



The effect of public school kindergarten on achievement in reading
by Elnora A Wright

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree
of Master of Science in Education at Montana State College

Montana State University

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Abstract:

The present study was a comparison of average achievements in reading from grade one through grade three and mental maturity of non-repeaters, and number, achievement, and mental maturity of repeaters in two school systems in Montana, Bozeman with kindergarten and Helena with no kindergarten. A comparison of medians of all Bozeman children against all Helena children showed that Bozeman second graders on Metropolitan Achievement tests averaged nine months higher in achievement in reading than Helena second graders on Gates Primary Reading Test; but by the end of grade three, the Helena children on Coordinated Scales of Attainment were nearly even with Bozeman children on Metropolitan Achievement Tests. In comparison of 391 children who remained in the Bozeman schools from kindergarten through grade three and 649 children who remained in Helena schools from grade one through grade three, second graders of Bozeman exceeded Helena children by seven months; and in grade three, Bozeman children exceeded Helena children by six months. Again this comparison was made on the basis of different tests. The average Intelligence Quotient of the two groups was 114.5 in Bozeman on California Mental Maturity Test and 103.7 in Helena on Kuhlmann-Pinch Mental Maturity Test. The testing procedure was Standardized by giving those tests which had been given in Helena to Bozeman children. The results were as follows: On Cates Reading Test, 45 Bozeman second graders exceeded 606 Helena children by 4.4 months, significant to the one per cent level of probability. On Coordinated Scales of Attainment, 48 Bozeman third graders exceeded 649 Helena children by 2.1 months, a difference significant to 1 per cent. On Kuhlmann-Finch Mental Maturity, 50 Bozeman fourth graders had an average Intelligence Quotient of 110.66, 7.01 points above Helena fourth graders with an average score of 105.65. This difference is significant to a two per cent level. Because of the significant difference in Mental Maturity, the advantages of the Bozeman children in reading through grade three cannot be conclusively attributed to kindergarten experience. Further investigation might show a correlation between scores on Mental Maturity tests and years of school experience up to grade four. From the Bozeman data, 84.6 per cent of the total children enrolled in the Bozeman Public Schools from 1950-1955 had kindergarten and produced 55.7 per cent of the repeaters; while 15.4 per cent of the children had no kindergarten and produced 44.3 per cent of the repeaters.

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ABSTRACT

The present study was a comparison of average achievements in reading from grade one through grade three and mental maturity of non-repeaters, and number, achievement, and mental maturity of repeaters in two school systems in Montana, Bozeman with kindergarten and Helena with no kindergarten. A comparison of medians of all Bozeman children against all Helena children showed that Bozeman second graders on Metropolitan Achievement tests averaged nine months higher in achievement in reading than Helena second graders on Gates Primary Reading Test; but by the end of grade three, the Helena children on Coordinated Scales of Attainment were nearly even with Bozeman children on Metropolitan Achievement Tests. In comparison of 391 children who remained in the Bozeman schools from kindergarten through grade three and 649 children who remained in Helena schools from grade one through grade three, second graders of Bozeman exceeded Helena children by seven months; and in grade three, Bozeman children exceeded Helena children by six months. Again this comparison was made on the basis of different tests. The average Intelligence Quotient of the two groups was 114.3 in Bozeman on California Mental Maturity Test and 103.7 in Helena on Kuhlmann-Finch Mental Maturity Test. The testing procedure was standardized by giving those tests which had been given in Helena to Bozeman children. The results were as follows: On Gates Reading Test, 45 Bozeman second graders exceeded 606 Helena children by 4.4 months, significant to the one per cent level of probability. On Coordinated Scales of Attainment, 48 Bozeman third graders exceeded 649 Helena children by 2.1 months, a difference significant to 1 per cent. On Kuhlmann-Finch Mental Maturity, 50 Bozeman fourth graders had an average Intelligence Quotient of 110.66, 7.01 points above Helena fourth graders with an average score of 103.65. This difference is significant to a two per cent level. Because of the significant difference in Mental Maturity, the advantages of the Bozeman children in reading through grade three cannot be conclusively attributed to kindergarten experience. Further investigation might show a correlation between scores on Mental Maturity tests and years of school experience up to grade four. From the Bozeman data, 84.6 per cent of the total children enrolled in the Bozeman Public Schools from 1950-1953 had kindergarten and produced 55.7 per cent of the repeaters; while 15.4 per cent of the children had no kindergarten and produced 44.3 per cent of the repeaters.

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CHAPTER I

INTRODUCTION

General Statement of the Problem

"Why should I send my child to kindergarten?" is the question that is being asked by many parents of five year old youngsters. "What advantages can kindergarten give my child?"

In the face of swelling numbers of young people in our schools, teacher, building, and equipment shortages, there is some question as to the advantages of the increasing numbers of kindergartens. Are kindergartens financially economical or could the money be better spent in some other phase of education?

In an attempt to answer some of the questions of the parent and taxpayer, a comparison has been made between children with public school kindergarten experience in the city of Bozeman, Montana, and children without kindergarten experience in the city of Helena, Montana, for "unless kindergarten teaches children something definite the expense of the kindergarten is not justified."¹

Purpose of the Study

The purpose of this study is to attempt to find out if children who have had kindergarten have certain academic advantages over children who have had no such experience. Are those children who have been enrolled

¹Taylor, Ethel R. Is the Kindergarten a Learning Situation? American Childhood. 38:23-5, April, 1953.

in public school kindergartens in Bozeman, Montana, better prepared for learning to read, will they learn faster, and will their achievement in reading be greater than those children who began first grade in Helena, Montana, without any experience in a public school kindergarten program? If a gap in achievement exists between the two schools, and if those children who have had no previous school experience can catch up, they must do so by the end of the third grade if they are going to compete successfully with children who have had kindergarten training. The transition from third to fourth grade is a difficult one to make and educationally children should be given every possible advantage in order to successfully make this transition.

Margaret L. White² refers to the "fourth-grade hump" in reading and says that the causes for this difficult period "do not arise overnight. They exist because of an accumulation of weaknesses and poor habits."

William S. Gray³ says that in the first three grades children read largely at the experience level; from fourth grade on the child must read at a creative level.

Miles Tinker⁴ has stated, "By the end of the primary grades, the

²White, Margaret L. Eliminating the "Fourth-Grade Hump" in Reading, A Monograph on Language Arts, No. 59. Row-Peterson and Co., Evanston, Ill.; 1949, 6 pp.

³Gray, William S. Introduction to the Teachers' Guidebook for Times and Places, the Basic Readers, Scott, Foresman and Co., Chicago: 1947.

⁴Tinker, Miles A. Teaching Elementary Reading. Appleton-Century-Crofts, Inc. New York: 1952, p. 241.

average child will have acquired a fair mastery of the fundamentals of reading. In addition he will have had an introduction to the comprehension skills and work-type reading. The latter prepares the child for the transition to reading required in the intermediate grades. In general, by the end of grade three, the child will have acquired a sound foundation for all future reading."

According to Ruth Strang⁵ and others, "With a sound foundation of beginning reading experiences children make rapid improvement in the fourth, fifth, and sixth grades....."

A study by Dr. Dorris Lee showed that in typical large American schools the demands upon reading ability in the fourth, fifth, and sixth grades are well beyond those which can be realized on the basis of primary reading skills. The sheer amount of material to be read requires considerable speed. The large vocabulary and formidable organization of typical materials in the social studies, sciences, and elsewhere require advanced techniques of working out the recognition of unfamiliar words. To meet the demands of the intermediate and upper grades the pupil must be able not only to read rapidly but to read in different ways and to select out and evaluate materials for various purposes. Dr. Lee found that children who have not equaled the level of reading ability represented by a reading grade score of 4.0 on typical standardized reading tests will be handicapped in schoolwork in the fourth and later grades. She referred to this as the "fourth grade hurdle." What she meant was that unless the pupil had hurdled the barriers into an intermediate grade type reading, he would be handicapped in later work. Even pupils of superior

⁵Strang, Ruth, Constance M. McCullough and Arthur E. Traxler. Problems in the Improvement of Reading. McGraw-Hill Book Co., New York: 1955, p. 93.

intellect, although they could compensate by superior insight for what they lacked in reading ability, would have done better had they advanced in reading ability beyond the initial fourth-grade level.

