NURSERY SCHOOL EXPERIENCES AND READINESS FOR LEARNING

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ABSTRACT

NURSERY SCHOOL EXPERIENCES
AND READINESS FOR LEARNING

by Mary Jean Oberlin

The purpose of this study was to determine the effect of nursery school experience on the measured intelligence and readiness quotient of the student.

The population used in this study was the twenty children enrolled in the Oberlin Nursery School in Muskegon, Michigan, during the 1965-66 school year. This group comes from an upper-middle-class neighborhood.

The child's change in intelligence quotient while enrolled in nursery school was determined by administering the Stanford-Binet Intelligence Test individually to each child at two different settings with a seven month interval between the settings.

The mean change in intelligence quotient was found to be +4.65. A "t" test was performed to determine if this change was significant. It was found to be significant beyond the one per cent level. The hypothesis, "The intelligence quotient of pre-school children will increase during the time they are in nursery school" was accepted.

The child's change in readiness quotient while enrolled in nursery school was determined by administering The ABC Readiness Test individually to each child at two different settings, with a seven month interval between settings. The ABC Readiness Test is used to assess readiness among

pre-schoolers in Muskegon County. It provides a readiness age which can be converted to a readiness quotient by dividing readiness age by the chronological age.

The mean change in readiness quotient was found to be +6.65. A "t" test was performed to determine if this change was significant. It was found to be significant beyond the one per cent level. The hypothesis, "The readiness quotient of pre-school children will increase during the time they are enrolled in nursery school" was accepted.

NURSERY SCHOOL EXPERIENCES AND READINESS FOR LEARNING

By

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The children and parents involved in this study were most cooperative and understanding in arranging convenient times for testing and interviews. Because of the nature of this study, these people must remain anonymous.

Last of all, a word of thanks to the family for making this possible, the mother-in-law, Grace Oberlin, and mother, Olive Stewart, who filled in so that interviewing and testing could take place, the husband, Lynn, who encouraged and guided and the children, Terri and Kevin, who tried to make long uninterrupted periods of time available.

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CHAPTER I

THE PROBLEM

The Purpose of This Study

The purpose of this study was to determine the effect of nursery school experience on the Intelligence Quotient and the Readiness Quotient of the student.

The Need of This Study

Currently there is great interest in pre-school education. Many positive claims have been made but in most cases no effort has been made to determine the results of nursery school experience. Some encouraging findings have come from the Head Start Programs. These, however, involve a different type of population than the one used in this study. The Head Start Programs are primarily for the culturally deprived and disadvantaged. The sample used in this study came from homes of the middle and upper-middle class population.

Definition of Terms

To clarify this study the following terms were operationally defined.

Nursery School Experiences--Nursery school experiences were such activities as cooperative play, free play, working with peers, listening and telling stories, creative expression with various media, planned

instruction and other experiences not generally provided in the home.

Nursery School Students--Nursery school students were children who were enrolled in a nursery school program.

Nursery School--A nursery school was a school for pre-kindergarten children licensed by the Michigan State Department of Social Welfare and the Michigan Department of Public Instruction.

Nursery School Teacher--A nursery school teacher was a person who was certified as such by the Michigan Department of Public Instruction.

Nursery School Helper--A nursery school helper was a person, approved by the Michigan State Department of Social Welfare, who assisted and helped with the children but who was not a fully trained and certified nursery school teacher.

Pre-School--Pre-school referred to all children who had not yet entered kindergarten.

I. Q.--I. Q. referred to the Intelligence Quotient as measured with the Stanford-Binet Test of Intelligence.

R. Q.--R. Q. referred to the Readiness Quotient as computed from the Readiness Age ($\frac{R.A.}{C.A.}$) as measured with the ABC Inventory Test to determine kindergarten and school readiness. (The ABC Inventory is the

instrument used by the schools of Muskegon County to advise parents as to when to start their children in kindergarten.)

Hypotheses to be Tested

During this study the following hypotheses were tested.

1. The I. Q. (Intelligence Quotient) of pre-school children will increase during the time they are enrolled in nursery school.
2. The R. Q. (Readiness Quotient) of pre-school children will increase during the time they are enrolled in nursery school.

The Organization of This Study

The balance of this study was organized into four chapters which were numbered II, III, IV, and V.

Chapter II Review of Literature--In this chapter literature including both research and theory which relate to the same area as this study is reviewed.

Chapter III Population and Procedure--A description of the nursery school used in this study is given. This includes the nursery school program, personnel, and students. The methods of collecting the data and the instruments used are reviewed. Also stated are the statistical methods used in testing the hypotheses.

Chapter IV Analysis of the Data--Data is reported under the two general areas of

(1) The changes in Students' I. Q.'s.

(2) The changes in Students' R. Q.'s.

The hypothesis related to each of the above areas was tested.

Chapter V Summary, Conclusions, and Implications--Material is summarized, conclusions and implications are drawn, and recommendations are made.

CHAPTER II

REVIEW OF LITERATURE

Educational literature has many articles which deal indirectly with the areas covered by this study. The review of literature related to this study was divided into two parts: (1) that which pertains to theory, and (2) that which was established by research. For the purpose of this study, all literature not directly connected with the reporting of research findings was considred to be theory.

Theory

Much has been written, especially recently, on the value of nursery schools. In 1966, the Educational Policies Commission reported "Research shows clearly that the first four or five years of a child's life are the period of most rapid growth in physical and mental characteristics and of greatest susceptibility to environmental influences. ..... Early education is advisable for all children because they are ready by the age of four for a planned fostering of their development and because educators know some of the ways to foster it through school programs."[1]

Professor J. McV. Hunt, University of Illinois, believes "It is no longer unreasonable to consider that it might be

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[1] Educational Policies Commission, "Begin Public Education at the Age of Four," The Education Digest, Vol. XXXII, No. 1, September, 1966. Pages 1-4.

feasible to discover ways to govern the encounters that children have with their environments, especially during the early years of their development to achieve a substantially faster rate of intellectual development and a substantially higher adult level of intellectual capacity."[1]

In an article describing what nursery school could and could not do for a child, Dr. Ira J. Gordon of the University of Florida states that nursery school does provide some of the essential experiences to help children to move toward self-esteem.[2] Since self-esteem is so important in helping the child form a good self-concept, it would seem that this is rather significant. In his work at the Fels Research Institute for the Study of Human Development in Yellow Springs, Ohio, Dr. L. W. Sontag felt that "success leads to success."[3] In studying the I. Q.'s of 140 children from the age of 2 to 12, he theorized that intellectual growth was due to a sense of independence developed among the children. Children high in independent problem solving behavior and the need for competition showed positive increases in I. Q. He felt that sound mental health

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[1]Henry Chauncy, "Intelligence and the Important Early Years," The Education Digest, XXIX, April, 1964, pages 23-25.

