READING ACHIEVEMENT OF BOYS AND GIRLS IN THEIR THIRD YEAR OF SCHOOL

by

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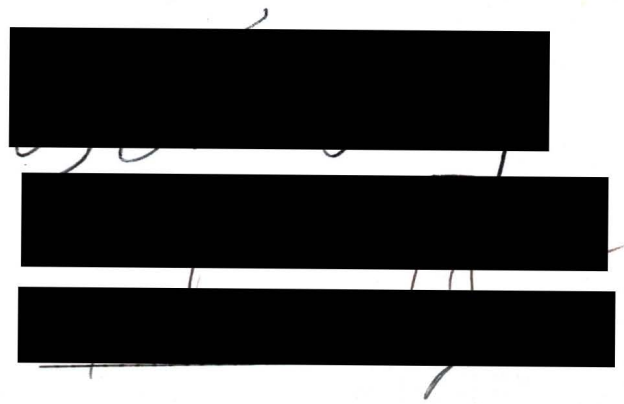
ABSTRACT

This study was designed to determine if the type of intelligence test used, individual or group, affects the results of a comparison between the reading achievement of boys and girls. The sample of thirty children (N = 15 girls, 15 boys) was randomly selected from eight elementary schools in Victoria, B. C. The criterion variable, reading ability, was determined on two separate measures. Intelligence was measured by both a group and an individual test.

Girls were found to have higher Informal Reading Inventory (IRI) scores when Wechsler Intelligence Scale for Children (WISC) Performance intelligence scores were controlled. A definite trend toward a difference in Metropolitan Elementary Reading Test (MERT) scores and IRI scores was seen when WISC Total intelligence scores were held constant. This trend also appeared in MERT scores when WISC Performance intelligence scores were held constant. In all cases the differences favored girls.

No differences were observed in either MERT or IRI reading scores when Lorge-Thorndike Intelligence Test scores were the covariate. This finding is in contrast to many previous studies reviewed in the literature.



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CHAPTER I

STATEMENT OF PROBLEM

Girls and boys enter school at the same age and in most classrooms are expected to master the same skills within a relatively uniform period of time. This rate of mastery is critical to reading achievement, since reading is the basis of many other learning activities. Early investigations found that sex differences existed in reading achievement, in grade one (Stroud and Linquist, 1943; and Carroll, 1948).

Other researchers have looked into the nature and extent of sex differences in reading achievement. The results of these investigations generally agree that girls are superior readers to boys by the end of grade one, but vary as to the degree of this superiority in later grades. There is enough agreement, however, to show educators that reading programs, especially in grade one, require constant attention and revision.

Lack of clarity in the differences between boys and girls in reading achievement beyond grade one is the basis of the first purpose of this investigation: to determine if there are differences in the reading achievement of girls and boys in their third year of school.

A common approach by investigators of sex differences in reading achievement is apparent. The subjects are given both a standardized

reading test and a group intelligence test which requires the subjects to read independently. These two measures appear to be partially a measure of the same ability.

Few investigations (Neville, 1962) make reference to the relationship between intelligence tests, which require reading, and standardized reading tests. The extent that the use of both of these tests affects the outcome of a study on sex differences in reading achievement requires more consideration. In the present study two measures of intelligence were obtained: one, an individual intelligence test which did not require reading, and the other, a group intelligence test which had to be read by the students.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

This chapter will be divided into four main parts: first, a review of research concerned with sex differences in reading achievement beyond grade one; then a review of research concerned with sex differences in reading achievement beyond grade one; next a look at research concerned with the relationship between intelligence and reading ability; and finally, a brief survey of opinion on the selection and application of the tests to be used in this investigation. Summaries are given at the end of each section.

Studies Dealing with Reading Achievement in Grade One

Comparison of the reading achievement of boys and girls in grade one has been the subject of considerable study. Carroll (1948) found that girls were higher than boys in both reading readiness and reading achievement. Ames (1964) and Pauly (1951) had similar findings and further suggested that boys would benefit from entering school later than girls. Balow (1963) found that if readiness was held constant sex differences disappeared. This appears to be in agreement with the fact that girls are more ready to begin reading instruction than boys. However, girls at the end of grade one had higher levels of achievement in reading than boys when scores on the Gates Primary Reading Test were compared. T-tests were used to determine the differences between the

means of each intelligence group of boys and girls.

Dykstra and Tinney (1969) found girls were superior to boys in measures of readiness which involved visual or auditory discrimination. Boys performed better than girls in an orally-administered test of general vocabulary. At the end of grade one girls were significantly better on tests of word recognition, paragraph comprehension, spelling, and word study. Boys were equal to girls only in understanding vocabulary measured in an oral test.

Dykstra (1967) and Wyatt (1966) studied the effect of various reading programs on sex differences in reading achievement. Both found that girls tended to be better readers on all programs, and that none of the programs had a unique effect on the achievement of boys and girls.

Davis (1967), in a study using 122 girls and 116 boys, found no significant differences in reading achievement between the sexes when scores on the Stanford Achievement Test, Primary Battery were compared. While the mean difference in the ages of the girls and boys was not significant, no mention was made of controlling for intelligence. Prescott (1955) found that girls were not consistently superior to boys in reading readiness on test scores from the Metropolitan Readiness Test when chronological age was considered.

The research studies discussed in this first section indicate that:

(a) Girls appear to be superior to boys in reading achievement by the end of their first year in school. This seems to be

true regardless of the method used to teach reading.