History of the Kindergarten

For many centuries there has been some form or plan of education for the young child. However, the early education was training for adult citizenship, and the teachers felt justified in the use of any means, no matter how harmful. Very little was known about children so the methods used were seldom concerned with children's needs.

In the seventeenth century, a Moravian educator, John Comenius,⁶ was the first to emphasize the value of play and first-hand experiencing. He also stressed health--mental and physical--and recognized individual differences in children.

In the eighteenth century in France, Jean Jacques Rousseau⁷ advanced ideas current in kindergarten teaching: controlled freedom for growth and development, child study by teachers and parents, the child's abilities in relation to his years.

In 1774, Jean Frederic Oberlin⁸ established the first school for very young children in Walback, France, where for the first time pictures, stories,

⁶Wills, Clarice D. and William H. Stegeman. Living in the Kindergarten. Follett Publishing Co., Chicago: 1954, p. 59.

⁷Ibid., p. 60.

⁸Ibid., p. 60.

and excursions were used to supplement teaching. The program included reading, number work, and other subjects that are in the primary grades now.

In Switzerland at the same time, Johan Heinrich Pestalozzi⁹ introduced object teaching. He believed learning to be more effective if children could see and feel objects rather than hear about them only. He believed in developing all aspects of the child, that education began at birth, but the child should not be removed from his home or mother in his early years.

In Bad Blankenburg, Germany, 1837, Friedrich Wilhelm Froebel¹⁰ gave this school for young children its name, "kindergarten," for he visualized children growing like plants. His "gifts" which included a ball, cube, and cylinder, six balls of colored yarn, and others, his "occupations" which included weaving, drawing, sewing, etc. long served in kindergartens in the United States. From 1837 to 1849 Froebel established kindergartens throughout Germany which were forbidden by edict in 1849; but his aims and ideas about child development were brought to the United States by Johannes Kraus, pupil of Froebel, who began lecturing for kindergartens in 1851.

From Kiessel¹¹ and DeYoung¹² comes the following history of kindergarten in the United States. Mrs. Carl Schurz opened the first German

⁹Wills & Stegeman, op. cit., p. 60.

¹⁰Ibid., p. 62.

¹¹Kiessel, W. C. Kindergarten in America. Education, 75:540-4, April, 1955.

¹²DeYoung, Chris A. Introduction to American Public Education. McGraw-Hill Book Co., Inc. New York: 1950, p. 129-130.

speaking kindergarten in Watertown, Wisconsin, in 1856. Between 1856 and 1870, ten kindergartens opened in the United States. In 1861 Elizabeth Palmer Peabody opened the first kindergarten for English speaking children on Pinckney Street, Boston.

In 1868 the first training school for kindergarten teachers opened in Boston under Mary Mann. The second was begun at Gramercy Park in New York City in 1873 by Marie Boelte and John Kraus.

In 1873 Susan Blow opened the first public kindergarten in the United States in St. Louis. At the time there were 1,252 children enrolled in private kindergartens. By 1880 there were 400 kindergartens in 30 different states and kindergarten training schools in ten different cities.

In 1891 a resolution passed by the National Education Association recognized kindergartens as part of all schools; by 1930¹³ 750,000 pupils, 30 per cent of the five year olds in the United States, were in kindergartens.

The Biennial Survey of Education¹⁴ for 1940-42 showed 625,783 pupils in public kindergartens and approximately 57,000 in private. In September, 1954, less than 100 years after kindergartens came into existence in the United States, approximately 1,473,000 children entered thousands of kindergartens in the United States.

In Montana¹⁵ there are very few public school kindergartens. The total enrollment of kindergarten pupils for the year 1954-55 was 2,385,

¹³Wills & Stegeman, op. cit., p. 67.

¹⁴Kiessel, op. cit., p. 540-4.

¹⁵State Department of Public Instruction Correspondence. Helena, Montana, April 21, 1956.

1,225 boys and 1,160 girls. Public school kindergartens were operated in the cities of Dillon, Red Lodge, Great Falls, Lewistown, Bozeman, East Helena, Livingston, Browning, Out Bank, Phillipsburg, Boulder, Conrad, Dupuyer, Deer Lodge, Plentywood, Choteau, Fairfield, Shelby, and Glasgow.

Statistics from the United States Bureau of Census¹⁶ indicates that the births in round figures have increased from 2,400,000 in 1940 to 3,548,000 in 1950. Because of the cost of equipment and buildings, and the teacher shortage, many kindergartens may be closed unless the value of the kindergarten can be clearly shown to the parents and lay organizations who will demand the retention of the kindergarten as part of the school program.

Previous Studies in the Field

Previous studies express some of the values thought to be derived from experiences in kindergartens.

The kindergarten has done more for the primary child than is sometimes realized by enlarging the vocabulary, especially in nouns and verbs, and by securing a natural tone which can only come through freedom of speech. Pestalozzi says in Leonard and Gertrude, "The child must speak well before he can read well." Thus we find that reading, in a sense, is begun in the kindergarten, although no written symbols are taught.¹⁷

¹⁶ Wills & Stegeman, op. cit. p. 71

¹⁷ Merrill, Jenny B. Ways and Means for Securing Organic Continuity between the Kindergarten and the Primary School in the Development of the Child. Seventh Yearbook, National Society for the Scientific Study of Education, Chicago: 1908, p. 19-34.

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Froebel said, "Without rational, conscious guidance, childish activity degenerates into aimless play instead of preparing for those tasks of life for which it is destined..... In the kindergarten they (the children) are guided to bring out their play in such a manner as really to reach the aim desired by nature, that is, to serve for their development....."¹⁸

For fifty years Froebel studied little children closely; he observed them at work and at play and the more he watched them, the more he realized that there is no more important period of education than the years before the child is seven. He concluded that the work of educating little children is more important, not less important, than the work of those who teach older boys and girls. Froebel believed that a child should develop naturally.

As Froebel discovered, we believe that through its limitations and possibilities the environment conditions the development of the young child. In schoolrooms, provide an environment where children will have freedom and learn to use it wisely, develop initiative and independence and practice co-operation or follow creative impulses; in short,—an environment satisfying to child nature.¹⁹

"The modern kindergarten is not the institution which Froebel created, though it is in method and technique its lineal descendent....."²⁰

¹⁸ Kilpatrick, William H. Froebel's Kindergarten Principles. The Macmillan Co., New York; 1916, p.84.

¹⁹ Taylor, Ethel R. An Environment Satisfying to Child Nature. American Childhood, 38:16-18, Oct. 1952.

²⁰ Mort, Paul R. and William S. Vincent. Introduction to American Education. McGraw-Hill Book Co., Inc. New York; 1954, p. 361.

As far back as 1926, Edward W. Goetch²¹ at the University of Iowa found that the reading scores and reading ages of children who had attended kindergarten were higher than those who had not attended kindergarten.

In 1937 Morrison²² reported a study of the progress data of 13,730 children showing non-promotion beyond grade one. His investigation showed that retardation was much greater for those children who had not attended kindergarten.

Recently investigators have shown conflicting results from their studies. East made an investigation in Blacksburg, South Carolina, a small rural-urban community with a township population of 7,000. Data from Metropolitan Achievement Tests given to first grade pupils in Blacksburg Community Schools revealed the following:

1. The median grade placement for the kindergarten pupils was four months more advanced than that of the non-kindergarten pupils.
2. The greatest difference in achievement was in word meaning.
3. Numbers seem to trouble non-kindergarten pupils least.
4. In all areas the kindergarten pupils excelled as a group.²³

²¹Goetch, Edward W. The Kindergarten as a Factor in Elementary School Achievement and Progress. University of Iowa Studies in Education, III-4. Iowa City, Ia. University of Iowa, 1926.

²²Morrison, John C. Influence of Kindergarten on the Age-Grade Progress of Children Entering School under Six Years of Age; Abstract. The Role of Research in Educational Progress. American Educational Research Association Official Report. American Educational Research Assoc., Washington: 1937, p.19-21.

²³East, J. K. Kindergarten is a Good Investment. School Executive, 72:52-3, May 1955.