[2]Ira J. Gordon, "What Nursery Schools Can and Cannot Do," P. T. A., September, 1963, Vol. LVIII, No. 1, Pages 10-12.

[3]L. W. Sontag, M. D., "Can We Increase Intelligence?" The P. T. A. Magazine, Vol. LX-No. 3, November, 1965, pages 20-22.

strengthened their self-concept and gave them a need to achieve, compete, and strive for independence. He suggested that over protection might harm the growth of intelligence. Praising a child for being independent would tend to increase the child's ability to do better which in turn helped him strive and compete. It would seem then that successful adjustment and growth in intelligence is fostered by settings where the child has an opportunity to act, think, and experiment on his own.

In an article on the benefits of nursery school, Dr. Smith, a Portland, Oregon physician, asserts that an important reason for early schooling is "the positive attitude toward education that the child derives from this experience. If the child has a happy year or two with a skilled nursery school teacher, grade school should pose no problem. He will have developed a feeling toward education, a feeling toward learning."[1] He also suggests that the "I. Q. can be raised if the child is stimulated early and skillfully under conditions that do not upset the child's equilibrium, or in any way make him feel pushed or pressed."[2]

New York City officials announced early in 1968 that they hoped to open two experimental mini-schools the following September in renovated buildings for 2-year-olds. "The

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[1]Lendon K. Smith, "The Doctor Looks at the Nursery School," Education, 87:474-477. April, 1967.

[2]Ibid., pp. 474-477.

earlier we get youngsters," says one administrator, "the better the chances of their doing well in school later."[1]

In her book on early elementary education, Myrtle M. Imhoff states, "The Nursery School and kindergarten programs are the natural and logical educational steps of a gradual transition into readiness for more mature developmental levels of learning. Such programs have important values for the child as an individual and as member of groups, and for parents and society in general."[2]

E. M. Standing, in exolling the virtues of Montessori schools for young children reports "the children work with such zest that not only do they cover the necessary ground, but they are found to be more alert, more independent, more full of initiative, and generally better informed than is usual at their age."[3]

While it is true that success is desirable in most cases, children need also know how to cope with failure and utilize it as a learning experience. Ethel Kawin, in discussing the problem of failure, says, "Research has demonstrated that young children who show undesirable reactions toward failure can be helped through the guidance

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[1] "Starting Them Young," Newsweek, January, 1968. P. 47-48.

[2] Imhoff, Myrtle M. Early Elementary Education. New York: Appleton-Century-Crofts, Inc., 1959, p. 110.

[3] E. Mortimer Standing, "The Proof of the Pudding--An Inquiry into the Results of the Montessori Method," Children's House, March/April, 1967, p. 18-22.

of nursery school teachers to develop more constructive ways of meeting failure."[1]

Today it is evident that all aspects of the elementary school curriculums have their roots in the nursery group and kindergarten. The child takes on essential attitudes, develops the beginnings of skills, and builds concepts basic to all fields of knowledge. He learns at his age level what will be a foundation for his later learning about health, social studies, science, mathematics, language, literature, art and music. "He starts joyously into the whole world of knowledge when he has experience in a well-planned curriculum."[2]

Research

The United States Department of Health, Education, and Welfare in one of their publications states "Findings give evidence that good schools for children below 6 years old lay the foundation for their later education."[3]

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[1]Prevention of Failure, Dept. of Elem.-Kindergarten Nursery Education, National Education Association, 1965, pp. 80-81.

[2]Vivian Edmiston Todd and Helen Heffernan, The Years Before School: Guiding Preschool Children. New York: MacMillan Co., 1964, pp. 20-22.

[3]Lillian L. Gore and Rose Koury, Educating Children in Nursery Schools and Kindergartens, U. S. Department of Health, Education and Welfare, OE-20054, No. 11, 1964, p. 1.

In his studies with nursery school children, Clark E. Moustakas found an advantage in motor development, and adjustment in favor of nursery school children. Several studies revealed that with increase in nursery school attendance, children were more sociable, constructive and persistent in their activities; chose friends with more similar interest; and engaged in less solitary play. Other studies suggested that, with training in nursery schools, response to failure situations was more mature, and children showed more persistence and less sensitivity to criticism than did other children. In the area of intellectual development, the evidence showed that attendance can counteract loss in language development and that kindergarten children with at least 100 days of nursery school are significantly ahead of non-nursery school children on information, reading readiness, and vocabulary tests.[1]

In looking over earlier research, it would seem that many of the people working in the 20's and 30's felt nursery school was not significant in raising the intelligence quotient. Page's conclusions after testing children who had attended nursery school and comparing them to siblings who had not, was that nursery school attendance did not increase subsequent test performance as there was no

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[1]Moustakas, Clark E. "Personality Studies Conducted in Nursery Schools." Journal of Educational Research, 46; November, 1952, pp. 161-177.

significant difference between the I. Q.'s of the groups.[1] In a similar study, Hildreth tested first graders and found that the children with nursery school or kindergarten experience exceeded the others by 5.69 points, but by a re-test in 18 months, the children with early school experience only were 1.66 points ahead of their peers. She concluded there was no real difference between the groups as the advantage of early childhood schooling tended to disappear within two years of subsequent schooling.[2] A study to determine the correlation between nursery school experience and I. Q. increase scored almost zero for Goodenough.[3]

More recent studies seem to favor nursery school. Ross and Douglas found that in a survey of 290 children who had attended nursery schools or classes, the work these children did at the age of eight in school was slightly higher in

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[1]James D. Page, "The Effect of Nursery School Attendance Upon Subsequent I. Q." Journal of Psychology-X, 1940, pp. 221-30.

[2]Gertrude Hildreth, "The Effect of School Environment upon Stanford-Binet Tests of Young Children." Nature and Nurture. Twenty-Seventh Yearbook, Part I, National Society for the Study of Education, Bloomington, Ill. Public School Publishing Co., 1928, pp. 355-59.

[3]Florence L. Goodenough, "A Preliminary Report on the Effect of Nursery School Training Upon the Intelligence Test Scores of Young Children." Nature and Nurture. 27th Yearbook, Bloomington, Ill. Public School Publishing Co., 1928, pp. 361-69.

test scores in ability and school performance than that of the non-nursery attendance group.[1]

In studying the intelligence test recores of 652 children at the Iowa Child Welfare Research Station, Beth Wellman concluded that the increase in I. Q. scores from fall to spring was due to nursery school attendance.[2] There was a negative change from spring to fall when the children were not in nursery school.

Professor Benjamin Bloom of the University of Chicago estimates that extreme environments (the difference between a very favorable environment and an underprivileged environment) each year in the first four may affect the development of intelligence by about 2.5 I. Q. points per year (or ten I. Q. points over that four-year period) while extreme environments during the period of ages eight to 17 may have an effect of only 0.4 points per year.[3]

In 1966, Dr. Julius Richmond, Director of the Head Start Program said the children enrolled in the summer program entered school better prepared, with greater confidence

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[1]J. W. B. Douglas and J. M. Ross, "The Later Educational Progress and Emotional Adjustment of Children Who Went to Nursery Schools or Classes," 10770, Psychological Abstracts, Vol. 39, No. 4, August, 1965, p. 1204.

