AN ABSTRACT OF THE THESIS OF

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WISC-R IQs of 6 Year Olds

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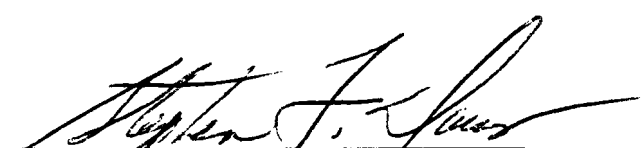
The Wechsler Intelligence Scale for Children - Revised is one of the most popular intelligence tests for children. In many instances, the results from the WISC-R may play a critical role in the education of children. Thus, because of the influence that such an assessment may have on a child, the use of that instrument must be as accurate as possible.

One method that was utilized to insure accurate results from the WISC-R was the standardization method used to norm the test. In the standardization procedure, Wechsler, in an attempt to make the norming group as representative as possible, included six demographic variables several of which were held proportionate to the 1970 census. The six variables used were age, gender, race, geographic region, occupation of head of household, and urban-rural residents.

Although Wechsler utilized the given variables to obtain a representative norming group, one important variable, grade level, was excluded from the standardizational procedure.

Previous research has suggested that one's level of education does in fact have an effect on his or her IQ. The current study was designed to investigate the effect of grade level on IQ and to assess the need of grade level as a variable for standardization of the instrument.

In the current study, forty 6 year old children were assessed with the WISC-R. The sample consisted of 20 males and 20 females, half of whom were in kindergarten, while the other half was in the first grade at the time of testing. All assessments were made within a one month period. Results found a significant difference between grade level on the Full Scale and Performance IQs. There was also significance between males and females on the Full Scale and Verbal IQs. The results of the study indicated that grade level does have an effect on IQ scores and should be considered for a standardization variable.



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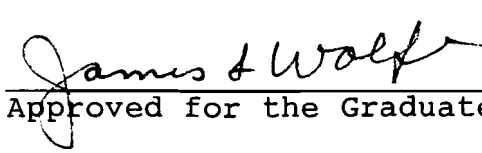

Approved for the Graduate Council

THE EFFECT OF GRADE LEVEL ON WISC-R IQs OF 6 YEAR OLDS

A Thesis Proposal

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A special thanks goes to my parents for making my academic endeavors possible. Their understanding and support throughout the years have been priceless. Finally, I express my deepest appreciation to Nancy, my wife, for her encouragement, understanding, and love.

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Chapter 1

Introduction

Some of today's most popular measures of intelligence used by clinical and school psychologists are the Wechsler scales. More specifically, for elementary age children, the Wechsler Intelligence Scale for Children - Revised (WISC-R) is commonly utilized. Most often, intelligence quotients (IQs) of children play a critical role in the placement into exceptional educational programs (Swanson & Watson, 1982). Therefore, statistical stability of the assessment is essential.

Today, the WISC-R is reported as the fifth most widely used psychological test in the United States (Lubin, Larsen, & Matarazzo, 1984). In fact, it is the most widely used intelligence test for measuring the abilities of children (Brown & McGuire, 1976).

Wechsler (1972), in an attempt to make the WISC-R as accurate as possible, utilized strict standardization procedures. A standardized instrument is one which has been normed by including a cross sectional sample that is representative of the population for which that test has been designed. In the standardization of any test, there are a number of demographic variables that must be included to assure that the sample group is representative of the population.

In the standardization of the WISC-R, Wechsler included

a number of demographic variables. These variables were age, sex, race, geographic region, occupation of head of household, and urban-rural residence. Although these variables were included in the standardization of the WISC-R, one particularly important element of the population for which the test was designed was ignored. That element which was not included in the standardization of the WISC-R was grade level. To date, no research has been conducted on the stability of the WISC-R involving children of the same age but of different grade levels.

For the purpose of this thesis and because an overwhelmingly accepted definition of intelligence has not yet been established, Wechsler's definition was applied. Another purpose for using Wechsler's definition of intelligence is that the WISC-R, which was the instrument employed to assess individual intelligence in this study, was developed by Wechsler and thus his definition would best describe the measurements that will be obtained.