(b) Girls are ready to begin reading instruction before boys.

Studies Dealing with Reading Achievement Beyond Grade One

The extent to which the difference in the reading achievement of boys and girls continues after grade one is unclear. Many studies have found girls to be better readers than boys well beyond the first grade. However, there is no agreement as to whether these differences increase, decrease, or remain constant with each successive year.

Two classical studies, Samuel (1943) and Stroud and Linquist (1942) found that girls in all elementary grades (grades 1 through 6) were better readers than boys.

Dykstra and Tinney (1969) studied children at the end of grade two. Girls were superior to boys in word recognition, paragraph comprehension, spelling, word study skills and language.

Gates (1961) and Pauly (1959) found girls to be better at reading than boys in grades two to eight. Pauly disregarded the differences in chronological age when analyzing the data, even though the boys were older than the girls. Older boys with retarded school progress were being compared with younger, achieving girls. It is not surprising that the girls were superior readers. In addition he found the difference between girls and boys became greater with each increased grade level. Gates found girls to be .2 standard deviations above boys in reading

achievement.

Wozencraft (1963) found a greater difference in the reading level of girls and boys at grade three than at grade six. The students were divided into three ability groups (low-I. Q. under 90; average-I.Q. between 90 and 109; high-I.Q. 110 and over) according to scores on the Kuhlman-Anderson Intelligence Test. Reading scores, from the Standford Achievement Tests, of boys and girls were compared within each ability group. Girls were better readers and younger than the boys in the average and low ability groups. No differences in reading ability were found in the high ability group, where the boys were younger.

Using a random sample of 564 third grade students and 603 sixth grade students, Wozencraft (1967) again concluded that the difference between sexes in reading achievement decreases as children become older.

Hughes (1953), in a study of students in grades three to eight, found that girls in the third and fourth grades achieved higher than boys in reading comprehension. However, by grade five no differences were observed. Hughes compared boys and girls in each grade on the basis of age, mental ability, comprehension, rate of comprehension, and word discrimination. These scores were obtained from the Chicago Reading Test and the SRA Test of Primary Mental Abilities.

Parsley, Powell, and Deutsch (1963) and Clark (1962) found no differences in the reading ability of boys and girls. Parsley, et. al. studied students in grades two through eight. They divided each grade into five intelligence groups and compared the achievement of boys and girls

within each ability group. Clark compared girls and boys in grades three, five, and eight. No reference is made to controlling for intelligence.

In a study of grades four to eight, Sinks and Powell (1965) controlled I. Q. (five groups), sex, and grade level. The California Test of Mental Maturity and the California Reading Test were used. Students were divided into groups of overachievers, achievers, and underachievers by comparing grade placement with achievement placement. However, no conclusions could be drawn from this study.

It is note-worth that studies (Parsley, et. al., 1963; Clark 1962; and Sinks, et. al., 1965) using both the California Test of Mental Maturity and the California Reading Achievement Test all reported no differences in reading achievement between boys and girls. Only one study (Jarvis, 1965), which used both of these tests, found any differences. Thus, it seems possible that the California Test of Mental Maturity and the California Reading Achievement Test may well be a measure of the same ability.

The research studies discussed in this second section indicate that:

(a) Sex differences in reading achievement do exist beyond grade one, possibly throughout the elementary grades. The extent of these differences in each grade is unclear.

(b) Most studies recognize the need to control for intelligence when studying reading achievement.

(c) Some investigations control age but do not consider the number of years students have spent in school. Years spent in school seems important in light of several studies which found boys to be older than girls in most grades.

(d) Standardized reading tests and group intelligence tests are used in most studies. Both require reading. No indications are given as to what effect these tests have upon poor readers. However, it may be assumed that bright, poor readers would do no better than dull, poor readers.

Studies Dealing with Intelligence and Reading Achievement

Researchers consistently find a positive correlation between intelligence and reading achievement. The extent of this correlation becomes a critical factor in a comparative study of reading ability.

Lennon (1950) found a correlation of .42 between of the Metropolitan Achievement Test (Reading) and the Pinter General Ability Test at the grade three level. Manolakes and Sheldon (1955) correlated the reading scores on the Progressive Achievement Test and the language factor intelligence quotient of the California Test of Mental Maturity. They found the correlations increased with grade level, ranging from .3 at grade one to .78 at grade twelve.

Cleland and Toussaint (1962) found correlations of .60 and .59

between the Gates Reading Survey and the S.R.A. Primary Mental Abilities Test and the Standford-Binet Intelligence Test, respectively.

While the positive correlation between reading achievement and intelligence is an established fact, it is necessary to consider the test used when interpreting these correlations. In a study reported by Manolakes and Sheldon (1955) a high correlation was found between an intelligence test and a reading test which both required the subject to read. Thus, a correlation could be expected between these two tests (Austin, Bush, and Huebner, 1961, p. 34; Wheeler, 1949).

There appears to be a need for a measure of intelligence which does not involve reading. Neville (1965) compared Metropolitan Reading Test scores with Lorge-Thorndike Intelligence Test scores (a test requiring reading) and Wechsler Intelligence Scale for Children scores (an individual test not requiring reading. He concluded that the Lorge-Thorndike Intelligence Test greatly under-estimated the intellectual level of children who had reading problems. Measures of intelligence which require reading do not give a valid assessment of the student with reading problems (Harris, 1956, p. 224; Spache, 1963, p. 117; Wheeler, 1949).

