investigator is not an educator and is, therefore, not qualified to make any judgements concerning the teaching ability of the teachers involved in this study. However, he did have a chance to observe some of the work being done in the special classrooms, and subjectively all EMR teachers seemed qualified and competent. While it was not possible to become as well acquainted with the much larger number of regular class teachers, there was no reason to believe that they were not performing their duties in an acceptable manner.

Some comments concerning the teachers were made in Chapter III. There was no apparent difference between the special class and regular class teachers. There was perhaps a slight tendency for the special class teachers to have more training in meeting specific needs of retarded children. Some of the teachers noted that they could definitely use more training in kindergarten and readiness work, additional instruction in arts, crafts, music, speech therapy, etc. One EMR class teacher made the following observation spontaneously when asked what qualified her to teach retarded children:

Patience. . . . Until a child is willing to accept himself and acknowledge and accept his personal limitations he cannot make progress in school or be a happy individual with any obtainable goals to strive toward. This is my thesis? It seems to work.

On the other hand, there were some regular classroom teachers who readily admitted that they were not qualified to teach retarded children and

definitely would not be interested in working with such a group. One typical response was:

I had one graduate course in teaching mentally retarded children. I learned enough to know I am not the one for the job.

If the special classroom provides a better environment for the child, how does this changed environment affect his behavior? The investigator had hoped that some differences in behavior of the two groups would emerge from the teachers' ratings of the subjects. The rating checklist provided the teachers contained a list of behaviors which the teacher should have been able to observe. Many of these were the type behaviors that are usually listed by other children as a basis for the selection or rejection of friends or playmates. There seemed, however, some reluctance on the part of most of the teachers to give any child a "bad" rating. Often the teachers would verbally communicate to the investigator behaviors of the child which seemed to annoy them but then would not rate the children accordingly when given the opportunity. Thus, no difference between the groups became apparent from a close observation of the data.

Conclusions and Recommendations

The following conclusions were reached in this study:

1. There was no significant difference between children in an EMR class and children in a regular class during a one year period insofar as test achievement is concerned.

2. There was no significant difference between children in an EMR class and a regular class during a one year period with regard to changes in IQ scores.

3. Children placed in an EMR class at an early age tend to make more progress than do children placed in an EMR class after several years in a regular class.

4. Factors predictive of success are not apparent from the tests used in this study. However, it is possible to predict more success for children who are placed at an early age.

Since it was not possible to reach more conclusions, the following recommendations are being made:

1. A similar study should be undertaken covering a period of not less than two years, and preferably longer, to more adequately assess some of the trends that seem to be developing in this study.

2. An allied study using the same subjects as the recommended achievement study should be conducted to determine social and emotional gains derived from EMR placement. These studies should be designed so as to permit a follow-up of the subjects after they leave school so that long range changes may be observed.

3. A more adequate screening method needs to be devised to help the individual teacher recognize the retarded child at an earlier age so that the child may receive special attention before he becomes too discouraged in a regular class.

4. A more thorough study of the use of intelligence tests in general, and the Binet in particular, with preschool children should be undertaken to help determine if many preschool children are being under-rated.

5. More school systems should devise plans for placing children in EMR classes as soon after they enter school as possible.

6. The present IQ limits of eligibility should be investigated to determine if there should be some change in the legal requirements for placement. This seems especially true when the apparently little advancement that children at the lower end of the eligibility range have been observed to make is considered.

7. The more effective use of retarded children's performance abilities should be studied by placing more of these children in trade schools or other similar facilities.

CHAPTER V

SUMMARY

This study was designed primarily to study the effectiveness of Educable Mentally Retarded (EMR) classes as measured by changes that occur in achievement test scores, intelligence test scores, and integrative ability test scores during the first year of such placement. Three hypotheses were stated in null form in which it was predicted that there would be no difference in either achievement test scores or IQ between children receiving special placement and those remaining in regular classes and that age of placement would not be important. Also, it was hoped that factors related to the prediction of success due to such placement could be discovered.