Wechsler defined intelligence as "the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment" (Matarazzo, 1972, p.79). Thus, Wechsler does not define intelligence as a single entity, but an overall ability to effectively comprehend and deal with one's environment. Therefore, intelligence is a function of the personality as a whole (Wechsler, 1981).

Equally as important as establishing an appropriate definition of intelligence is the need to discuss the general development of intellectual functioning in individuals. It is generally accepted that the growth of intellectual functioning or mental age can be described as somewhat of a curve that gradually increases from birth to late adolescence and early adulthood (Bayley, 1955; Wechsler, 1950).

To insure accurate and stable IQ scores, and in consideration of the natural development of intellectual functioning, an individual's obtained measurement is compared with the mean IQ of individuals of that age. By comparing one's IQ with the average IQ for that age, it is reported that one's level of intelligence, or deviation IQ, will remain relatively constant throughout one's life (Klonoff, 1972).

Stability of Intelligence

The consistency of IQ has been supported by several studies. Some of the earliest studies to identify IQ consistency were reviewed by R. L. Thorndike (1940). He reported a number of studies in which the authors attempted to identify the degree of IQ stability using individuals who were participating in later secondary and collegiate studies. Results of the studies found IQ correlations of different groups ranging from .58 to .89. Relative

to the current study, Thorndike identified several studies concerning children at lower educational levels. He identified a study conducted by Lauderbach and Hause (1932), who tested students in the fourth, fifth, and sixth grades. The authors administered the McCall Multi-Mental Test and retested after 11 months. In the study, the correlation was found to be .791. Lithauer and Klineberg (1933) administered the Stanford-Binet to 120 orphans before and 14 months after entrance into an orphanage. The authors found a correlation of .76. The last study reported by Thorndike that included elementary aged children was that of Seagoe (1934) in which tests were given to children in grades 1, 3, 5, and 7. The tests administered were the Detroit First Grade Intelligence Test (T1), the Detroit Primary Intelligence Test (T2), the National Intelligence Test Scales A (T3A) and B (T3B), and Terman Group Test of Mental Abilities (T4). The tests were administered at two year intervals. Correlations were: First Grade and Third Grade, (T1 vs. T2) .642; Third Grade and Fifth Grade, (T2 vs. T3A) .700 and (T2 vs. T3B) .727; Fifth Grade and Seventh Grade, (T3A vs. T4) .797 and (T3B vs. T4) .869. Finally, over a four-year period, the third grade results correlated with the seventh grade results at a level of .765 (T2 vs. T4).

Zimmerman and Woo-Sam (1972) reviewed several stability studies involving the Wechsler Intelligence Scale for

Children administered to normal subjects. In the first article reviewed, Quereshi (1968) studied 328 school children at 5 age levels who were retested after 3 months. Querushi found a median correlation of .82. The second study cited by Zimmerman and Woo-Sam reported that Irwin (1966) included 29 6-year-olds and 29 11-year-olds in his study. The subjects were retested after 1 month in which an overall correlation of .94 for 6-year-olds and .98 for 11-year-olds. Finally, Zimmerman and Woo-Sam reviewed the 1967 study of Conklin and Dockrell. The study included a sample of 10-year-olds who were to be retested 2 and 4 years later. The authors reported results with a correlation of .72 over the 4 year period.

One of the first longitudinal studies involving the original 1949 Wechsler Intelligence Scale for Children (WISC) exclusively was conducted by Klonoff (1972). Klonoff included 173 children ranging from age 5 to age 13. The WISC was administered to nine different age groups on three occasions at 1 year intervals. The author found correlations of the nine age groups between the first and second testing session that ranged from .76 to .92; between the second and third sessions that ranged from .75 to .89; and between the first and third testing session correlations that ranged from .72 to .87. The results of the study were consistent in finding lower correlations at the lower age levels. That is, correlations were lower at the younger

age groups and consistently increased with each age level.