[2]Beth L. Wellman, "The Effects of Preschool Attendance Upon Intellectual Development." Child Development and Behavior. (Edited by R. G. Barker and others) New York: McGraw-Hill Book Co., 1943, pp. 229-44.

[3]Henry Chauncy, "Intelligence and the Important Early Years," The Education Digest, April, 1964, Vol. 29, p. 24.

and with considerably better capacity for work than children not enrolled in the program.[1] As an example, he cited the gain of four to 12 months on intelligence test performance during a six-week Head Start Program at Clovis, California.

A gain of 14 months in performance on a test designed to measure intellectual ability was reported by Dr. Richard Silberstein of the Staten Island Head Start Project.[2]

Brown and Hunt write of a study of 84 kindergarteners where half had previously attended nursery school and the others had not.[3] Their kindergarten teacher was asked to rate each child as to how she felt the child adjusted to kindergarten activities, peers and personal adjustment. The teacher did not feel that the nursery school children differed in intelligence from the non-nursery school children. However, the teacher did rate the non-nursery school children as better adjusted and more cooperative.

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[1] Scholastic Teacher, "Head Start Report, " New York: Scholastic Publications, March 18, 1966, p. 2.

[2] Erwin Knoll, "Will Public Schools Control Head Start?" Nation's Schools, 77, No. 6, June, 1966, pp. 48-49.

[3] Ann Wilson Brown and Raymond G. Hunt, "Relations between Nursery School Attendance and Teacher's Ratings of Some Aspects of Children's Adjustment in Kindergarten." Child Development, 32: 585-96, September, 1961.

A similar study by Allen and Masling in comparing nursery school pupils with non-nursery school pupils found that the nursery school group was better adjusted by second grade.[1] This raises the possibility of it taking two years to do away with the independent behavior and self-sufficiency developed in nursery school atmosphere where self-discovery and free expression is encouraged as opposed to most kindergarten and first grade programs that are more structured and rigid.

The prime wish of Head Start planners was readiness for formal schools. They also hoped for a minimum academic gain from Head Start experiences in an increase of from five to ten points in I. Q.[2]

In direct opposition of this was Anderson's study of children who had six months of nursery school as compared to a control group with no nursery school experience. He found that the nursery school group gained 2.41 I. Q. points while the non-nursery school group lost 1.23 points. After obtaining a critical ratio of 1.18, he decided that

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[1]G. Allen and J. Masling, "An Evaluation of the Effects of Nursery School Training on Children in Kindergarten-First-Second Grades." Journal of Educational Research, 1957, 51, pp. 285-296.

[2]William F. Brazziel, "Two Years of Head Start," Phi Delta Kappan, Volume XLVIII-No. 7, March, 1967, pp. 344-348.

the results indicated that nursery school experience had no specific effect on increase in I. Q.[1]

Stressing the importance of a pre-school training program that would reduce the drop out rate, Martin Deutsch, Director of the Institute for Developmental Studies and Professor of Psychiatry at the New York Medical College, writes "We have some preliminary data on this which indicate that pre-school, kindergarten, or day-care experience, or a combination of these, is associated with higher group intelligence test scores. The scores are higher in the first grade, and the differential tends to be accentuated in a fifth grade.....I would hypothesize a very strong relationship between the first school experiences of the child and academic success or failure, and that the more invarient the school experience, the more important the early experience would be to the academic success of the child. I would also hypothesize that children who have had a pre-school and kindergarten experience are more likely to cope appropriately with the kinds of things the school demands intellectually than are children who have not had this experience."[2]

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[1]L. Dewey Anderson, "A Longitudinal Study of the Effects of Nursery School Training on Successive Intelligence-Test Ratings." Intelligence: Its Nature or Nurture. Thirty-Ninth Yearbook, Part II, National Society for the Study of Education. Bloomington, Illinois: Public School Publishing Co., 1940, p. 3-10.

[2]Fred M. Hechinger, Editor, Pre-School Education Today. Garden City, New York: Doublday & Co., 1966, pp. 18-20.

In discussing the values of early childhood education, Elizabeth Mechem Fuller sums up with, "In the last analysis, what is certain to be learned from such a literature search is that given a normal and ready child, an alert and skilled teacher, some ingenious materials, time to work, and an atmosphere and physical plant which is conducive to learning--all is well! But let any one element be lacking or less than perfect and trouble can occur. Research can reveal what these elements are and what casual relations exist; it becomes the task of the educator to translate the research contributions into actions and to remain receptive to the continuing process of evaluation and re-evaluation carried on by anyone with the interest and the ability to do the job well."[1]

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[1]Elizabeth Mechem Fuller, Values in Early Childhood Education. Dept. of Kindergarten-Primary Education, National Education Association, 1960, p. 62.

CHAPTER III

Population of the Study

The nursery school children used in this study were enrolled in the Oberlin Nursery School of Muskegon, Michigan during the 1965-1966 school year. This was the only nursery school in Muskegon County and operated two days a week. Since the Oberlin Nursery School was a private school and charged a tuition of five dollars per week, the students who attended were there because they wanted to be and the parents wanted them to be. This helped to produce a highly motivated group. The children were divided into two groups; one met in the morning and the other one in the afternoon. No attempt was made to separate the children according to ability or any other criteria. The selection of sessions was a matter of parental choice on a first come-first choice basis. The school was licensed for fifteen students per session. There were move outs and move ins, making 20 students in attendance during the complete duration of this study.[1] These students made up the population which was used. The group was composed of 14 boys and

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[1]One of the twenty students moved away in March. The time interval between testing was shorter in her case. She is student number 20.

6 girls. When the study started in October, the youngest student was a boy 3 years and eleven months old while the oldest student was a boy 5 years and one month old. This population came from an upper-middle class neighborhood. Four of the students had physicians for fathers, four other students had teachers for both parents. Twelve of the fathers of these students were college graduates, six had attended some college, one was only a high school graduate and one had completed only eleventh grade. Ten of the mothers of these students were college graduates, seven had attended some college, and the other three were only high school graduates. Information concerning the students' birthdates, sex, their parents' occupations and formal education, is listed in Appendix D.

Procedure Used in This Study

The Stanford-Binet Scale and the ABC Inventory were administered individually to each student during October of 1965. The same tests were re-administered during May of 1966 to the same students again on an individual basis.

As each test was administered at a special time, this was a total of four separate testing situations for each student. The testing took place with only the examiner and the student present.