Conclusions that can be drawn from this section are:

(a) The positive correlation between intelligence and reading achievement make the control of intelligence necessary in a comparative study of reading scores. The extent of this correlation varies with the tests being used.

(b) Poor readers receive deflated scores on intelligence tests

which require reading. Depending on the severity of the reading disability, this under-estimation can range from slight to gross.

Studies Dealing with Tests of Reading Ability and Intelligence

This section includes a summary of research indicating test procedures to be followed. As well, a brief statement is given concerning the application of the tests selected for use in this investigation. General conclusions will be found at the end of each section.

Metropolitan Elementary Reading Test (MERT)

The Metropolitan Elementary Reading Test, a group paper and pencil test, is considered to be one of the best survey tests of reading achievement available today (Robinson, 1965). The test is composed of two subtests, Reading and Word Knowledge. The subtest Reading measures paragraph meaning and questions four kinds of comprehension skills: main thought, details, inferences, and meaning of words from context. The subtest Word Knowledge measures vocabulary and word recognition. Thus, independent scores are given for reading comprehension and vocabulary.

While the Metropolitan Reading Test is considered to be an outstanding measurement of every pupil in reading for comparative purposes, it must still be only be considered a rough measure of reading ability (Robinson, 1965). Other investigators (McCracken, 1967; Plessas,

1967; Sipay, 1964) have concluded that standardized tests often overestimate the child's reading level by one to four years. Poor readers, particularly, may receive inflated scores purely by chance. Other students, while being able to read, are unable to cope with the mechanics of a paper and pencil test.

The Metropolitan Reading Test, then is a good measure for general comparative purposes. A more accurate means of placing the child at the appropriate grade level in reading is also needed in order to compare the reading achievement of students in the same year of school.

The Informal Reading Inventory (IRI)

The Informal Reading Inventory places the child in a functional reading situation where he reads standard selections from a basal reading series. In this way, a more accurate estimate of the child's appropriate reading level is obtained than with most standardized tests (Goudey and Olsen, 1968). The instructional level is determined by combining the comprehension level, in both silent and oral reading, with the level of word recognition in oral reading.

While the Informal Reading Inventory is more accurate than standardized reading tests, it is more subjective in its interpretation, partly due to its individual administration. It is desirable then, to use both an informal reading inventory and a standardized test when comparing reading achievement, in order that the best features of both may be utilized.

Lorge-Thorndike Intelligence Test (L-T)

The Lorge-Thorndike Intelligence Test is considered to be one of the best group tests available considering the psychological constructs upon which it is based and its statistical standardization (Freeman, 1959; Milholland, 1959). Panther (1967) in a study of comparison with the Standford-Binet, found the correlations to be high enough to support the validity of the Lorge-Thorndike Intelligence Test.

It is composed of a verbal and non-verbal battery. As with any group test, factors other than intelligence can greatly influence the score. Neville (1965) found that such a test significantly underestimated the intellectual level of children who had reading problems. While the authors (Lorge and Thorndike, 1964) encourage the use of the non-verbal battery with retarded readers, Pidgeon (1959) reminds the user that more factors than inability to read can influence a paper and pencil test.

However, due to the wide useage of group standardized intelligence tests in investigations of this nature, it is important to have such an estimate of mental ability. Also needed is a test which does not require the child to read or write.

Wechsler Intelligence Scale for Children (WISC)

In a review of literature on the reliability and concurrent validity of the Wechsler Intelligence Scale for Children, Burnstein (1965) found it to be a well standardized, stable instrument. A

frequently used individual test of mental ability, the WISC is considered to be one of the major contributions to the field of intelligence testing with children (Patterson, 1959).

The test is composed of ten subtests which yield three scale scores: Verbal, Performance, and Total. The test was found to be equally good for boys and girls with no differences between subtests to account for the measurable difference between the academic successes of boys and girls of elementary school age (Gainer, 1962).

Since this test does not require the student to read, it is an appropriate instrument to use in comparison with the Lorge-Thorndike Intelligence Test.

Summary

The first section of this chapter presented a review of research on sex differences in reading achievement in grade one. This literature suggested that girls' reading achievement is superior to boys' by the end of grade one.

The second section of this chapter presented findings of studies which investigated sex differences in reading achievement beyond the first grade. The results of these studies indicated that girls are superior to boys in reading achievement beyond grade one. Little agreement was found to the extent of this superiority in the various elementary grades. In general then while girls are superior readers to boys beyond grade one, the nature or extent of this superiority is unclear.

The third section of this chapter reviewed literature into the relationship between intelligence and reading. These investigations showed intelligence to be correlated with reading achievement. Therefore, intelligence must be controlled when comparing reading scores. This section also pointed out that poor readers receive deflated scores on intelligence tests requiring reading. Thus, the means of measuring intelligence must be carefully considered.

Finally, the fourth section of this chapter included a brief discussion of the test procedures followed in the various studies reviewed. Tests selected for the present investigation were also reviewed. This section showed that:

(a) All investigations which controlled for intelligence used a group intelligence test.

(b) A group intelligence test is partly a measure of reading ability.

(c) An individual intelligence test gives an estimate of general mental ability which is not affected by reading ability.

(d) To accurately assess reading achievement, both a standardized test of reading achievement and an informal reading inventory should be used.