These 52 kindergarten and non-kindergarten pupils were taught in mixed groups. The two first-grade teachers divided both the kindergarten and non-kindergarten pupils as nearly equally as possible between them in order that each teacher would have a mixed group. In 1950 the first grade placement on the Metropolitan Achievement Test was 1.7 for children who had had no kindergarten. In 1951 on the same test the median for the children who had had kindergarten was 2.1. There were fewer failures among kindergarten children than among non-kindergarten.

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Bergamini and Swanson²⁴ compared two groups of boys and girls at Ella School in Olivehurst, California; one group was designated as a kindergarten group and one as a no-kindergarten group. By matching mental ages from Pintner-Cunningham Primary Mental Maturity Tests and chronological ages, the average I. Q. was 97 for the kindergarten group and 98 for the no-kindergarten group. Metropolitan Reading Readiness tests were given to both groups. This test is devised to measure traits and achievements of school beginners which contribute to their readiness for first grade instruction. Factors tested for readiness are: linguistic attainments and aptitudes, visual and auditory perception, motor skills, and ability to follow directions. Consistent accuracy in scoring signified those children ready to accept first grade instruction. The lower the score the more the teacher needs to study the children for reasons why they are not ready—health, or emotional strengths and weaknesses.

²⁴Bergamini, Yolanda and Walter Swanson. Does Kindergarten Make a Difference? School Executive, 74:54-5, Dec. 1954.

The kindergartners were better in numbers and copying. No-kindergarten group had consistently higher scores, three times, in word meaning and comprehension of language, but not in usage. The authors asked, "Why did the no-kindergarten group score higher on word comprehension? Perhaps because they were home a year longer where they could carry on spontaneous conversation all day with adults and playmates? Is word comprehension a natural sequence of word usage?"

Scores on copying mostly favored the kindergarten group. The authors question the real purpose and value of the kindergarten in the readiness for learning in the first grade. They suggest that other research has indicated that social adjustment of the child to the school situation is the main reason for having a kindergarten. Social adjustment, getting along with and respecting each other, is part of the readiness for learning. Lack of readiness may account for a pupil's failure to learn in the first grade.

In a survey of rural schools in Nebraska, Kazienko²⁵ revealed that pupils who, at five years of age, entered "beginner" classes emphasizing learning readiness, achieved higher in grade four than did pupils who actually entered the first grade at five years of age.

Is "early childhood the golden time for language"²⁶; is it the best time for preparing children for the process of learning to read?

²⁵Kazienko, L. W. Beginner Grade Influence in School Progress. Educational Administration and Supervision, 40:219-28, April 1954.

²⁶Gregory, Benjamin C. The Necessity of Continuity Between the Kindergarten and the Elementary School. The Present Status Illogical and UnFroebelian. Seventh Yearbook, National Society for the Scientific Study of Education, Chicago: 1908, p. 23-34.

Definition of Terms

Kindergarten.—²⁷ Froebel advocated the kindergarten as a class for children of three to six years of age. Literally the word kindergarten means a garden for children for Froebel visualized children as growing after the manner of plants. Kindergarten for the purpose of this paper is defined as public school for the five year old.

Mental Maturity Tests.—(1) The California Test of Mental Maturity, Pre-primary Battery. E. T. Sullivan, W. W. Clark, and E. W. Tiegs,²⁸ California Test Bureau, Los Angeles, California. This test yields both language and non-language mental ages and Intelligent Quotients.

(2) Kuhlmann-Anderson, now Kuhlmann-Finch, Mental Maturity Tests.²⁹ F. H. Finch, The Psychological Corporation, 522 Fifth Ave., New York 36, N. Y. This is a group test to measure general learning ability. It yields an Intelligent-Quotient, also.

Reading Tests.—Gates Advanced Primary Reading Tests. Arthur I. Gates,³⁰ Bureau of Publications, Teachers College, Columbia University. This test consists of two parts, word recognition and paragraph reading.

²⁷Wills, Clarice D. and William H. Stegeman. Living in the Kindergarten. Follett Publishing Co., Chicago: 1954, p. 63.

²⁸Sullivan, E. T., W. W. Clark, and E. W. Tiegs. The California Test of Mental Maturity. California Test Bureau, Los Angeles California.

²⁹Finch, F. H. Kuhlmann-Finch Mental Maturity Tests. The Psychological Corporation, New York: 1952.

³⁰Gates, Arthur I. Gates Advanced Primary Reading Tests. Bureau of Publications. New York: 1945.

Achievement Tests.---(1) Coordinated Scales of Attainment. M. E. Branom and other authors,³¹ Educational Test Bureau, 720 Washington Avenue S. E., Minneapolis 14, Minnesota. This group test consists of a battery for each of grades 1, 2, and 3, covering subjects reading, spelling, arithmetic skills, literature, and science. Only the reading section was used.

(2) Metropolitan Achievement Tests.³² World Book Company, Yonkers, New York. This group achievement test consists of a series of tests for grades 1 through 8, which show achievement in the subjects reading, spelling, and arithmetic in the primary grades and language arts, arithmetic skills, social studies, literature, and science in the intermediate and upper elementary grades. Again, only the reading section was used.

Statistical Data.---Fisher's method of t as described by Snedecor³³ was used to determine whether the differences in reading achievement and intelligence quotients between the groups of children studied were significant.

Delimitation

This study will be limited to the effectiveness of public school kindergarten experience on the reading progress of pupils from beginning

³¹Branom, M. E. and others. Coordinated Scales of Attainment. Educational Test Bureau, Minneapolis: 1949.

³²Metropolitan Achievement Tests. World Book Company, Yonkers, New York: 1949

³³Snedecor, George W. Statistical Methods. The Iowa State College Press, Ames, Iowa: 1946

school through grade three. The results of tests administered from 1950 to 1955 in Bozeman, Montana, and Helena, Montana, have been selected for research.

These two towns were chosen as most comparable because occupationally both seem to have similar elements--non-industrial--one tempered by a college (Bozeman), and the other because it is the capitol (Helena).

Bozeman, Montana,³⁴ county seat of Gallatin County with a 1950 census of 12,500, is an agricultural town, culturally influenced by Montana State College, a land grant college. Bozeman has five public and one parochial grammar schools, one public and one parochial high school. Bozeman has a public school kindergarten.

Helena, Montana,³⁵ is the capitol city with a population of 18,741 (1950 census). It is not an industrial city, being culturally influenced mainly by state government. Helena has one public library, the new Pioneer-Memorial building with museum and State Historical Library. In Helena there are seven public and two parochial grammar schools. The city has one public and one parochial high school, one business college and one trade and vocational college, and Carroll College (Catholic). Helena does not have a public school kindergarten.

Procedure

In order to discover any academic advantages received from kindergarten

³⁴Bozeman Chamber of Commerce. Bozeman, Montana. Bozeman, Montana: 1956.

³⁵Helena Chamber of Commerce and U. S. Department of Agriculture. Helena, Montana. Helena, Montana: 1956.

training, the following data were collected from the records of both towns: (1) Chronological ages, (2) results of reading tests in grade two and three for the years 1950-1955, (3) an intelligence test score, and (5) the number of retardations in each system.

Summary

In an attempt to find out if children who have had kindergarten have certain academic advantages, namely that they will make greater growth in reading, than children who have had no kindergarten, an investigation has been made comparing the Bozeman schools with kindergarten and the Helena schools with none. The investigator believes that if a gap in achievement exists between the two schools, and if those children who have had no previous school experience can catch up, they must do so by the end of grade three if they are going to compete successfully with children who have had kindergarten and if they will make the difficult transition from grade three to grade four without hardship.

Test data from the two schools have been collected, compiled, and studied; the results and conclusions will appear in a later chapter.

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CHAPTER II

COLLECTION AND INTERPRETATION OF DATA

Helena Schools

The following data were collected from the records of the Helena Public Schools: Results of achievement tests in reading for each class of first graders over the four year period, 1949 to 1952, were taken. Each class was then followed until the children were third graders and scores in reading achievement were recorded. Each score is the median grade placement in years and months of achievement based upon national norms of the test given. The tests administered were as follows: Gates Reading Tests were given to the second graders once at the end of November or first of December and again the last of March or first of April (only the March-April scores are recorded to compare with the Bozeman data since the tests were administered in Bozeman only in March or April); Coordinated Scales of Attainment was used in the third grade at the end of March or first of April.