The students were given the regular program of the Oberlin Nursery School. This consisted of about 45 minutes of free play or some days, a directed art activity that

needed time to dry and then the free play. The music period lasted from 5 to 15 minutes depending on the wishes and motivation of the group and consisted of formal nursery school song learning, rhythms, musical games, and impromptu musical experiences. After a bathroom period, a snack of milk and crackers was served which was followed by a quiet period of story time, quiet play (puzzles or looking at books) or listening to records. Such materials and equipment as art supplies and musical instruments were available at all times to experiment with, as were dress-up clothes and all types of large and small muscle play materials such as blocks, dolls, and large boards. The children did not take field trips in cars, although they often explored the $3\frac{1}{2}$ acres of nursery school land. There were planned exhibitions such as a fire truck demonstration, a young baby, puppies, turtles, geese, fish, rabbits, and ducks. Even a policeman visited the nursery school. Some children with a special interest in mathematics worked with various types of exploratory mathematics materials. Some children were more interested in artistic expression or engineering feats than others. A balanced program was casually maintained and the children were allowed to indulge in their interest of the moment. The program contained free and directed play, music and art experiences, conversation and story time, math and science informal teachings, and dramatic play. Some days found much more of one

type of work than another. The school was approved by the state nursery school consultant who inspected the equipment and program frequently with no warning of when she would appear. The profit from tuition was used to purchase equipment such as books, toys, records and art supplies.

In presenting new ideas and concepts, special care was taken to be sure that the students were not exposed to any direct answers to any of the questions on either of the tests used in this study. In some cases deliberate deletion of certain material was made to insure that the tests would be valid and not influenced by teaching that might "cram" the children.

This study was originally planned with a control group. The children in this group were selected and the ABC Inventory was administered to each in the fall and the spring. These children were tested in their own homes. Unfortunately, a majority of the parents overheard the questions and primed the children for the next test. These parents were trying to be helpful and openly stated to the examiner that they had worked with their children so that they should do much better. The data were so contaminated that this part of the study had to be abandoned.

The data from the nursery school children was not affected as they were tested in the privacy of the nursery school. This study was then completed as action research using the nursery school group and basing the results on the changes in this group.

Instrumentation

The Stanford-Binet Scale is an individual intelligence test which takes about one hour to administer. It was scored in months (mental age) and when divided by the chronological age, yielded the intelligence quotient.

To determine kindergarten and school readiness, the ABC Inventory was used. This is an individual test, requiring about 15 minutes to administer. Scoring was accomplished by converting the "raw score" into readiness age as suggested by the accompanying Ready-Age Table on the front of the test form. The readiness quotient was computed by dividing by the chronological age.

Each test was administered individually to students in the Oberlin Nursery School during October of 1965 and repeated in May of 1966. The time between the two tests was approximately seven months.

Analysis of the Data

The following tests were carried out on the data:

1. A "t" test was performed to determine if the nursery school students' I. Q.'s were the same after attending nursery school as they were before. This test was performed by

using the sum of the differences of each student's scores.[1] This tested the first hypothesis that pre-school children's Intelligent Quotients would increase during the time that they are enrolled in the nursery school.

2. A "t" test was used to determine if the nursery school students' R. Q.'s are the same after they attended nursery school as they were before. This test was performed by using the sum of the differences of each student's scores.[2] This tested the second hypothesis that pre-school children's R. Q.'s will increase during the time that they are enrolled in nursery school.

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[1] Richard P. Runyon and Audrey Haber. Fundamentals of Behavioral Statistics. Addison-Wesley: Reading, Mass., 1967, pp. 169-171.

[2] Ibid.

CHAPTER IV

ANALYSIS OF THE DATA

The Intelligence of the Children

Each Stanford-Binet test was scored in terms of a mental age and an intelligence quotient. In October the mean chronological age of the group was 54.15 months. The mean mental age of the group was 61.65 months. The mean mental age for the May test was 72.25 months. Information containing individual students' mental and chronological ages is summarized in Appendix E.

The mean intelligence quotient of the 20 children in October was 114.4 points. Their mean intelligence quotient in May was 119.05 points. The mean change in intelligence quotient from the October testing date to the May testing date was an increase of 4.65 points. Individual intelligence quotient scores are shown in Appendix F.

A "t" test was performed to determine if the nursery school children's intelligence quotients were the same after attending nursery school as they were before. This test was performed by using the sums of the differences of each student's scores.[1] The "t" ratio was found to be 3.69

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[1]Richard P. Runyon and Audrey Haber. Fundamentals of Behavioral Statistics. Addison-Wesley: Reading, Mass., 1967, pp. 169-171.

which was greater than the table value of "$t_{.995}$" (2.86)[1]; the mean increase of 4.65 in intelligence quotient is significant beyond the one per cent level of significance. The hypothesis, that the intelligence quotient of pre-school children will increase during the time they are enrolled in nursery school was accepted at the one per cent level of significance.

Statistical information from the "t" test of the differences in intelligence quotients is listed in Table 1.

TABLE 1. Statistical summary of the results of the "t" test to determine if the children's intelligence quotients were the same after attending nursery school as they were before.

I. Q.	(Fall Average)	114.40
I. Q.	(Spring Average)	119.05
I. Q.	(Change: Spring-Fall)	+4.65
S = 5.63		
S = 1.26		
"t"= 3.69[a]		

[a]Significant beyond the one per cent level of significance

[1]Wilfrid J. Doxon and Frank J. Massey, Jr., Introduction to Statistical Analysis. New York: McGraw-Hill, 1957, p. 384.

The Readiness of the Nursery School Children

Each ABC Inventory test was scored in terms of items correct and the raw score converted into readiness age and readiness quotient. In October the mean chronological age of the group was 54.15 months. The mean readiness age of the group was 55.15 months. The mean readiness age for the May test was 66.15 months. Information containing individual students' readiness and chronological ages is summarized in Appendix G.

The mean readiness quotient of the 20 children in October was 101.9 points. Their mean readiness quotient in May was 108.55 points. The mean change in readiness quotient from the October testing date to the May testing date was an increase of 6.65 points. Individual readiness quotients are shown in Appendix H.

A "t" test was performed to determine if the nursery school children's readiness quotients were the same after attending nursery school as they were before. This test was performed by using the sums of the differences of each student's scores.[1] The "t" ratio was found to be 3.69 which was greater than the table value of "$t_{.995}$" (2.86), so the mean increase of 6.65 in readiness quotient is significant beyond the one per cent level of significance. The hypothesis, the readiness quotient of pre-school children

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[1]Runyon and Haber, loc. cit.

will increase during the time they are enrolled in nursery school was accepted at the one per cent level of significance.

Statistical information from the "t" test of the differences in readiness quotients is listed in Table 2.

TABLE 2. Statistical summary of the results of the "t" test to determine if the children's readiness quotients were the same after attending nursery school as they were before.