Sex differences in reading achievement have been widely studied. However, little consideration has been given to determining the effect a group intelligence test has on the results. It would appear then that a study which compared group intelligence tests with individual intelligence tests with regard to reading is warranted.

CHAPTER III

STATEMENT OF HYPOTHESES

Research Model

There is agreement that girls are better readers than boys at the end of grade one (Ames, 1964; Pauly, 1951; Balow, 1963). This difference appears to continue throughout the elementary grades (Gates, 1961, Hughes, 1953; Wozencraft, 1963, 1967).

The model used in the above studies was similar. A random sample of students in specified grades were administered a group intelligence test and a standardized reading test. These scores were then compared to determine whether differences in reading achievement existed when intelligence was controlled.

Age was also taken into account in the studies reported by Clark (1959) and Hughes (1953). Since boys are frequently found to be older than girls in most elementary grades, age must be considered when comparing reading achievement (Clark, 1950; Anderson, et. al., 1956; Hughes, 1953).

To compare sex difference in reading achievement age and intelligence must be held constant. This model is used in the present study as it gives a clear assessment of sex differences in reading achievement which is not influenced by differences in age or intelligence.

It has been shown that a group test under-estimates the intelligence of children with reading difficulties (Neville, 1965). Both an individual and a group intelligence test were administered in the

present study to determine if the instrument used to measure intelligence effects comparisons in reading achievement. Also, both an individual and a group measure of reading ability were used to make use of the best features of both types of tests.

Criterion Measure

The criterion measure in this study is reading ability. The literature strongly suggests that reading ability cannot be accurately assessed by use of a standardized reading test alone (Robinson, 1965; McCracken, 1967; and Plessas, 1967). In view of this, reading ability is assessed according to two variables.

These criterion variables are Informal Reading Inventory level (IRI) and Metropolitan Elementary Reading level (MERT). They are derived as follows:

IRI - the instructional reading level is the standard grade level scored on the Informal Reading Inventory.

MERT - the Metropolitan Elementary Reading level is the standard grade level mean of the two subtests, Word Knowledge and Reading.

Hypotheses

The following hypotheses are tested in this study:

1. There will be no difference in the MERT reading grade level scores of boys and girls when WISC intelligence scores are controlled.
2. There will be no difference in the IRI reading grade level scores of boys and girls when WISC intelligence scores are controlled.
3. There will be no difference in the MERT reading grade level scores of boys and girls when L-T intelligence scores are controlled.
4. There will be no difference in the IRI reading grade level scores of boys and girls when L-T intelligence scores are controlled.

CHAPTER IV

METHOD AND RESULTS

Experimental Design

This study was designed to determine whether there are differences in reading achievement between girls and boys in their third year of school. Age and intelligence were held constant.

Subjects

The subjects (Ss) were 30 children, 15 girls and 15 boys, in their third year of school. As a child must be a full six years of age by the end of December to enter grade one in the Greater Victoria school system, children in their third year of school would be between the ages of 8 years 6 months and 9 years 5 months at the time of this study.

The Ss were randomly selected from eight elementary schools in Victoria, B. C. These schools were also selected by use of a table of random numbers and were considered to be a reasonable cross-section of elementary schools in the Victoria area.

Procedure

The procedure involved the administration of four tests to each of the Ss. The Wechsler Intelligence Scale for Children and the Informal Reading Inventory were administered by the investigator during April and

May, 1969. Classroom teachers gave the Lorge-Thorndike Intelligence Test during February and March, 1969, respectively. The procedure is given below for those tests administered by the investigator.

Wechsler Intelligence Scale for Children (WISC)

The complete scale of the WISC was individually administered to each S by the experimenter (E) according to the instructions of the manual. Three scores were computed for each S: Verbal Intelligence, Performance Intelligence, and Total Intelligence.

Informal Reading Inventory (IRI)

Two sections of the Informal Reading Inventory were individually administered by the E to all Ss. These sections included: the graded silent reading passages and the graded oral reading passages.

(a) Silent reading. The functional silent reading level is the graded level immediately preceding the level at which the S fails to score 70% or higher on the silent reading comprehension questions.

(b) Oral reading. The functional oral reading level is measured in two parts, and is the graded level immediately preceding the level at which the S fails to score (a) over 85% in word recognition, or (b) 70% or higher on the oral reading comprehension questions.

The instructional reading grade level is the lower of the two functional reading levels, silent or oral.

Administration

The S was seated at a table with the E. The test began with the graded oral reading section which was approximately two reading levels below his present grade level in school. The S read the passage aloud while the E marked the appropriate errors. When the S finished the passage the E asked him the oral reading comprehension questions which follow the selection.

Next, the S was instructed to open a reader to the graded silent reading passage of approximately the same reading level, and to read the selection silently. When the S finished reading the passage, the E asked him the silent reading comprehension questions which follow the selection.

The S proceeded through each succeeding graded level in the above manner until the instructional reading grade level was reached.

Scoring

Answers to all comprehension questions are given in the test booklet and are scored as either correct or incorrect. Errors in word recognition are: substitutions, omissions, insertions, mispronunciations, and E pronunciations.

Other Testing

In addition to the tests administered by the E, all the Ss were given the Lorge-Thorndike Intelligence Test (Canadian Form) and the Metropolitan Elementary Reading Test as part of the regular testing program carried on by the Greater Victoria School District. The results

of these tests, which were administered on a group basis by the regular classroom teachers, were provided for use in this study.