Kuhlmann-Anderson (Kuhlmann-Finch) Mental Maturity Tests were given to each class when it reached grade four. The median Intelligence Quotients for each class are shown in Table I. Since Mental Maturity Tests were given when each class reached grade four, no Intelligence Quotient scores were available for the class which began in 1952.

TABLE I
 READING MEDIANS EXPRESSED IN GRADE AND MONTHS
 AND MENTAL MATURITY SCORES FOR CLASSES OF FIRST GRADERS
 BEGINNING EACH YEAR 1949-1952;
 HELENA PUBLIC SCHOOLS, HELENA MONTANA

School	1949			1950			1951			1952	
	Reading Median for			Reading Median for			Reading Median for			Reading Median for	
	Ave. IQ	Grade 2	Grade 3	Ave. IQ	Grade 2	Grade 3	Ave. IQ	Grade 2	Grade 3	Grade 2	Grade 3
Jefferson	109	2-8	4-9	110	3-7	5-1	106	3-3	5-0	3-3	4-9
Emerson	100	3-2	4-9	104	3-0	5-1	101	2-8	4-8	3-1	4-9
Central	101	3-3	4-8	103	3-3	5-0	104	3-2	4-5	3-3	5-3
Bryant	98	3-4	4-9	101	3-2	4-9	98	3-4	4-8	3-2	5-1
Hawthorne	103	3-4	4-9	104	3-7	4-9	108	3-6	5-0	3-9	5-0
Lincoln	95	2-9	4-5	95	2-8	4-6	91	2-8	4-2	3-2	4-1
Broadwater	105	3-4	5-1	105	3-5	5-2	102	3-4	5-2	3-3	5-0
Average		3-2	4-9		3-3	5-1		3-2	4-8	3-3	4-9

Bozeman Schools

The following data were collected from the records of the Bozeman Public Schools: Results of achievement tests for each class of first graders beginning in the years 1950-1953 were taken. Each class was then followed for three years. The scores are recorded (Table II) in grades and months of achievement based upon the national norm of the test used. For grades one to three, Metropolitan Achievement Tests were administered. With the exception of the third grade records of the class which began in 1953, all tests in the Bozeman School system were given in April of each year; the 1953 tests were given January 10-11. Each score is the median grade placement.

California Mental Maturity tests were given in November, 1956, in the Bozeman Schools and the median Intelligence Quotient scores appearing in Table II are the results of those tests. The class beginning in 1953 had not been given a mental maturity test so no Intelligence Quotients appear for them.

In order to standardize testing procedure, those tests which were given in Helena were given to children in two schools, Irving and Whittier, in Bozeman, April 18 to April 25, 1957. In the following paragraph are the data collected from those tests:

Gates Advanced Primary Reading tests were given to 45 second graders. The median score was third grade seven months and the average score was third grade and eight months.

TABLE II
 READING MEDIANS EXPRESSED IN GRADE AND MONTHS
 AND MENTAL MATURITY SCORES FOR CLASSES OF FIRST GRADERS
 BEGINNING EACH YEAR 1950-1953;
 BOZEMAN PUBLIC SCHOOLS, BOZEMAN, MONTANA

School	Ave IQ	Reading Medians											
		1950			1951			1952			1953		
		1	2	3	1	2	3	1	2	3	1	2	3
Irving	109	2-1	4-2	5-7	2-9	4-3	5-3	2-8	4-1	4-6	2-8	4-1	4-6
Hawthorne	104	1-7	3-5	5-0	2-3	3-7	4-7	2-4	3-6	4-3	2-4	3-6	4-3
Emerson	113	1-9	4-3	5-7	3-0	4-9	5-4	3-0	4-3	5-1	3-0	4-3	5-1
Longfellow	106	2-2	4-2	5-5	2-8	4-7	5-1	2-7	4-1	4-8	2-7	4-1	4-8
Whittier	106					4-8	5-1	2-8	4-3	4-5	2-8	4-3	4-5
Average		2-1	4-1	5-4	2-8	4-5	5-1	2-7	4-1	4-7	2-7	4-1	4-7

Coordinated Scales of Attainment (Reading Tests, only) was given to 48 third graders. The median score was fifth grade one month; the average score was fifth grade no months.

Kuhlmann-Finch Mental Maturity Tests were given to 50 fourth graders. The average Intelligence Quotient of these children was 108.5.

Interpretation of Data

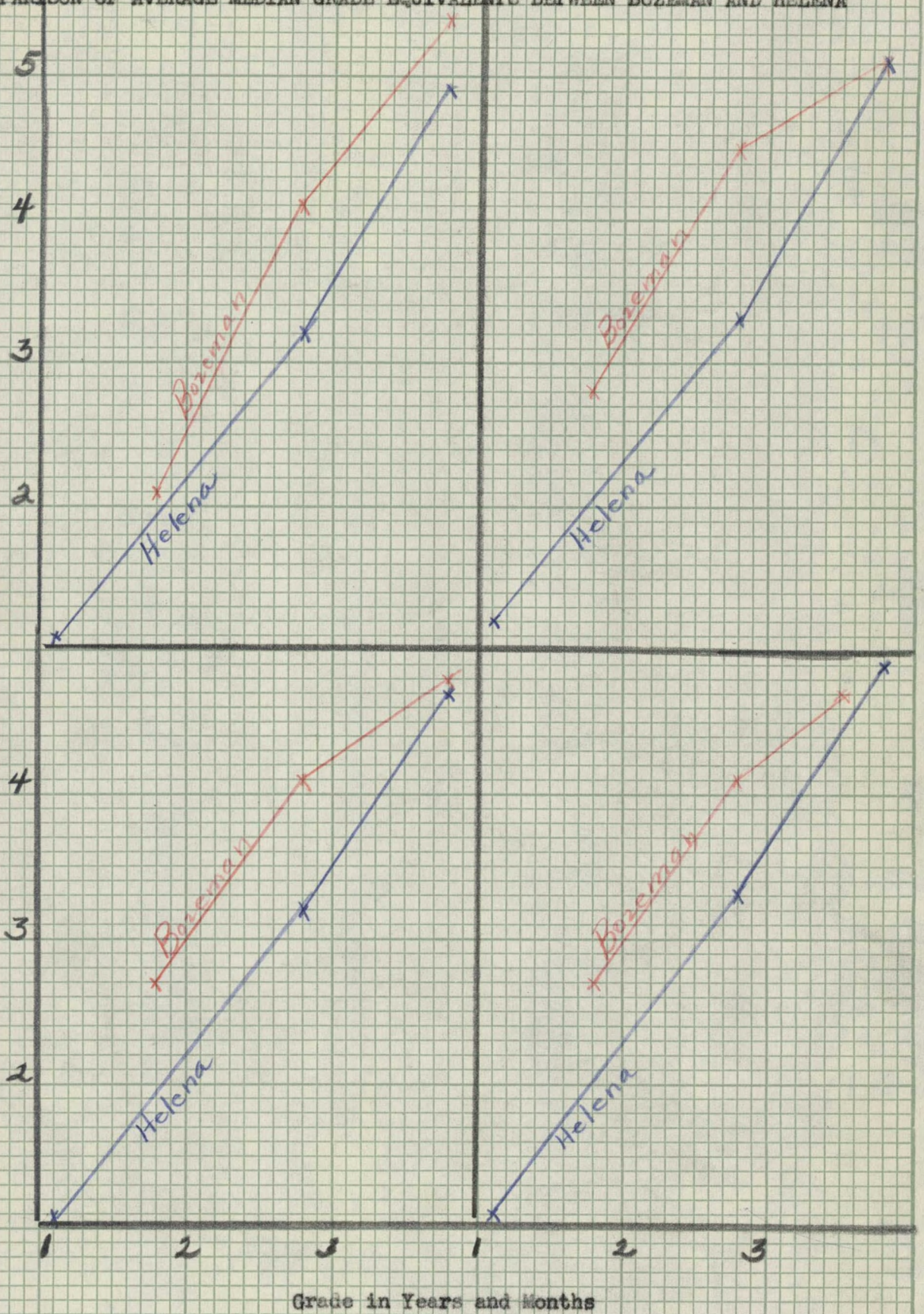
Comparison of Median Grade Equivalents:--In Figure 1, the average median grade equivalents of the Helena Schools were plotted against the average medians of the Bozeman Schools. According to median scores for the total number of children who took the tests, the achievement in the Bozeman Schools was above the achievement in the Helena Public Schools in grade two; but by the end of the third grade in three years out of four, the Helena achievement medians approximated or exceeded the Bozeman scores.