R. Q.	(Fall Average)	101.90
R. Q.	(Spring Average)	108.55
R. Q.	(Change: Spring-Fall)	+6.65
S = 8.06		
S = 1.80		
"t" = 3.69[a]		

[a]Significant beyond the one per cent level of significance

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The purpose of this study was to determine the effect of nursery school experience on the intelligence quotient and the readiness quotient of the student.

Most authorities agree that the environment has a great effect on the pre-school child's learning. Many believe that it may affect the child's intelligence quotient. Some research evidence tends to support this point of view.

The population used in this study was the twenty children enrolled in the Oberlin Nursery School in Muskegon, Michigan, during the 1965-66 school year. This group comes from an upper-middle-class neighborhood.

The child's change in intelligence quotient while enrolled in nursery school was determined by administering the Stanford-Binet Intelligence Test individually to each child at two different settings with a seven month interval between the settings.

The mean change in intelligence quotient was found to be +4.65. A "t" test was performed to determine if this change was significant. It was found to be significant at

beyond the one per cent level. The hypothesis, "The intelligence quotient of pre-school children will increase during the time they are in nursery school" was accepted.

The child's change in readiness quotient while enrolled in nursery school was determined by administering the ABC Readiness Test individually to each child at two different settings, with a seven month interval between settings. The ABC Readiness Test is the test used to test pre-schoolers in Muskegon County. It scores directly in a readiness age which was converted to a readiness quotient by dividing the readiness age by the chronological age.

The mean change in readiness quotient was found to be +6.65. A "t" test was performed to determine if this change was significant. It was found to be significant beyond the one per cent level. The hypothesis, "The readiness quotient of pre-school children will increase during the time they are enrolled in nursery school" was accepted.

Conclusions

From the data, the following conclusions about the sample used in this study were drawn:

1. Pre-school children's intelligence quotients were raised while they were enrolled in nursery school.

2. Pre-school children's readiness quotients were increased while they were enrolled in nursery school.

Implications

It would seem that many problems would be alleviated by a successful well planned pre-school or nursery school program for three and four-year-olds. If nursery school experience is a contributing factor to increasing children's intelligence and readiness, then this nursery school experience should help to cause other desirable changes. This is the time when a favorable environment combined with an eager, curious child can produce an avid learner. Good habits of inquiry and discovery are easily developed at this age. Developing a good self-concept should help spur the child onto higher learning, thus decreasing greatly the present drop-out rate of students from environments that haven't fostered intellectual activities and goals. Public school Kindergarten would not be the trauma it often is to some children if they had early education in a happy nursery school atmosphere. Children from all of our social and economic levels would benefit. The motivated middle class would continue to strive and the "disadvantaged" would tend to fill in the gap and "catch up." Thus, slower or disadvantaged children would profit as well as those intellectually talented.

This study is limited in scope because of the size of the population used. More research is needed with greater numbers of children. It would be beneficial to find out whether these gains in intelligence quotient and in readiness quotient hold in future years or whether they are temporary. A longitudinal study might also be in order to determine what other effects nursery school attendance would have on children. Studies comparing intellectual gains of children from different social-economic groups should prove very revealing. There is also the need for research to determine the maximum and minimum advantage to be found in nursery school programs of various time lengths.

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APPENDIX

APPENDIX A: ABC Inventory Test Sheet

A B C INVENTORY

To Determine Kindergarten & School Readiness

By NORMAND ADAIR and GEORGE BLESCH

Name ..... Sex ..... Date _____
yr. mo. day

Address ..... Born _____
yr. mo. day

School ..... Dist. ..... Age _____
yrs. mos.

	Total
I _____	
II _____	_____ Readiness Age
III _____	
IV _____	_____ _____ Yrs. Mos.

Total Raw Sc.	R-A Yrs. Mos.	Total Raw Sc.	R-A Yrs. Mos.	Total Raw Sc.	R-A Yrs. Mos.	Total Raw Sc.	R-A Yrs. Mos.	Total Raw Sc.	R-A Yrs. Mos.	Total Raw Sc.	R-A Yrs. Mos.
25-29	3—6	45-47	4—1	65-66	4—8	82	5—2	94	5—8	106-108	6—2
28-30	3—7	48-50	4—2	67-69	4—9	83-84	5—3	95-96	5—9	109-110	6—3
31-33	3—8	51-54	4—3	70-71	4—10	85-86	5—4	97-98	5—10	111-114	6—4
34-36	3—9	55-57	4—4	72-77	4—11	87-88	5—5	99-100	5—11	115-118	6—5
37-38	3—10	58-60	4—5	78-79	5—0	89-90	5—6	101-103	6—0	119-120	6—6
39-41	3—11	61-62	4—6	80-81	5—1	91-93	5—7	104-105	6—1	121-122	6—7
42-44	4—0	63-64	4—7								

SECTION I

"Draw-Man"

Score four points for any of the following items present:

_____

head

legs

arms

body

neck

eyes

nose

mouth

hair

feet

clothing (see manual)

fingers

hand

thumb

ear

eyebrow

other

Total _____

SECTION II

Score two points for any a, b or c items answered correctly. 32 points possible.

Points

1. What has:

_____ (a) wings. (*Any winged insect, bird or machine.*)
(b) 4 wheels. (*Any 4-wheel object or device.*)

2. Tell me the color of:

_____ (a) grass (*green*) (b) an apple (*red*)
(c) a banana (*yellow*)

3. Which is larger:

_____ (a) a dog or a cat (b) cow or a pig (c) man or a boy

4. What time of the year:

_____ (a) do we swim (*summer*) (b) does it snow (*winter*)

5. Which is faster:

_____ (a) a car or a horse (b) a train or a truck

6. How many wheels does:

_____ (a) a motor scooter have. (*Two*)
(b) a wheelbarrow have. (*One*)

7. When is:

_____ (a) The 4th of July (b) Christmas
(Suggest summer or winter for "a", no help for "b")

_____ Total

SECTION III

Score two points for each of the following items answered correctly. 12 points possible.

_____ 1. What is ice when it melts? (*Water*)

_____ 2. What makes a cloudy day bright? (*Sun*)

_____ 3. If today is Sunday, what is tomorrow?

_____ 4. What makes day warmer than night? (*Sun*)

_____ 5. How do we hear? (*With our ears*)

_____ 6. What are your eyes for? (*To see or look*)

Total

SECTION IV

Score eight points for each item completed successfully. 32 points possible.

_____ 1. Counting 4 squares (above).

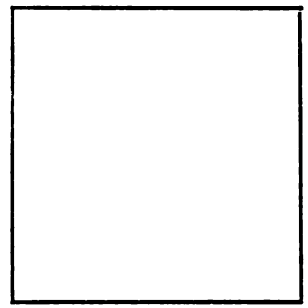
_____ 2. Fold a paper triangle.