Assignment of Subjects

The Ss were divided by sex for comparative purposes in this study (N=30; 15 boys, 15 girls).

Statistical Design

Initial t comparisons were made between boys and girls for differences in age, intelligence and reading scores. Correlations were then made between each measure of intelligence with each measure of reading.

Mean scores for the two criterion variables (MERT and IRI scores) of reading ability were then analyzed.

An analysis of covariance was used to control for differences in intelligence between boys and girls. In this way effects of variations in mental ability were eliminated when comparing differences in reading achievement.

Results

This section of the chapter deals with the analysis of the data on reading ability. Tests for differences in age and intelligence are also included. A brief summary of the findings is included at the end of this chapter.

Complete data was collected on all of the subjects randomly

selected for this study. Sample size was consistent for each comparison (N=15 girls and 15 boys).

F tests for homogeneity of variance were made for all comparisons. They were all found to be non-significant (F>.05).

Mean age, intelligence, and reading grade level scores were compared for differences between boys and girls. See Table I. No differences were found in age. This was due to the criterion set up for inclusion in the sample. Intelligence scores, compared on verbal, non-verbal, and total scores for both the WISC and the L-T showed no differences between boys and girls.

Sex differences were not apparent in the MERT and IRI reading grade level scores. However, there is no way of telling which part of these scores is reading achievement and which part is intelligence.

It is therefore necessary to look at the correlations between intelligence scores and reading scores. Table II shows the extent of the relationship between both reading scores (MERT and IRI) and all measures of intelligence (L-T and WISC scores). The amount of variance in the reading scores associated with intelligence ranges from approximately 6% to 41%. Thus, the relationship between reading (MERT and IRI) and intelligence (WISC and L-T) makes it necessary to hold intelligence constant.

An analysis of covariance, with intelligence (WISC and L-T scores) as the covariate, was carried out on the reading grade level scores of boys and girls. This analysis takes into account the high correlations

TABLE I

Means, Standard Deviations and t Tests on

Sex Groups

	Variable	BOYS: (N=15) Mean	S.D	GIRLS: (N=15) Mean	S.D.	t	Probability
1.	Age	109.00	3.23	107.53	3.20	1.21	.24
2.	WISC Verbal	105.80	13.85	110.07	13.36	.83	.41
3.	WISC Performance	112.07	8.62	105.73	13.35	1.49	.15
4.	WISC Total	109.47	11.40	108.60	12.30	.19	.85
5.	L-T Verbal	95.33	14.15	101.87	16.75	1.12	.27
6.	L-T Non-Verbal	97.27	18.35	98.93	13.93	.27	.79
7.	L-T Total	96.47	14.83	100.60	13.65	.77	.45
8.	MERT	3.85	.79	4.29	1.10	1.20	.24
9.	IRI	2.91	1.25	3.60	1.33	1.43	.17

TABLE II

Correlations Between I.Q. (WISC Scores and L-T Scores) and IRI and MERT

I.Q.	IRI	MERT
WISC		
Verbal	.447	.656
Performance	.553	.354
Total	.562	.587
L-T		
Verbal	.602	.640
Non-verbal	.355	.238
Total	.534	.488

TABLE III

Analysis of Covariance on MERT and IRI Scores
Between Boys and Girls with I.Q. (WISC Scores) as the Covariate

A. Analysis of Variance

	$\bar{X}_{boys}$	$\bar{X}_{girls}$	Mean Sq. Between	Mean Sq. Within	F*	Probability
WISC I.Q.						
Verbal	105.80	110.06	136.50	198.33	.69	.414
Performance	112.06	105.73	300.88	135.35	2.22	.147
Total	109.47	108.59	5.62	150.55	3.74	.848
IRI	2.90	3.60	3.61	1.78	2.03	.165
MERT	3.85	4.29	1.41	.98	1.44	.240

*df = 1/28

B. Analysis of Covariance

	$\bar{X}_{boys}$	$\bar{X}_{girls}$	Mean Sq. Between	Mean Sq. Within	F*	Probability
WISC I.Q.						
IRI x Verbal	2.99	3.51	1.99	1.51	1.32	.260
IRI x Performance	2.66	3.84	9.68	1.01	9.60	.004
IRI x Total	2.88	3.63	4.20	1.20	3.52	.072
MERT x Verbal	3.95	4.19	.42	.59	.71	.406
MERT x Performance	3.73	4.40	3.13	.82	3.83	.060
MERT x Total	3.83	4.31	1.70	.64	2.67	.114

*df = 1/27

TABLE IV

Analysis of Covariance on MERT and IRI Between Boys and Girls with I.Q. (L-T Scores) as the Covariate

A. Analysis of Variance

	$\bar{X}_{boys}$	$\bar{X}_{girls}$	Mean Sq. Between	Mean Sq. Within	F*	Probability
L-T I.Q.						
Verbal	95.33	101.87	320.13	257.61	1.24	.274
Non-Verbal	97.27	98.93	20.88	284.35	.07	.788
Total	96.47	100.60	128.13	217.76	.59	.449
IRI	2.91	3.60	3.61	1.78	2.03	.165
MERT	3.85	4.29	1.41	.97	1.44	.240

*df = 1/28

B. Analysis of Covariance

	$\bar{X}_{boys}$	$\bar{X}_{girls}$	Mean Sq. Between	Mean Sq. Within	F*	Probability
L - T I.Q.						
IRI x Verbal	3.06	3.44	1.03	1.22	.84	.367
IRI x Non-Verbal	2.93	3.58	3.13	1.61	1.94	.175
IRI x Total	3.00	3.50	1.83	1.34	1.36	.253
MERT x Verbal	3.99	4.16	.34	.62	.39	.540
MERT x Non-Verbal	3.86	4.28	1.26	.96	1.31	.262
MERT x Total	3.92	4.22	1.67	.79	.85	.364

*df = 1/27

found between reading scores and intelligence. Using this statistical method differences found in the reading grade scores of boys and girls were not due to intelligence.