Magnusson and Backteman (1978) conducted a study to test the stability of intelligence and creativity. A total of 1,000 children were administered a group intelligence test at ages 10, 13, and 15. Results indicated that intelligence measures between ages 10 and 15 obtained a correlation coefficient of .75 for both males and females. It must be noted, however, that group administered tests designed to measure intellectual ability are less stable than individually administered IQ tests and should be used with caution (Hopkins & Bracht, 1975; Roszkowski, 1984).

More closely related to the present study, are several studies directed toward the investigation of the stability of the WISC-R. Wechsler (1974) retested 303 children who were included in the standardization of the WISC-R after 1 month. Wechsler found a stability coefficient of .90 for the Full Scale IQ. Wechsler's findings were supported by related studies involving exceptional students in which correlation coefficients ranged from .79 to .88 (Smith 1978; Smith & Rogers, 1978; Vance, Blixt, Ellis, & DeBell, 1981).

Vance, Hankins, and Brown (1987) conducted a longitudinal investigation of the stability of the WISC-R over a 6-year period. Their sample included 32 children who were currently enrolled in a special education program. The age of the children through the 6-year period ranged

from 6 years 5 months at the time of the first session to 16 years 11 months at the time of the third and final testing session. The average time span between individual testings was 3.1 years. Results of the study indicated stability coefficients of .74 between the first and second testing session, .87 for the second and third session, and an overall correlation of .81 between the six year investigation.

Although the previously listed research indicates that IQ appears to remain relatively constant throughout one's life, some researchers have found this to be misleading. An early investigation of the instability of intelligence included 252 children from the Berkley Survey Group (Honzik, Macfarlane, & Allen, 1948). Subjects in the study were administered one of five tests in accordance with their age, at successive age levels. The five tests were the California Preschool Schedule, I or II (21 months - 5 years); the 1916 Stanford-Binet, (6 and 7 years); the Stanford-Binet, Form L (8 years); the Stanford-Binet, Form L or M (9-15 years); and the Wechsler-Bellevue (18 years). Results pertaining to IQ consistency, between ages ages 6 and 18, indicate that 60 percent of the group changed 15 or more points, one-third of the group changed 20 or more points, and 9 percent of the group demonstrated an IQ change of at least 30 points. Finally, only 15 percent of the individuals

demonstrated an IQ change of less than 10 points. One caution that must be noted when reviewing a study such as this that includes the correlations between several different instruments is the fact that different tests may measure different concepts.

In a similar study, McCall, Appelbaum, and Hogarty (1973) studied the inconsistency of IQs, using data from the Fels Research Institute. The institute is part of Wright State University School of Medicine. A child is initiated into the study prior to birth; supplemental assessments are taken no more frequently than six month intervals until age 18. Subjects were assessed a maximum of 17 times from ages $2\frac{1}{2}$ to 17. Overall, the authors found, on the average, that individuals demonstrated an increase of 28.5 IQ points at the last testing when compared to the initial testing results. Furthermore, 1 of 7 individuals increased IQ by more than 40 points.

From the interesting findings of intellectual instability, researchers have focused on the point in life when one's IQ is least stable. Bayley (1949), in an attempt to highlight intellectual growth trends, studied 40 children who had been tested approximately 38 different times from one month to 18 years of age. The results of her study indicated that although the distribution of IQ scores did not show a consistent trend in variability, subjects' IQ scores showed more change in infancy and preschool age.

Finally, Baley reported that by early school age, individual IQ scores become and remain relatively stable.

Bradway (1945), and Bradway, Thompson, and Cravens (1958) conducted a twenty-five year longitudinal study to examine IQ changes that occur at pre-school age (2 to $5\frac{1}{2}$ years old), 10 years later, and once again 15 years later. Initially, the authors included 212 children, ten years later 138 of these children were tested once again, and finally, approximately 15 years later 110 of these subjects were located and reassessed. Of the 138 subjects who were included in the first and second testing session, 50 individuals demonstrated statistically significant differences in IQ scores between the 2 assessments. Forty-two of the subjects who demonstrated statistically significant changes were included in the final testing session.

Bradway and Robinson (1961) reassessed the scores of 54 subjects from a previous study who had demonstrated the greatest change in IQ. The results of the investigation found that the correlation of first and last test administrations was .59, and the correlation between the second and last testing sessions was .85. These results indicated a greater change of intellectual ability at the earlier ages.