3. Repeat 4 digits (one success in three trials).

_____ (a) 3725 (b) 4531 (c) 8694

_____ 4. Copy a square (one success in 2 trials).

_____ Total



APPENDIX B: ABC Inventory Test Manual

The

A B C INVENTORY

TO DETERMINE

KINDERGARTEN AND SCHOOL READINESS

ADMINISTRATION AND SCORING PROCEDURES

FOR

EXAMINERS AND TEACHERS

Prepared and distributed by
EDUCATIONAL STUDIES & DEVELOPMENT
1357 Forest Park Rd. - Muskegon, Michigan 49441

Research Edition

ADMINISTRATION AND CONDITIONS FOR SCORING

The ABC Inventory is straightforward and direct. With very little effort, the examining person will become comfortable and effective in presenting questions. Usually eight or nine minutes is all that is necessary to obtain the information needed. Suggested correct answer in italics follows questions that have no obvious answer. Scoring can be accomplished as the examination is conducted and final raw scores can be readily interpreted. A supply of paper cut into six inch squares approximately the weight of typing paper, a few large pencils like the ones used in the early elementary grades and the ABC Inventory are all that are necessary.

Other than a normal regard for the comfort of the child, no special conditions for testing are required. The kindergarten classroom is a likely test setting as the furnishings and equipment accommodate physical features of small children. Keeping the child at ease by reassuring and encouraging him should be a primary concern. It is often helpful to put the child at ease by asking the name of a sibling or requesting him to name some simple object in the room.

The inventory is constructed in four sections and items are placed according to difficulty but sequential progression is not essential. Instructing the youngsters to draw a man (Section I) is perhaps a good method for introducing the ABC Inventory and for establishing initial rapport. Frequently, children find this threatening and will respond more securely to other items such as a request to copy a square. Essentially, an examiner will want to establish a friendly relationship with the child and only determine whether or not the child knows the answer to any given item regardless of its placement or sequence in the test form. Fill in all identifying information on the test form face sheet and do necessary subtraction to obtain age in years and months (ignore days).

The ABC Inventory is not an intelligence test. It is not a highly complicated questionnaire. Items and tasks included in the inventory are familiar to educators and long have been recognized as pertinent to growth and development aspects. It has been used with a high degree of success in identifying children who subsequently demonstrated inadequate school performance. Hopefully, its use will provide a greater understanding of maturation as related to learning, reduce the risk of academic difficulties and failure, enhance better mental health and self concepts among school children and provide a basis for better parent-teacher understanding.

SECTION I

Provide the youngster with a large pencil and the test form. Place the form with the space for drawing a man, face up on the table before him and say, **Draw a man right here.** *Touch or tap the blank space provided under Section I.* If the child seems vague or confused restate the instructions with friendly encouragement. Only 2% in the high scoring group refused such a request, whereas, 30% of the low scoring group would not draw a man in spite of firm urgings. Offer whatever encouragement you feel will be helpful in making the child secure and responsive. However, make no reference to any specific part of a man. Do not say, for example, "Draw his eyes", "Draw his arms", etc. Instead, keep instructions general. A child may stop after drawing the head. Encourage additional effort by saying, **That's nice — draw the whole man.** If a youngster shows no further attempt or seems to be satisfied with his effort, continue with the testing. Drawings may be poorly coordinated, disjointed, inverted or with parts improperly placed. However, do not penalize for clumsy effort or poor art work. If a child appears to be aware of a concept, score four points regardless of placement or body connection for any of the items listed on the test form for Section I. Where more than one article of clothing is drawn, score four points for each article. Ordinarily, youngsters include seven to ten of the suggested items. Some not listed may appear for which four points per item is scored.

SECTION II

In this section, preface each sub-scale (a-b-c) item with the main question. For example, **What has** wings? **Tell me the color** of grass. **What time of the year** does it snow? and so forth.

To item (c) in question 2, many will say a banana is "White". Question further for the color of the peel by requesting the color of the "outside part" or the "part thrown away". If still unable to answer "Yellow" do not give credit and continue without further help.

Young children who do not know an answer will often offer the last alternate stated by the examiner. Therefore, in Section II, it is important in items 3, 5 and 7 to mention the preferred alternate first. Such as: **Which is larger—a dog or a cat? Which is faster—a car or a horse?** When presenting item 7, suggest the seasons for item (a) such as: **When is the 4th of July—summer or winter?** However, add no assistance for item (b). A youngster receives two points for each sub-item he answers correctly. A full score of 32 is possible for this section.

SECTION III

Section III requires little explanation. The questions are merely stated as they are written and they are scored two points when right. Frequently a child will answer "Gone" for item 1. Follow by asking, **What is left when ice is gone?** If he answers, "Water" give credit. Score two points for each correct answer. Twelve points are possible in Section III.

SECTION IV

Section IV will, perhaps, require greater attention to administration and scoring. This section, on the other hand, was found to be most discriminating in the group studied. Two-thirds of the lower group failed in items 2, 3 and 4. Counting up to four was seen to be the easiest of the items for the immature children. Even so, only one out of two in the lower group succeeded in this task. All of the children in the upper group were able to count four items cor-

rectly. Also, in the upper group, more than two-thirds succeeded in: folding a paper triangle; in repeating digits; and, nine out of ten copied the square accurately.

Item 1: counting up to four. Many children at an early age will count to five or ten with accuracy, however, they often fail in counting separate objects. Therefore, the examiner should determine that a child has awareness that the number he states is related to the objects he is counting. Place the form with the heavy black squares toward the child and ask, **How many of these are there?** Some children will count with their fingers, some will merely look and answer. The important thing is that they give you a correct total. For example, if the child touches each square and says, "one-two-three-four", the examiner must still ask, **Yes, now, how many are there?** If a child is unable to say "Four" as a single thought he is scored a failure for the item. Score eight points for a plus answer.

Item 2: folding a triangle. Take a paper square and say, **Watch me.** *Fold the paper once diagonally to form a triangle, then fold it once again to make a smaller triangle.* Execute the steps slowly making certain that the child is attending. *Place the paper triangle before the youngster and give him an unfolded paper square saying,* **Now you fold yours just like mine.** *Point to your example.* Do not allow it to become unfolded. Give ample time and encouragement, but no assistance or suggestions. A fold is acceptable if the corners are within a half-inch of meeting. Credit 8 points.

Item 3: repeating digits forward. Secure the child's attention and say, **I'll say some numbers and when I'm through, you say them just like I do. Ready? Now, listen.** *Say the first series of numbers at one second intervals* and when finished, say, **You say them.** If the child fails say, **Alright, but this time, say them the same way I do. Listen now,** *and say the next series.* Repeat instructions for the third series of numbers if necessary. Score 8 points for success in any one of three series.

Item 4: copy a square. The criteria for success on this test are (1) the preservation of squareness and (2) four reasonably good right angles. All sides need not be of exact length, but height and width should be fairly equal. Give the youngster the pencil and place the form in front of him. Say, **Make one just like this — make it right here.** *Indicate the space next to the example square.* If the first effort is a failure, *trace the illustration square with your finger while saying,* **Make another square. Be sure to make it just like this one. Make it right here.** *Point out an appropriate blank area on the form.* If the child is successful in either of two trials, score 8 points.