Care was taken to insure that assumptions underlying use of the analysis of covariance were met. Homogeneity of variance was found for all comparisons. In addition, regression effects were checked and found to be normal.

The analysis of variance on intelligence, IRI, and MERT scores precedes the analysis of covariance in each case (Tables III and IV). In this way, the effect of controlling intelligence when comparing reading grade level scores can readily be observed.

Table III presents the findings of the analysis of covariance on reading scores with WISC intelligence as the covariate. A significant difference, favoring girls ($p < .01$), was found between the IRI scores of boys and girls when WISC Performance intelligence was held constant.

Other comparisons between boys and girls were not significant. A definite trend toward differences appeared in a number of instances: when WISC Performance intelligence scores were used with MERT scores; when WISC Total intelligence scores were used with MERT scores; and when WISC Total intelligence scores were used with IRI scores. In all cases the trends show girls to have higher reading achievement scores than boys. No such trend was found when WISC Verbal intelligence scores were used.

Findings of the analysis of covariance on IRI and MERT scores,

with L-T intelligence as the covariate, are presented in Table IV. No differences or trends were observed.

Inspection of the grade level means included in Tables III and IV shows that girls are approximately seven months ahead of boys in IRI reading ability. In reading achievement (MERT scores) girls are favored by 4.4 months. When WISC Total I.Q. was held constant even greater differences were observed between the girls and boys (adjusted means).

Summary of Findings

This study was designed to determine if the type of intelligence test used, individual or group, effects the results of a comparison between the reading achievement of boys and girls. The findings were summarized to show the effect of intelligence scores on two measures of reading ability.

A brief summary of the findings for each hypotheses is now given.

> Hypothesis 1: There will be no significant difference in the MERT reading grade level scores of boys and girls when WISC intelligence scores are controlled.

No differences were found between the MERT reading grade level scores of boys and girls when WISC intelligence was held constant. A trend toward a difference was shown when WISC Performance and WISC Total intelligence scores were held constant.

> Hypothesis 2: There will be no significant differences in the IRI reading grade level scores of boys and girls when WISC intelligence scores are controlled.

Girls had significantly higher ($p<.01$) IRI reading scores than boys when WISC Performance intelligence was held constant. A trend toward a difference, again favoring girls, was seen when WISC Total intelligence was held constant.

> Hypothesis 3: There will be no significant difference in the MERT reading grade level scores of boys and girls when L-T intelligence scores are controlled.

When L-T intelligence scores were held constant no differences were found in the MERT reading grade level scores between boys and

girls.

> Hypothesis 4: There will be no significant difference in the IRI reading grade level scores of boys and girls when L-T intelligence scores are controlled.

No differences were recorded in the IRI scores between boys and girls when L-T intelligence scores were held constant.

girls.

> Hypothesis 4: There will be no significant difference in the IRI reading grade level scores of boys and girls when L-T intelligence scores are controlled.

No differences were recorded in the IRI scores between boys and girls when L-T intelligence scores were held constant.

CHAPTER V

DISCUSSION AND SUMMARY

This study found that the measure of intelligence, group or individual, does effect the findings when comparing the reading achievement of girls and boys. When WISC performance intelligence was held constant girls were found to have significantly higher IRI reading scores than boys. No differences were observed when any of the L-T intelligence scores were held constant. This latter finding is contrary to many previous study results. The null hypothesis can, therefore, be accepted for Hypotheses 1, 3, and 4 but must be rejected for Hypothesis 2.

Limitations of This Investigation

The sample size in this investigation (N = 30) is a minimal number of Ss from which to draw conclusions in a study using this type of statistical analysis. An increase in the sample size may have accentuated the observed differences, allowing more clear-cut findings. Generalizations to the school population should be made with great care in view of this minimal sample.

The reliability of the tests used in this study could be higher. When using test scores from a school district testing program, the reliability of individual test scores is dependent on a number of variables. Thus, it is impossible to ensure that each student received the instruct-

ions necessary for a reliable score. Although care was taken to be completely objective in individual assessments, scoring of individual tests, especially the Informal Reading Inventory, tends to be partially subjective.

One last consideration lies in the nature of the two reading scores (IRI and MERT). These scores are not comparable, and indeed, are expected to differ (McCracken, 1967; Plessas, 1967). Generalizations to actual school grade levels should not be undertaken.

Discussion and Educational Implications

One significant difference was observed in this investigation. Girls had significantly superior IRI reading grade level scores than boys when WISC Performance intelligence was held constant. The reason for this difference is clear. The boys obtained higher WISC Performance intelligence scores than the girls ($\bar{X}_{boys} = 112.0$; $\bar{X}_{girls} = 105.7$). At the same time girls had higher IRI scores than boys ($\bar{X}_{girls} = 3.6$; $\bar{X}_{boys} = 2.9$). Therefore, when intelligence was held constant the boys' mean reading score decreased while the girls' mean reading score increased. This factor also accounted for the trend toward a difference between girls and boys when WISC Total intelligence scores were used with MERT and IRI scores, and when WISC Performance scores were used with MERT scores.