Comparison of Achievement of Children Who Remained in Each System the Total Period, Grade One to Grade Three:--In an attempt to find just what achievement can be attributed to either school system, the scores for those children who remained in either system for the whole period, grade one through grade three, were recorded.

Scores for all children who remained in the Bozeman system from kindergarten through grade three are shown in Table III. The scores made by the Bozeman children on tests given when they were in kindergarten are not shown since there is no comparable score for the Helena children. Scores for those Bozeman children who were in the system from grade one through grade three, but who did not have kindergarten, are recorded in Table IV.

FIGURE 1
COMPARISON OF AVERAGE MEDIAN GRADE EQUIVALENTS BETWEEN BOZEMAN AND HELENA

Grade Equivalent (Yrs. and Mos.)



Grade in Years and Months

TABLE III

MEAN READING SCORES FOR CHILDREN WHO REMAINED IN THE BOZEMAN SCHOOLS FROM KINDERGARTEN THROUGH GRADE THREE LISTED ACCORDING TO CHRONOLOGICAL AGE

		Non-Repeaters				Repeaters							
Age in Yr. Mo. No.		Ave. IQ	Grade	Reading Means		Grade			Ave. IQ	Grade	Reading Means		
			1	2	3	1	2	3			1	2	3
5-6	1	113	2-9	4-5	7-1								
5-7	1	117	3-3	3-9	5-4								
5-8	1	—	3-3	4-4	6-4								
5-9	2	123	2-6	4-6	5-2								
5-10	21	123	2-8	4-2	5-1	2	0	1	104	2-1	2-9	3-8	
5-11	25	110	2-7	4-2	5-2	3	0	0	96	2-1	3-6	4-1	
6-0	34	119	2-9	4-4	5-5	0	2	0	101	1-9	3-2	4-4	
6-1	30	118	2-8	4-3	5-3	2	0	0	97	1-5	2-4	3-0	
6-2	31	114	2-9	4-2	5-3	3	0	1	95	2-3	3-4	4-0	
6-3	23	115	2-8	4-1	4-8	3	1	0	85	1-8	2-6	3-2	
6-4	24	108	2-9	4-3	5-4	6	3	0	95	2-2	3-5	4-1	
6-5	36	115	2-9	4-4	5-5	4	2	0	95	2-3	3-8	4-3	
6-6	32	118	2-9	4-3	5-4	0	0	1	110	3-4	3-5	4-7	
6-7	35	115	3-0	4-3	5-5	1	0	0	88	1-8	2-2	1-8	
6-8	26	115	3-2	4-6	5-7	2	1	0	105	2-1	3-3	4-5	
6-9	20	114	3-1	4-6	5-9	1	0	0	108	2-3	4-8	6-2	
6-10	10	112	3-2	4-8	6-5								
Ave.	*352	116.3	2-9	4-3	5-4	27	9	3	96.6	2-1	3-3	4-0	

39*

*—These figures are totals, not averages.

Total children—391; Average Reading—Grade 2, 4-2; Grade 3, 5-3; IQ, 114.3

TABLE IV

MEAN READING SCORES FOR BOZEMAN CHILDREN WITH NO KINDERGARTEN

Age in Yr. No.	No.	Non-Repeaters				Repeaters			
		Ave. IQ	Grade 1	Grade 2	Reading Means 4	Grade 1	Grade 2	Grade 3	Ave. IQ
5-10						2	0	0	100
5-11	4	119	2-8	4-3	5-3	1	0	1	98
6-0	5	121	2-9	4-4	5-6	1	0	0	65
6-1	3	112	2-6	3-9	5-5	4	0	0	104
6-2	2	114	3-0	4-2	5-3				
6-3	6	118	3-0	4-9	5-8	4	0	1	97
6-4	3	113	2-4	3-7	5-2	4	0	1	97
6-5	4	121	3-1	4-7	5-7	2	0	0	92
6-6	5	115	2-7	4-4	5-7	0	1	0	123
6-7	2	---	2-7	4-4	5-1	4	0	0	96
6-8	3	104	3-1	4-4	5-0				
6-9	5	116	2-8	4-1	4-9	1	0	1	103
6-10	2	123	3-6	5-1	6-9	1	0	0	88
6-11	3	105	3-0	4-2	5-0				
7-0	1	107	2-4	4-3	4-9				
Ave.	*48	115.6	2-9	4-4	5-4	24	1	4	97.9
						29*			

*—These figures are totals, not averages

Total children—77; Average Reading—Grade 2, 4-1; Grade 3, 5-1; IQ, 107.6

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Scores for all children who remained in the Helena system from grade one through grade three are recorded in Table V.

Table VI is a comparison of the averages in achievement expressed in grade equivalents, taken from Tables III, IV, and V, for all children who did not repeat a grade. Table VII shows a comparison of the achievement of those children who did not repeat a grade.

The mean grade equivalents for 352 children who remained in the Bozeman Public Schools from kindergarten through grade three in the years 1950 to 1953 were as follows (kindergarten scores are excluded since there is no comparable score in the Helena data): Grade one made an achievement equivalent of second grade and nine months; grade two, fourth grade and three months; and grade three, fifth grade and four months. The average Intelligence Quotient of these children was 116.5 on California Mental Maturity Tests.

During the same years there was a total of 39 children who had kindergarten experience who repeated some grade. From this total, 27 repeated in first, nine in second, and three in third. The grade equivalents of the repeaters were as follows: grade one, second grade and one month; grade two, third grade and three months; grade three, fourth grade and no months. On California Mental Maturity Tests, the average Intelligence Quotient of this group was 96.58.

During the period of this study, there were 79 children who had no kindergarten experience entered in first grade in Bozeman Schools. Forty-eight of these children passed each year with an average grade placement score as follows: Grade one, second grade eight months; grade two, fourth grade four months; grade three, fifth grade four months. Average

TABLE V

MEAN READING SCORES FOR CHILDREN WHO REMAINED IN THE HELENA SCHOOLS FROM GRADE ONE (NO KINDERGARTEN) THROUGH GRADE THREE LISTED ACCORDING TO CHRONOLOGICAL AGE

Non-Repeaters						Repeaters							
Ages in	Ave.	Grade	Reading Means			Grade	Ave.	Grade	Reading Means				
Yr. Mo. No.	IQ		1	2	3	1	2	3	IQ		1	2	3
5-8	1	106	1-7	4-6	5-2								
5-9	1	---	1-2	2-9	5-0								
5-10	13	101	-9	3-7	4-8	5	1	0	97	-7	3-2	4-4	
5-11	42	109	1-0	3-7	5-0	11	3	0	89	-7	2-9	3-9	
6-0	51	110	1-0	3-5	4-8	10	0	0	86	-7	3-1	4-2	
6-1	53	107	1-0	3-7	4-9	8	1	0	93	-8	2-8	4-2	
6-2	42	110	1-0	3-4	4-9	6	2	0	87	-5	2-7	3-7	
6-3	47	109	1-1	3-5	4-9	4	1	0	80	-6	2-7	3-6	
6-4	46	109	1-2	3-7	4-9	8	0	0	81	-8	2-6	3-7	
6-5	46	108	1-1	3-5	4-9	6	0	0	80	-6	2-8	3-7	
6-6	45	104	1-2	3-4	4-9	9	0	0	79	-8	2-8	3-8	
6-7	52	104	1-2	3-5	4-8	6	1	0	77	-7	2-5	3-1	
6-8	43	103	1-2	3-5	4-7	4	0	0	80	-9	2-9	3-5	
6-9	42	107	1-3	3-8	5-2	6	0	0	81	-8	2-9	3-8	
6-10	32	102	1-3	3-6	4-9	1	0	0	84	-7	2-6	3-4	
Ave.	*556	103.7	1-1	3-6	4-9	84	9	0	83	-7	2-8	3-8	
						*93							

*—These figures are totals, not averages
Total children—649; Average Reading—Grade 2, 3-5; Grade 3, 4-7; IQ, 103.7

TABLE VI
COMPARISON OF TOTAL MEAN READING SCORES
EXPRESSED IN GRADE AND MONTHS
OF BOZEMAN AND HELENA CHILDREN
(NON-REPEATERS)

School	No.	IQ Ave.	Grade Reading Means		
			1	2	3
Bozeman Children with kindergarten	352	116.3	2-9	4-3	5-4
Bozeman Children with- out kindergarten	48	115.6	2-9	4-4	5-4
Helena Children with- out kindergarten	556	106.7	1-1	3-6	4-9

TABLE VII
COMPARISON OF TOTAL MEAN READING SCORES
EXPRESSED IN GRADE AND MONTHS
OF BOZEMAN AND HELENA CHILDREN
(REPEATERS)

School	No.				Ave. IQ	Grade Reading Means		
	Grade			Total		1	2	3
	1	2	3					
Bozeman Children with kindergarten	27	9	3	39	96.6	2-1	3-3	4-0
Bozeman Children with- out kindergarten	26	1	4	31	97.9	2-5	3-6	4-4
Helena Children with- out kindergarten	79	9	0	97	83.0	-7	2-8	3-8

Intelligence Quotient was 115.6.