USING THE RESULTS OF THE SCALE

Combine the totals of each section. This total test score may be used in different ways. For example, in a study group of 166 pre-schoolers a total score less than 70 correlated highly (r=.71) with failure in kindergarten.

When screening young pre-schoolers, the following explanation of scores for children legally admissable to school before age 5 will be useful.

Interpret the test according to the category the score is in. The paragraph that applies to a child should be read carefully. If the score is near the top or bottom of a particular bracket the interpretation can be affected somewhat by the appropriate adjacent paragraph. Interpretive Data refers to those children who are **younger** than five years of age.

Score	
	Children whose scores are above 95 have a very good chance of succeeding in kindergarten. Progress in kindergarten is expected to be above average and youngsters scoring in this numerical range can be regarded as having suitable readiness for school.
	Those whose scores range from 70 to 94 are believed to be average and above for their age group. However, their success in kindergarten when compared with their "older" classmates may not be outstanding. The children who have scored in this range should have little difficulty achieving in the kindergarten and it is believed that they will be able to meet the requirements of first grade the year following.
	Children whose scores are in the 50 to 69 range may find considerable difficulty in making adjustments in kindergarten. Their general readiness for the more formal aspects of school is questioned and when they are expected to meet the demands of first grade some youngsters in this group will likely falter. Their present readiness for school is believed to be marginal. Their parents may want to be advised of their child's limitations and want to consider holding them out of school until added growth provides them with a greater advantage.
	If enrolled in school this coming year, children who have scored less than 50 on this survey, face the greatest possibility of failure and their school years ahead are apt to be difficult and frustrating. Their parents should be alerted to their youngster's disadvantages and they might be encouraged to have their child remain at home for another year. Readiness for school for children who score in this range definitely is lacking.
	A "zero" score indicates the results are invalid and suggests that a child may be disturbed in his personal adjustment skills. His potential for school readiness is not clearly understood and it may be masked by excessive shyness or highly resistant behavior. At any rate, early school progress might be observed closely and appropriate school management be accomplished promptly.

Raw scores may be converted into "readiness ages" also as suggested by the Ready-Age table below and on the front of the test form. Merely read the years and months adjacent to a given total score. For example, a total raw score of 90 suggests a readiness age of 5 years and 6 months regardless of the child's calendar age. A "zero" score indicates the results are invalid and the child should be evaluated more closely.

READY AGE TABLE

Total Raw Sc.	R-A Yrs. Mos.	Total Raw Sc.	R-A Yrs. Mos.	Total Raw Sc.	R-A Yrs. Mos.
25-29	3—6	65-66	4—8	94	5—8
28-30	3—7	67-69	4—9	95-96	5—9
31-33	3—8	70-71	4—10	97-98	5—10
34-36	3—9	72-77	4—11	99-100	5—11
37-38	3—10	78-79	5—0	101-103	6—0
39-41	3—11	80-81	5—1	104-105	6—1
42-44	4—0	82	5—2	106-108	6—2
45-47	4—1	83-84	5—3	109-110	6—3
48-50	4—2	85-86	5—4	111-114	6—4
51-54	4—3	87-88	5—5	115-118	6—5
55-57	4—4	89-90	5—6	119-120	6—6
58-60	4—5	91-93	5—7	121-122	6—7
61-62	4—6				
63-64	4—7				

N=619 kindergarteners.

NOTES ON CONSTRUCTION

There are administrative advantages in enrolling children for school on a chronological age basis. However, from an educational and psychological point of view, a child is seriously disadvantaged when daily academic requirements excell his capabilities. Increasingly, more educators are examining school readiness at admission in order to avoid some of the problems among children in the early academic years.

School can be equally rewarding for all children when their growth and learning skills are comparable. Initial entry into school on a chronological age basis ignores the concept of individual differences in learning and it defeats many children at the very onset of their education. Differences in abilities are very subtle when first entering school, however, they do exist. When daily demands exceed the maturity of the child, an enduring matrix of negative life experiences is formed predisposing him to later learning and behavior problems. His vagueness, frustration and confusion may eventually become rebellion and resistence with an active rejection of all educative efforts.

The principle purpose of the ABC Inventory is to identify children who are immature for a standard school program. Operationally, the inventory serves best when used in pre-school screening and it has been designed with this function in mind. Aims in developing the inventory, were to: (1) devise a screening technique that was reliable and valid; (2) construct a format that was easily managed by inexperienced examiners; (3) outline adminstration, scoring and interpretation procedures that were direct and uncomplicated; (4) maintain economy by minimizing equipment needs and time consuming procedures; and (5) be suitable to children in the pre-school age range. Construction of the ABC Inventory began in 1960. Item analysis, weighting and refinement continued through 1962. The standardization group throughout consisted of boys and girls whose ages ranged from 4 years 9 months through 4 years 11 months. The average age was 4 years 10 months. No effort was made to separate the scores of boys and girls or to make allowances for socio-economic differences. The fifteen schools involved in the study included K-12 systems in areas with 400 total enrollment to moderate sized systems enrolling over 5,500. Because the number in the standardization study is large (N = 166) and the age range small, biases in selection are belived to be diluted.

Reliability was established by matching comparable groups and assuming group equivalency. Scores for children of the same age who enrolled in the same school districts two years apart were compared with the following results:

	1962 group	1964 group
No. In Both Groups	166	314
Means For Both Groups	65.51	66.71
Standard Deviations	22.66	21.78
Standard Error of means	1.76	1.23
Mean Difference	1.20	
Standard Error	2.08	
Critical Ratio	.58	

According to Table of t, no significant difference between means.

Validity was determined by comparing "pass-fail" features between children in the upper and lower half of the score distribution. Eighty-three in the standardization group obtained scores 68 and above while 83 scored below 68. Forty-three children failed their first year of school. Of those failing, 37 or 86% were identified accurately. Seventy-seven or 63% passing, scored above 68. (tetrachoric correlation = .70)

A ready age scale was constructed by combining all test scores over a 3 year period (N = 619) into a frequency distribution and examining its resemblence to a normal bell-shaped curve. Features of divergence from symmetry were studied for significance. The test for skewness and kurtosis was not significant. Deviating scores were measured from the mean and on a basis of their percentile rank were given an age index. This index, called a "readiness age," approximates the mental age features described for other tests and carries similar implications. This treatment was tested by comparing the ABC Inventory ready age with the Stanford-Binet mental age. In a small sample study (N = 14), the product moment correlation between ready age and mental age equaled .78. Investigation of this relationship is being extended and subsequent statistical measures may not yield so high a correlation.