Boys did less well in WISC Verbal intelligence. Thus, the differences between the girls and boys reading scores became smaller when WISC

Verbal intelligence was held constant. It is suggested, therefore, that the measure of intelligence used does effect the results of this study. Further investigation of this finding is well warranted.

The strength shown by boys on the WISC Performance Scale is another interesting finding uncovered in this investigation. It would appear that teaching methods of a less verbal nature may be more suitable for boys.

When L-T intelligence scores were held constant no differences were observed between boys and girls in MERT and IRI reading scores. This finding is contrary to much of the literature reviewed. While no conclusive reason can be given for this inconsistancy, two explanations are possible.

(a) The analysis used in this investigation compared children of equal intelligence for differences in reading scores. Since boys had lower L-T intelligence scores than girls, the analysis adjusted the boys mean reading score upward. Conversely the girls mean reading score was lowered. The differences in the mean reading scores then became slight.

(b) The group procedures used for giving the Lorge-Thorndike Intelligence Test in Victoria School District includes the machine scoring. It is possible that the test became partly a measure of the child's ability to place his answer in the correct place. Thus it is difficult to assess the reliability of the L-T intelligence scores used in this investigation.

Lorge-Thorndike Intelligence Test scores should be used cautiously

by teachers. In comparison with WISC intelligence scores, these scores appear to under-estimate a child's mental capacity. This is especially true for boys where the WISC mean score was thirteen points higher than the L-T mean score. When using the L-T intelligence scores for any purpose teachers would do well to remember the outside influences reflected in the score, i.e., reading skills, ability to follow directions, ability to use a pencil, etc.

The findings of this investigation showed that there are differences in the reading ability of girls and boys in grade three. The reading grade level for girls was found to be three to seven months ahead of that for boys the same age. This difference could be even greater in a regular classroom, where age varies. Indeed, boys are often found to be older within any given grade.

Secondly, teachers would do well to make more use of the Informal Reading Inventory. This test appeared to be more sensitive in assessing reading ability than the Metropolitan Elementary Reading Test. In addition, the Informal Reading Inventory places the child in a functional reading situation. Such a test makes a continuing assessment of reading acheivement possible.

One important implication for further research became evident from this investigation. Girls reading achievement scores were consistently better than the boys. However, differences between the intelligence of boys and girls varied according to the measure used. When a group intelligence test was used the difference in the reading achievement of

boys and girls was minimized. It would appear that an individual measure of intelligence is more valid for this type of investigation.

Summary

This study was designed to determine whether there are differences in reading achievement between girls and boys in their third year of school. Age and intelligence were held constant. The sample of thirty children was randomly selected from eight elementary schools in Victoria, B.C. For comparative purposes the children were divided by sex (N = 15 girls and 15 boys). The criterion measure, reading ability was determined on two variables: Informal Reading Inventory (IRI) reading grade level scores and Metropolitan Elementary Reading Test (MERT) reading grade level scores. Intelligence was measured by both an individual, Wechsler Intelligence Scale for Children (WISC), and a group, Lorge-Thorndike Intelligence Test (L-T), test.

Comparisons, using the t distribution, were made between boys and girls for differences in age, intelligence, and reading scores. Differences on MERT and IRI scores were compared between boys and girls through an analysis of covariance. Intelligence (WISC scores; L-T scores) was the covariate.

Girls were found to have significantly higher ($p<.01$) IRI reading scores than boys, when WISC Performance intelligence was held constant.

Other comparisons between boys and girls were not significant. A definite trend toward differences appeared in a number of instances:

when WISC Performance intelligence scores were used with MERT scores; when WISC Total intelligence scores were used with MERT scores; and when WISC Total intelligence scores were used with IRI scores. In all cases the trends show girls to have higher reading achievement scores than boys. No such trend was found when WISC Verbal intelligence scores were used.

No differences were observed in either the MERT or the IRI reading scores of boys and girls when L-T intelligence scores were the covariate. This finding was in contrast to many previous studies reviewed in the literature.

In conclusion, this study showed that girls are superior readers to boys in their third year of school. These differences become significant when an individual measure of intelligence is used to control differences in intelligence.

REFERENCES

References

Ames, B. L., & Ilg, F. Sex differences in test performance of matched girl-boy pairs in the five to nine year old age range. Journal of Genetic Psychology, 1964, 104, 25-34.

Anderson, I. H., Hughes, B. O., & Dixon, W. R. Age of learning to read and its relation to sex, intelligence, and reading achievement in the sixth grade. Journal of Educational Research, 1956, 49, 447-453.

Austin, M. C., & Huebner, M. H. Evaluating progress in reading through informal procedures. Reading Teacher, 1962, 15, 338-343.

Austin, M. C., Bush, C., & Huebner, M. H. Reading evaluation. New York: Ronald Press, 1961.

Balow, I. H. Sex differences in first grade reading. Elementary English 1963, 40, 303-306.

LB1576 E6

Burnstein, A. G. In O. K. Buros (Ed.) Fifth mental measurement yearbook. New Jersey: Gryphon Press, 1959, 559-560.

Carrol, M. W. Sex differences in reading readiness at the first grade level. Elementary English, 1948, 25, 370-375.