Thirty one of these children repeated a grade; 26 in grade one, one in grade two, and four in grade three. The achievement test scores for the repeaters were: grade one, second grade five months; grade two, third grade six months; grade three, fourth grade four months. Average Intelligence Quotient of this group was 97.9.

Of the 400 Bozeman children who did not repeat a grade, the average grade placement scores were never more than a month apart whether the children had kindergarten experience or not.

Of the 70 Bozeman children who repeated a grade, 39 had kindergarten and made the following average grade placement scores: grade one, second grade one month; grade two, third grade three months; grade three, fourth grade no months. Of this group of repeaters, 27 repeated first grade, nine repeated the second, and three repeated third grade. Intelligence Quotient average figure was 96.58.

Of the repeaters, 31 had no kindergarten experience and made the following average grade placement scores: grade one, second grade five months; grade two, third grade six months; and grade three, fourth grade four months. The average Intelligence Quotient of this group was 97.9.

Of the 391 children who had kindergarten experience, there were 39 repeaters; 27 repeated in first grade, nine in second, and three in third. Of the 79 children who had no kindergarten experience, 31 repeated; 26 in the first grade, one in the second, and four in the third. According to these data 39 per cent of the children who entered the Bozeman schools without kindergarten experience repeated one grade in the first three.

The total number of children in the Bozeman Schools in this study was 462. 391, or 84.6 per cent, of these children had kindergarten and produced 39, or 55.7 per cent, of the repeaters (total repeaters, 70). While those children with no kindergarten numbered 71, or 15.4 per cent. of the total, they produced 31 or 44.3 per cent of the repeaters.

In the Helena Public Schools (Table V, VI, and VII), there were 648 children who remained in the system for the entire three years over the four year study. Of these youngsters, with an average Intelligence Quotient of 106.7, 556 made the following mean grade equivalent scores on achievement tests in reading: grade two, third grade six months; grade three, fourth grade nine months. Eighty-seven children repeated a grade. Of this number, 78 repeated in first, nine in second, and none in third. The average Intelligence Quotient of this group was 83.0 and the grade equivalent scores were second grade eight months in April of grade two, and third grade eight months in April of grade three.

Data from Standardizing the Testing Procedure Between Helena and Bozeman Schools.—Gates Advanced Primary Reading Tests were given to 45 second graders in the Whittier and Irving Schools, Bozeman, in April, 1957. The median grade equivalent on the test was third grade and seven months. The average score was third grade and eight months.

Coordinated Scales of Attainment (Reading Section) was given to 48 Bozeman third graders in the same two schools. The median on this test was fifth grade and one month. The average score for this group was also fifth grade and one month.

Kuhlmann-Finch Mental Maturity tests were given to 50 fourth graders in these two Bozeman schools. An average Intelligence Quotient of 108.5 was recorded for these children.

Summary

A comparison of medians of all Bozeman children against all Helena children showed that Bozeman second graders on Metropolitan Achievement Tests averaged nine months higher in achievement than Helena second graders on Gates Primary Reading Test; but by the end of grade three, the Helena children on Coordinated Scales of Attainment were nearly even with the scores of the Bozeman children on Metropolitan Achievement Tests.

In a comparison of 391 children who remained in the Bozeman schools from kindergarten through grade three and 649 children who remained in the Helena schools from grade one through grade three, the Bozeman second graders exceeded Helena children by seven months, and in grade three Bozeman children were six months ahead of the Helena children.

The average Intelligence Quotients of the two groups were 114.3 in Bozeman on California Mental Maturity and 103.7 in Helena on Kuhlmann-Anderson (Kuhlmann-Finch).

Those tests which were given in Helena were given to groups of Bozeman children in April, 1957. On Gates Reading Test 45 Bozeman second graders exceeded the Helena scores by 4.4 months. On Coordinated Scales of Attainment, 48 Bozeman third graders exceeded the Helena children by 2.1 months. On Kuhlmann-Finch Mental Maturity Tests, 50 Bozeman fourth graders had an average Intelligence Quotient of 110.66, 7.01 points above the

average score of the Helena children which was 103.65.

Of the total of 462 children in the Bozeman school system, 391, or 84.6 per cent, of the children had kindergarten and produced 39 or 55.7 per cent of the 70 repeaters. 71 or 15.4 per cent of the total children had no kindergarten and produced 31 or 44.3 per cent of the repeaters. Of the 71 children who entered without kindergarten, 48 did not repeat a grade; 31 did.

CHAPTER III

CONCLUSIONS AND SUMMARY

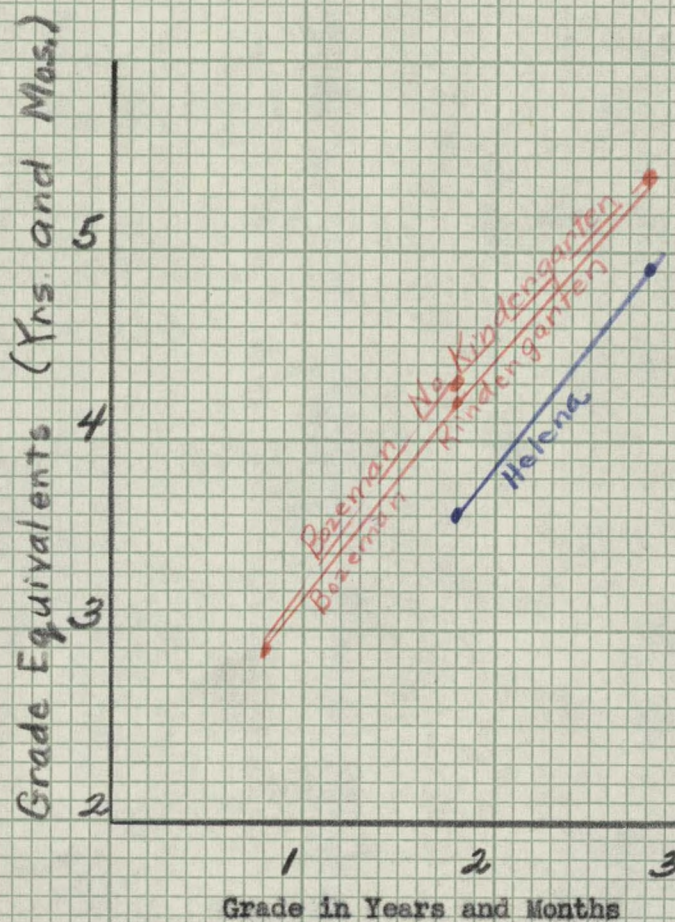
Comparison of Data from Bozeman and Helena Public Schools

Comparison of Median Achievement.---In a comparison of the median achievement of all of those children who had kindergarten in the Bozeman schools and the median achievement of the children with no kindergarten experience in the Helena Schools (Fig. 1) between the years 1949-1953, the Bozeman children exceeded the Helena children from eight to twelve months in grade two. In grade three the Bozeman children exceeded the Helena children by five months in 1949-1950; the scores were the same in 1950-1951, Helena exceeded Bozeman by one month in 1951-1952; and in 1952-1953, on tests given to the Bozeman children in January the grade equivalent score was fourth grade seven months, while the Helena children had a grade equivalent of fourth grade nine months on tests given in April.