The research edition of the ABC Inventory has been found to be reliable and valid. It approaches closely the aims originally outlined in the section under Purpose. The ABC Inventory is not an absolute scale. However, used as prescribed, it can identify successfully children whose maturity for school is questionable. One is always reminded that a pre-school child should not be denied entrance or admission on the basis of a test score alone (or on any other single criterion). Although, children scoring at a level where maturity to meet the demands of school is questionable, should be studied carefully. Experience indicates that deferred entrance is one good solution for avoiding early academic difficulties. A pre-school nursery or other adjusted entry situation for such children could be possible alternates.

APPENDIX C: Information Sheet for Parents

[illegible] _____ [illegible] _____

OCCUPATION OF PARENTS _____

_____

AGE OF PARENTS AND BIRTH DATE FATHER: _____ MOTHER: _____

EDUCATIONAL BACKGROUND: MOTHER _____

FATHER _____

NUMBER OF CHILDREN IN FAMILY:

OLDER _____ SEX _____

YOUNGER _____ SEX _____

DOES YOUR CHILD ATTEND SUNDAY SCHOOL? _____

(If "YES" how often?) _____

[illegible] CHILD WATCH T.V.? YES _____ NO _____

UNDER 5 HOURS A WEEK	_____
FROM 5-8 HOURS A WEEK	_____
8-10	_____
10-12	_____
12-14	_____
14-16	_____
16-20	_____
20-25	_____
OVER 25 HOURS A WEEK	_____

HAS YOUR CHILD EVER:		(Done any in the l[illegible] 6 months?)
HAD A TRAIN RIDE?	_____	_____
HAD AN AIRPLANE RIDE?	_____	_____
HAD A BOAT RIDE?	_____	_____
BEEN TO THE ZOO?	_____	_____
BEEN TO THE MUSEUM?	_____	_____
[illegible] CIRCUS?	_____	_____
BEEN TO THE CARNIVAL?	_____	_____
BEEN TO THE MOVIES?	_____	_____

HOW MANY MOVIES HAS YOUR CHILD SEEN IN HIS LIFETIME? _____

APPENDIX D: Nursery School Children's Background

Student Number	Sex	Birth-date	Education Father	Education Mother	Occupation Father	Occupation Mother
1	M	11-1-61	Ed.D.	B.A.	Teacher	Teacher
2	F	7-19-61	B.A.	B.A.	Jeweler	Teacher
3	M	12-16-61	B.S.	1 yr. C	Realtor	R.N.
4	M	5-29-61	2 yr. C	½ yr. C	Salesman	Housewife
5	M	2-7-61	2 yr C	B.A.	Vice-Pres. Marketing	Housewife
6	F	2-23-61	11th	H.S.	Restaurant	Housewife
7	M	10-14-61	M.A.	M.A.	Teacher	Teacher
8	M	11-21-60	B.S.E.	1½ yr. C	Elec. Eng.	Housewife
9	M	12-4-60	M.D.	3½ yr. C	Physician	Housewife
10	F	7-10-61	B.S.	B.S.	Teacher	Teacher
11	M	1-20-61	M.D.	1 yr. C	Physician	Housewife
12	M	11-26-61	2 yr. C	B.A.	Purch. Agt.	Housewife
13	M	4-10-61	1½ yr. C	H.S.	Salesman	Med. Sec.
14	M	9-20-60	M.S.	H.S.	Businessman	Housewife
15	F	11-24-61	M.A.	B.A.	Teacher	Teacher
16	M	11-2-60	1 yr. C	1 yr. C	Timekeeper	Med. Sec.
17	M	10-12-60	2 yr. C	B.S.	Businessman	Teacher
18	M	2-26-61	B.A.	B.A.	Plant. Mgr.	Housewife
19	F	3-23-61	M.D.	R.N.	Physician	Housewife
20	F	5-15-61	M.D.	M.A.	Physician	Eng. Tchr

H.S. - High School Graduate

APPENDIX E: Student's Mental and Chronological Ages

Student Number	Chronological Age in October, 1965	Mental Age[a] in October, 1965	Mental Age[a] in May, 1966
1	47 months	74 months	86 months
2	52	65	78
3	47	50	63
4	53	48	64
5	57	69	80
6	56	70	80
7	48	64	72
8	59	63	68
9	59	67	78
10	52	49	62
11	57	57	66
12	47	60	67
13	55	52	65
14	61	63	74
15	47	50	59
16	60	71	78
17	61	64	76
18	56	65	78
19	55	71	80
20	54	61	71

[a]As measured by the Stanford-Binet Scale

APPENDIX F: Students' Intelligence Quotients

Student Number	I.Q.[a] in October 1965	I.Q.[a] in May 1966	Change in I.Q.
1	157	162	+ 5
2	125	134	+ 9
3	106	117	+11
4	91	107	+16
5	121	125	+ 4
6	125	127	+ 2
7	133	129	- 4
8	107	103	- 4
9	114	120	+ 6
10	94	105	+11
11	100	102	+ 2
12	128	124	- 4
13	95	105	+10
14	105	109	+ 4
15	106	109	+ 3
16	118	116	- 2
17	105	112	+ 7
18	116	124	+ 8
19	129	129	0
20	113	122	+ 9
Mean	114.4	119.05	+4.65

[a]As measured by the Stanford-Binet Scale

APPENDIX G: Students' Readiness and Chronological Ages

Student Number	Chronological Age-Oct. 1965	Readiness Age[a] Oct. 1965	Readiness Age[a] May, 1966
1	47 months	71 months	79 months[b]
2	52	67	75
3	47	42	57
4	53	42	54
5	57	59	74
6	56	60	70
7	48	44	59
8	59	61	64
9	59	60	77
10	52	43	59
11	57	57	63
12	47	44	53
13	55	55	59
14	61	57	70
15	47	42	53
16	60	64	77
17	61	59	72
18	56	59	64
19	55	64	77
20	54	53	67
Mean	54.15	55.15	66.15

[a]As measured by the ABC Inventory Test

[b]This student scored above the norms for the test, so the highest score listed was used.

APPENDIX H: Readiness Quotients of the Students

Student Number	Readiness Quotient[a] October, 1965	Readiness Quotient[a] May, 1966	Change in R. Q.
1	151	146[b]	- 5
2	129	128	- 1
3	89	106	+17
4	79	90	+11
5	104	116	+12
6	107	111	+ 4
7	92	105	+13
8	103	97	- 6
9	102	118	+16
10	83	100	+17
11	100	97	- 3
12	94	98	+ 4
13	100	95	- 5
14	93	103	+10
15	89	98	+ 9
16	107	115	+ 8
17	97	106	+ 9
18	105	102	- 3
19	116	124	+ 8
20	98	116	+18
Mean	101.90	108.55	+6.65

[a]Computed by using the readiness age from the ABC Inventory test

[b]Student scored above norms for the test. The top score listed was used to arrive at this readiness quotient