Clark, W. W. Boys and girls - are there significant ability and achievement differences? Phi Delta Kappan, 1959, 41, 73-75. L11 P45

Cleland, D., & Toussaint, I. The inter-relationships of reading, listening, arithmetic computations. The Reading Teacher, 1962, 228-231.

Davis, O. L., & Slobodian, J. Teacher behavior toward boys and girls during first grade reading instruction. American Educational Research Journal, 1967, 4, 261-269. LB1028 A16

Dykstra, R. Cooperative research program in first grade reading instruction. Childhood Education, 1967, 14, 27-28.

Dykstra, R., & Tinney, F. Sex differences in reading readiness - first-grade achievement and second-grade achievement. In J. A. Figurel (Ed.) Reading and Realism: Proceedings of the Thirteenth Annual Convention International Reading Association, 1959, Vol. 13, Part 1, 623-628.

Freeman, F. In O. K. Buros (Ed.) Fifth mental measurement yearbook. New Jersey: Gryphon Press, 1959, 479-480.

Gainer, W. L. The ability of the WISC sub-tests to discriminate between boys and girls of average intelligence. California Journal of Educational Research, 1962, 13, 9-16.

Gates, A. Sex differences in reading ability. Elementary School Journal, 1961, 61, 431-435.

Goudey, C. E., & Olsen, J. H. Informal reading inventories. New York: Ginn and Company, 1966.

Harris, A. How to increase reading ability. 3rd ed. New York: Longmans, Green and Co., 1956.

Hughes, M. C. Sex differences in reading achievement in the elementary grades. In H. M. Robinson (Ed.) Clinical studies in reading II. Chicago: University of Chicago Press, 1953, 102-106.

Jarvis, O. T. Boy-girl ability differences in elementary school language arts. Childhood Education, 1965, 42, 198-200.

Lennon, R. T. The relation between intelligence and achievement test results for a group of communities. Journal of Educational Psychology, 1950, 41, 301-308.

Lorge, I., Thorndike, R. L., & Hagen, E. Examiner's manual: Lorge-Thorndike intelligence tests. New York: Houghton Mifflin Company, 1964.

McCracken, R. A. The informal reading inventory as a means of improving instruction. In T. C. Barrett (Ed.) The evaluation of children's reading achievement: Perspectives in reading. No. 8. Newark, Delaware: International Reading Association, 1967.

Manolakes, G., & Sheldon, W. The relation between reading test scores and language-factor intelligence quotients. Elementary School Journal, 1955, 55, 346-350.

Metropolitan Elementary Reading Tests. New York: Harcourt, Brace and World, Inc., 1958.

Milholand, J. In O. K. Buros (Ed.) Fifth mental measurement yearbook. New Jersey: Gryphon Press, 1959, 481-482.

Neville, D. The relationship between reading skills and intelligence test scores. The Reading Teacher, 1965, 18, 257-262.

Panther, E. E. A study of the validity of the Lorge-Thorndike intelligence test at the primary grade level. Journal of Educational Research, 1967, 60, p. 236.

Parsley, K., Powell, M., O'Conner, H., & Deutsch, M. Are there really sex differences in achievement? Journal of Educational Research, 1963, 57, 210-211.

Patterson, G. R. In O. K. Buros (Ed.) Fifth mental measurement yearbook. New Jersey: Gryphon Press, 1959, 559-560.

Pauly, F. R. Let's give boys a break. Phi Delta Kappan, 1959, 40, 281-283.

Pauly, F. R. Sex differences and legal school entrance age. Journal of Educational Research, 1951, 45, 1-9. LB1028 J75

Pidgeon, D. A. In O. K. Buros (Ed.) Fifth mental measurement yearbook. New Jersey: Gryphon Press, 1959, p. 482.

Plessas, G. P. Another look at the reading score. In W. K. Durr (Ed.) Reading instruction: Dimension and issues. Boston: Houghton Mifflin Company, 1967.

Prescott, G. A. Sex differences in Metropolitan readiness test results. Journal of Educational Research, 1955, 48, 605-610.

Robinson, H. A. In O. K. Buros (Ed.) Sixth mental measurement yearbook. New Jersey: Gryphon Press, 1965, 1073-1074.

Samuels, F. Sex differences in reading achievement. Journal of Educational Research, 1943, 36, 594-603.

Sinks, N. B., & Powell, M. Sex and intelligence as factors in achievement in reading grades four through eight. Journal of Genetic Psychology, 1965, 106, 67-79.

Sipay, E. R. A comparison of standard reading scores and functional reading levels. Reading Teacher, 1964, 17, 265-268.

Spache, G. Toward better reading. Chapaign, Ill.: Garrard Publishing Company, 1963.

Stroud, J. B., & Lindquist, E. F. Differences in achievement in the elementary and secondary school. Journal of Educational Psychology, 1942, 33, 657-667. LB1051 A2 J6

Wechsler, D. Wechsler intelligence scale for children. New York: Psychological Corporation, 1949.

Wheeler, L. R. The relation of reading and intelligence. School and Society, 1949, 70, 225-226.

Wozencraft, M. A. A comparison of the reading ability of boys and girls at two grade levels. Journal of Reading Specialists, 1967, 6, 136-139.

Wozencraft, M. Sex comparisons of certain abilities. Journal of Educational Research, 1963, 57, 21-27.

Wyatt, N. Sex differences in reading achievement. Elementary English, 1966, 43, 596-600.

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