Comparison of Average Achievement for Children Who Remained in Their Respective Systems, Grade One to Grade Three.---In Tables VI and VII, when the children who remained in each system from kindergarten or grade one through grade three, were compared according to average achievement, the Bozeman children, whether they had kindergarten or not, exceeded the Helena children. The scores of the children who did not repeat are compared in Table VI and Figure 2. In the Bozeman children who did not repeat a grade, there is no significant difference in achievement between those children who had kindergarten and those children who did not have kinder-

FIGURE 2

COMPARISON OF MEAN READING SCORES OF NON-REPEATERS
OF HELENA AND BOZEMAN



garten experience. However, the Bozeman children exceeded the achievement of the Helena children who have had no kindergarten by 7.7 months in grade two and by 5.3 months in grade three.

The grade equivalents of those children who repeated a grade were compared for the two schools (Table VII and Figure 3). The Bozeman repeaters who had no kindergarten exceeded those who had kindergarten by from three to four months each year. Bozeman repeaters who had kindergarten were ahead of the Helena youngsters who had no kindergarten by five months in grade two and two months in grade three. Helena repeated approximately the same percentage of children as did Bozeman. From Table VI and VII, of 648 children in the Helena schools, 87 or 13.5 per cent repeated. Of 462 children in Bozeman, 70 or 15.2 per cent repeated.

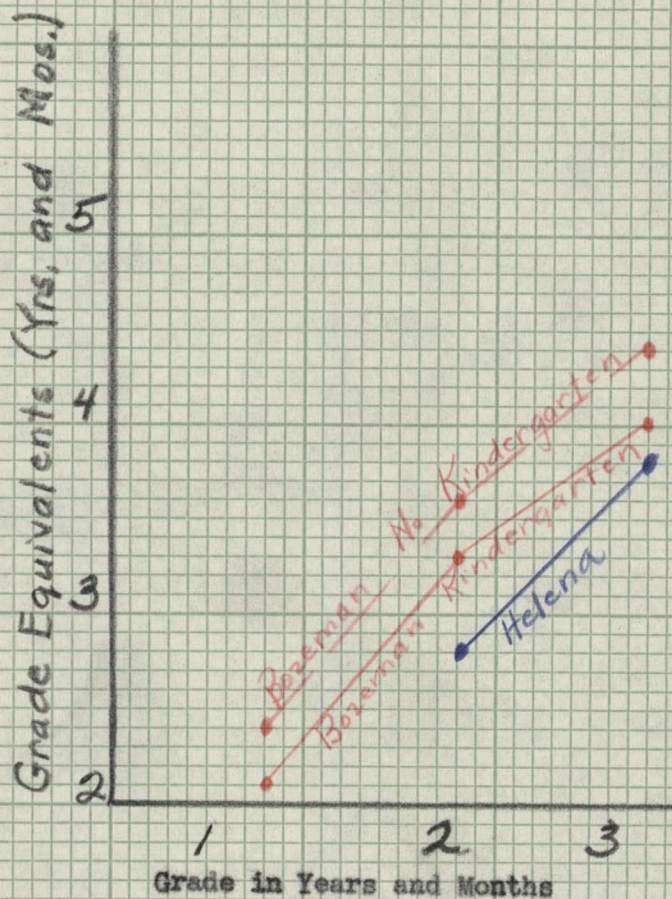
The total number of Bozeman children in this research who had kindergarten was 391; they made an average grade equivalent score of fourth grade two months in grade two, and fifth grade three months in grade three. This group had an average Intelligent Quotient of 114.3 on California Mental Maturity tests.

The total number of children who did not have kindergarten was 77. The average scores of this group were fourth grade one month in grade two and fifth grade one month in grade three, with an Intelligence Quotient of 107.6.

A total of 649 Helena children who had no kindergarten, with an Intelligence Quotient of 103.3, made average grade equivalent scores of third grade five months in grade two and fourth grade seven months in grade three.

FIGURE 3

COMPARISON OF MEAN READING SCORES OF REPEATERS
OF HELENA AND BOZEMAN



In comparing Intelligence Quotient scores (Tables VI and VII), the following differences were also noted: Bozeman children who did not repeat had an average Intelligence Quotient nine points higher than the Helena non-repeaters. Bozeman repeaters were fourteen to fifteen points higher than Helena repeaters.

Comparison of Bozeman and Helena Children on the Same Tests.—It must be noted that the differences in achievement and in Intelligence Quotient might be due to the different tests administered in the two towns. In an attempt to eliminate this variable factor, a known group of Bozeman children was given those tests which were given to the Helena children.

In a comparison of medians on the Gates Advanced Primary Reading Tests given to 45 second graders in the Whittier and Irving schools in Bozeman in April, 1957, the median grade equivalent on the test was third grade seven months compared to Bozeman's medians on Metropolitan Achievement Tests (Reading Section) of fourth grade one month in 1950, fourth grade four months in 1951, fourth grade one month in 1952, and fourth grade one month in 1953. Helena's medians on Gates Advanced Primary Reading Test were third grade two months in 1949, third grade three months in 1950, third grade two months in 1951, and third grade three months in 1952. The median of the group of Bozeman children exceeded the score of the Helena children by four to five months on the same test.

The means for these two schools were compared and the results appear in Table VIII. Bozeman children made a grade equivalent of third grade nine months compared to the Helena means of third grade and nearly five months, a difference of 4.4 months in favor of the Bozeman children.

TABLE VIII
COMPARISON OF BOZEMAN AND HELENA CHILDREN
GRADE TWO
GATES READING TESTS

School	Number Children	Degrees of Freedom	Mean Score	Sum of Squares
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Bozeman Control	45	44	3.90	35.31
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Helena	606	605	5.46	56.89
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		Sum = 649	Difference .44	Sum = 92.20
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$$s^2 = 92.20 / 649 = .14$$

$$s_{\bar{x}} = \sqrt{.14 (606 / 45) / (606)(45)} = .058$$

$$t = .44 / .058 = 7.58$$

Hence P = 0.01

This difference is significant to the one per cent level of probability.

Coordinated Scales of Attainment (Reading Section) given to 48 Bozeman third graders yielded a median of fifth grade one month compared to Bozeman medians on Metropolitan Achievement Tests (Reading Section) of fifth grade four months in 1950, fifth grade one month in 1951, fourth grade seven months in 1952, and fourth grade nine months in 1953. The median for 1953 was calculated from the 1950, 1951, 1952 scores. The 1953 tests were given in January while the tests were given in April the other years. An average was made of the growth from grade two to grade three for the years 1950, 1951, 1952 and that average was added to the grade two median of the 1953 group to get a fourth grade nine months for 1953. Helena children had a median score on Coordinated Scales of Attainment (Reading Section) of fourth grade nine months in 1949, fifth grade one month in 1950, fourth grade eight months in 1951, and fourth grade nine months in 1952. The median of this group of 48 Bozeman children exceeded that of the Helena children by three to four months on three years data and equalled the Helena median of one year.

The mean achievement for both schools on Coordinated Scales of Attainment is compared in Table IX. Bozeman children made a grade equivalent of fifth grade; Helena children, fourth grade and seven months. Bozeman children exceeded Helena children by 2.1 months, a difference which is significant to the one per cent level of probability.

On Kuhlmann-Finch Mental Maturity tests given to 50 fourth graders in the Bozeman schools, the Bozeman control group made an average Intelligence Quotient of 110.66 compared to Helena's 103.65. On California

TABLE IX
COMPARISON OF BOZEMAN AND HELENA CHILDREN
GRADE THREE
COORDINATED SCALES OF ATTAINMENT

SCHOOL	Number Children	Degrees of Freedom	Mean Score	Sum of Squares
Bozeman Control	48	47	4.95	15.84
Helena	649	648	4.74	106.88

Sum = 695 Difference .21 Sum = 120.72

$$s^2 = 120.72 / 695 = .17$$

$$s_x = \sqrt{.17 (649 / 48) / (649)(48)} = .062$$

$$t = .21 / .062 = 3.38$$

hence $P = 0.01$

Mental Maturity, Bozeman children with kindergarten had a score of 114.3; those without kindergarten 107.6. The mean Intelligence Quotients for the Bozeman children are compared with those of the Helena children in Table X. Bozeman children had an average Intelligence Quotient of 110.66; Helena, 103.65. There is a difference of 7.01 points in favor of the Bozeman children; a difference which is significant to the 2 two per cent level of probability.