There was a total of twenty-four experimental and twenty-four control subjects matched into pairs on a basis of sex, number of years in school, age, and IQ on the Stanford-Binet. In addition, there was some attempt to match on socio-economic factors. Each group was divided into three subgroups according to number of years of school previously attended. Each child was administered a battery of tests near the beginning and again near the end of the school year. Change scores were calculated from the differences between the first and the second administration. The results were analyzed by the use of non-parametric statistics.

The results indicated that the control subjects tended to show more improvement on the Stanford-Binet Intelligence Scale than did the

experimental subjects, but this difference was not statistically significant. On both the Bender-Gestalt Design Test and the Hunter-Pascal Concept Formation Test there was no difference between the groups. The California Achievement Test had five subtests definitely showing no significant difference, while each group had one test tending to show them to be superior. Only the Draw-a-Person test favored the experimental group, and here again the differences were not significant.

The conclusions drawn from the study were that there was no significant difference between the groups with regard to achievement or IQ change. On the other hand, there were many indications that early EMR placement is superior to placement at a later date after the child has begun to recognize his tendency to be a failure. This evidence of early success was the only predictive feature found. It was recommended that a more thorough, long range study be undertaken studying not only achievement, but social and emotional factors as well. Also, it would seem wise to get the retarded children into the special classes as soon as possible. Therefore, a more accurate early screening device is needed, but there are some indications that the Binet yields a score that is too low when administered to a preschool or beginning school child.

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APPENDIX

BEHAVIOR RATING SHEET

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INSTRUCTIONS:

This is part of a dissertation study and all replies will be kept strictly confidential. As soon as this form is returned to Kenneth Warren, the child's name will be removed and a code number substituted to assure complete anonymity.

Please rate _____ in each of the following areas. Ratings should be based on his behavior as it compares with that of other children in your class. While emphasis should be placed primarily on his current behavior, also consider his behavior for the entire 1959-60 school year. Ratings should be as follows:

1. Least of any member of the class.
2. Less than average for the class.
3. More than average for the class.
4. Most of any member of the class.

Code Number _____	1 least	2 below average	3 above average	4 most
1. Absent from class.	1	2	3	4
2. Needs assistance with class work.	1	2	3	4
3. Requests assistance with class work.	1	2	3	4
4. Requires aid with wearing apparel.	1	2	3	4
5. Goes to rest room.	1	2	3	4
6. Pays attention to class work.	1	2	3	4
7. Is disciplined by the teacher.	1	2	3	4
8. Fights with others in the class.	1	2	3	4
9. Cheats in class.	1	2	3	4
10. Lies in class.	1	2	3	4
11. Cries in class.	1	2	3	4
12. Sits still in class.	1	2	3	4
13. Speaks without permission.	1	2	3	4
14. Whispers to others.	1	2	3	4
15. Moves about room without permission.	1	2	3	4
16. Destroys materials and supplies	1	2	3	4
17. Plays with others in the class.	1	2	3	4
18. Steals from his classmates.	1	2	3	4
19. Displays outbursts of temper.	1	2	3	4
20. Bullies his classmates.	1	2	3	4
21. Shows off in front of others.	1	2	3	4
22. Shares things with others.	1	2	3	4
23. Swears in class.	1	2	3	4
24. Smiles in the classroom.	1	2	3	4
25. Cooperates in classroom projects.	1	2	3	4

Add any special characteristics or behaviors that distinguish this child from the others in the class.

BACKGROUND INFORMATION SHEET

INSTRUCTIONS:

Your name is not needed on this blank.

Please check each item below as it applies to you and return to Kenneth Warren. Question VIII is especially important, and a complete answer would be appreciated.

- I. Type class: regular special
- II. Grade taught: 1 2 3 4 5 6 7 8
- III. Training: no college degree
 BA or BS
 degree plus advanced training
- IV. Number of years teaching: less than 5
 5-10
 10-15
 more than 15
- V. Number of elementary education courses: 0 1 2 3 4 5 6 7 8 9 10
- VI. Number of special education courses: 0 1 2 3 4 5 6 7 8 9 10
- VII. Number of child development or
 psychology courses: 0 1 2 3 4 5 6 7 8 9 10
- VIII. Comment on any additional training that would qualify you to
 teach mentally retarded children.