Conclusions

Comparison of Median Achievement on Different Tests.—In comparing the average median grade equivalents of all children who had no kindergarten in the Helena Schools against the average median grade equivalents of all children who had kindergarten in the Bozeman schools, the following results are observed: grade one, since the tests were given at different times, the scores of the two schools are not comparable; grade two, the Bozeman children exceeded the Helena children by nine months, twelve months, nine months, and eight months in the four years of the study, 1949-1953, respectively; third grade, Bozeman children exceeded the Helena children by five months in 1949-50, the score was the same in 1950-51, the Helena children exceeded the Bozeman children by one month in 1951-52, and since the tests were given at different dates in 1952-53, the scores for that year are not comparable.

If median scores for both schools are considered, the Bozeman children in grade two exceed the Helena children by eight to twelve months (an average of nine months greater achievement); but by the end of grade three

TABLE X
COMPARISON OF BOZEMAN AND HELENA CHILDREN
GRADE FOUR
KUHLMANN-FINCH MENTAL MATURITY TESTS
(IQ)

School	Number Children	Degrees of Freedom	Mean Score	Sum of Squares
Bozeman Control	50	49	110.66	9915
Helena	648	647	103.65	251487
		Sum = 696	Difference 7.01	Sum = 261402

$$s^2 = 261,402 / 696 = 375.58$$

$$s_x = \sqrt{(375.58)(648 / 50) / (648)(50)} = 2.84$$

$$t = 7.01 / 2.84 = 2.47$$

$$\text{hence } P = 0.02$$

the Helena children equalled or exceeded the Bozeman children two years and were five months behind them one year.

Different tests were administered in the two schools, hence any ideas based upon these figures are not conclusive. However, the great difference in the scores at the end of the second grade might indicate that if the Bozeman children have an advantage because of kindergarten experience that advantage is greatest at the end of second grade and is lost by the end of grade three.

Comparison of Average Achievement on Different Tests for Children Who Remained in Their Respective Systems, Grade One to Grade Three.—Of the 391 children who remained in the Bozeman schools from kindergarten through grade three, the following mean grade equivalents are recorded: grade two, fourth grade two months; grade three, fifth grade three months. Average Intelligence Quotient was 114.3.

Of the 649 children who remained in the Helena schools from first grade through third grade, the following mean grade equivalents are recorded: grade two, third grade and five months; grade three, fourth grade and seven months. Average Intelligence Quotient of this group was 105.7.

Different tests were administered in the two systems, hence any conclusions based upon these figures are only indicative. On the basis of these figures in grade two, Bozeman children exceeded Helena children by seven months in achievement. In grade three Bozeman children exceeded Helena children by six months in achievement.

In Intelligence Quotient Bozeman children exceeded Helena children by 10.6 points. Such a difference in intelligence should be an important

factor in achievement in reading.

Comparison of Bozeman and Helena Children on the Same Tests.---When those tests which were given in Helena, were given to a group of Bozeman children, the following results were obtained:

On Gates Reading Test, 45 Bozeman second graders had a mean grade equivalent score of third grade nine months compared to the mean grade equivalent of 606 Helena children of third grade and four and six tenths months. The 4.4 months lead which the Bozeman children had over the Helena children is significant to the one per cent level of probability.

On Coordinated Scales of Attainment, 48 Bozeman third graders made an average grade equivalent score of fourth grade nine and five tenths months compared to the average score of 649 Helena children of fourth grade seven and four tenths months. This advantage of 2.1 months which the Bozeman children have is significant to the one per cent level of probability.

On Kuhlmann-Finch Mental Maturity test, 50 Bozeman children in grade four had an average Intelligence Quotient of 110.66. 648 Helena children had an average Intelligence Quotient of 103.65. The difference of 7.01 in favor of the Bozeman children is significant to the two per cent level.

From these data, the Bozeman children are 4.6 months ahead of the Helena children in grade two, and 2.1 months ahead of the Helena children in grade three; the Bozeman children have an Intelligence Quotient score 7.01 points higher than the Helena children. Since the differences are significant, Bozeman children are achieving more in grades two and three in the area of reading. These differences, in light of the higher

Intelligence Quotient of the Bozeman children, cannot wholly be attributed to kindergarten experience which the Bozeman children have had, unless four years of school experience have an effect upon performance on Mental Maturity tests. Further investigation may show this to be so.

Bozeman School System.—With respect to the Bozeman school system from a total of 462 children, 391 or 84.6 per cent of the children had kindergarten and produced 39 or 55.7 per cent of the 70 repeaters. 71 or 15.4 per cent of the total children had no kindergarten and produced 31 or 44.3 per cent of the repeaters. These figures would indicate that children without kindergarten are greatly handicapped in the Bozeman schools. Of the 71 children who entered without kindergarten, 48 did not repeat a grade, 31 did. One might almost say, in view of this, that a child entering the Bozeman schools without the benefit of kindergarten has a thirty-nine per cent chance of repeating a grade in the first three years of his school career.

Summary

This investigation was made to find out if those children who have public school kindergarten experience have certain academic advantages in reading over children who have had no kindergarten. Are children with kindergarten experience better prepared for learning to read and will they achieve more?

Previous studies in the field had not shown conclusively that kindergarten experience resulted in any advantages. Some authors as a result of their findings questioned the real purpose and value of the kindergarten

in readiness for learning in the first grade.

The present study was a comparison of average achievements in reading from grade one through grade three and mental maturity of non-repeaters, and number, achievement, and mental maturity of repeaters in two school systems in Montana, Bozeman with kindergarten and Helena with no kindergarten.

A comparison of medians of all Bozeman children against all Helena children showed that Bozeman second graders on Metropolitan Achievement tests averaged nine months higher in achievement in reading than Helena second graders on Gates Primary Reading Test; but by the end of grade three, the Helena children on Coordinated Scales of Attainment were nearly even with Bozeman children on Metropolitan Achievement Tests.

In a comparison of 391 children who remained in the Bozeman schools from kindergarten through grade three and 649 children who remained in Helena schools from grade one through grade three, second graders of Bozeman exceeded Helena children by seven months; and in grade three, Bozeman children exceeded Helena children by six months. Again this comparison was made on the basis of different tests.

The average Intelligence Quotient of the two groups were 114.3 in Bozeman on California Mental Maturity Test and 103.7 in Helena on Kuhlmann-Finch Mental Maturity Test.

Since these comparisons were based upon different tests given to each system, the testing procedure was standardized by giving those tests which had been given in Helena to Bozeman children. The results were as follows: On Gates Reading Test, 45 Bozeman second graders exceeded 606 Helena

children by 4.4 months, significant to the one per cent level of probability. On Coordinated Scales of Attainment, 48 Bozeman third graders exceeded 649 Helena children by 2.1 months, a difference significant to 1 per cent. On Kuhlmann-Finch Mental Maturity, 50 Bozeman fourth graders had an average Intelligence Quotient of 110.66, 7.01 points above Helena fourth graders with an average score of 103.65. This difference is significant to a two per cent level.

In the light of the significant difference in scores on Mental Maturity tests, the advantages the Bozeman children have in reading through grade three cannot be conclusively attributed to kindergarten experience. Further investigation might show a correlation between scores on Mental Maturity tests and years of school experience up to fourth grade.

One of the most important conclusions drawn from the Bozeman data is that 84.6 per cent of the total children enrolled in the Bozeman Public Schools from 1950-1953 had kindergarten and produced 55.7 per cent of the repeaters; while 15.4 per cent of the children had no kindergarten and produced 44.3 per cent of the repeaters.

What is the cost of this 15.4 per cent of the children to the Bozeman School System? Is the cost of the repetitions enough to justify the maintenance of the kindergartens if kindergarten can prevent such repetitions?

Suggestions for Further Study

Another study might follow the school career of the non-kindergarten group through grade eight and calculate the actual cost of this group

throughout elementary school in Bozeman.

A comparison might be made between those children having the same Intelligence Quotient in the two different systems with respect to reading achievement.

A study might be made of the effect of kindergarten upon performance in Mental Maturity tests.

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