Hopkins and Bracht (1975) conducted a 10 year longitudinal study involving students who were administered

a group intelligence test at grades 1, 2, 4, 7, 9, and 11. Again, results indicate that intelligence measures, although variance over long periods of time is minimal, are less stable at lower grade levels.

Svancarova (1982) studied 100 children at ages 4, 6, 8, 10, and 12. The Draw-a-Man Test was used to measure intellectual development. Results indicate that the subjects' greatest amount of intellectual growth occurred between the ages of 4 and 6. The results of this study indicate one logical explanation for the variability of intelligence at the younger ages; intellectual growth occurs most rapidly in this age range, thus correlations in IQ scores would most likely be lower at this age level.

Influence of Education

One final aspect of intelligence that must be taken into consideration for the purpose of the current study is the effect of education on IQ scores. Cahan and Cohen (1989) conducted a study to determine if changes in intellectual abilities are due to age or education. The authors included 12,090 fourth, fifth, and sixth grade students. Twelve tests, covering a wide range of items, were selected from well known group tests of general ability and were administered to students between May and June, 1987. Results of the study indicated that schooling has a considerable effect on intelligence. In fact, the author

attributed the increase of IQs to educational influences rather that developmental influences. In a similar study, Harnqvist (1968) reported results that also found changes in intelligence levels from age 13 to 18 years of age. The author attributed these changes to education and to some extent, home background.

The literature cited previously suggested that reliable IQ scores, especially at the lower grade levels, are difficult to obtain confidently. Considering that education has been shown to influence change in intellectual performance, the effect of education at the lower elementary level, specifically kindergarten, may promote increases in IQ.

Two studies have been conducted that investigate these influences of education. The first study was conducted by Buck, Gregg, Harper, and Snider (1971). In their study, a total of 387 subjects was administered the Stanford-Binet at age 3 and again at age 5 years and 4 months. The subjects were divided into 3 groups in regard to the amount of time spent in kindergarten by their reassessment at the age of 5 years, 4 months. These groups consisted of individuals who had received 1 month, 1 to 3 months, or 4 months of kindergarten. The subjects were also divided into three subgroups according to the social status of occupation of the head of household; these groups were labeled as S1 (professional and technical occupations),

S2 (skilled blue collar workers), and S3 (semi-skilled and unskilled workers). The mean IQs for S1 in the three time spans were 112.1, 118.3, and 126.8; for S2 the IQ scores were 106.6, 115.4 and 123.6; and in S3 the scores were 103.0, 106.8, and 111.7. The findings in this study suggest that kindergarten experience does has a positive influence on intellectual levels.

The second study to investigate the influence of kindergarten was conducted by Roy and Tiwari (1977) who studied 100 individuals ranging from 5 to 7-years in which some had attended kindergarten and some had not. Results of the investigation found that individuals who had not been exposed to kindergarten demonstrated problems in adjustment, academic achievement, and demonstrated lower levels of intellectual development.

Due to the reported plasticity of intelligence in younger childhood and the educational influences on IQ, the standardization procedures for an individually administered intelligence test are critical. Wechsler in his revision of the WISC included six demographic variables some of which closely reflected the general population. As previously mentioned these variables were age, sex, race, geographic region, occupation of head of household, and urban-rural residence. However, with the suggestion of previous research that IQ does not become statistically stable until later childhood and the fact

that education does have a significant effect on IQ scores, it is possible that a child's level of education could have an impact on test results.

As stated previously, the standardization of the WISC-R failed to include grade level. Again, it is possible for individuals of the same age to be at different levels of education. Thus, children with different levels of experience are being compared to the same norming group. Thus, one cannot assume that age is the sole criterion by which an individual can be judged. Because an intelligence scale at young age levels measures such general capacities and lower grade levels may enhance such general capacities, the possibility of educational influences affecting test results does exist. Finally, the assessment of individual intelligence at the elementary and secondary level carries with it great responsibilities. Scores that are obtained may have great implications educationally on that specific individual. Thus, scores must be as accurate as possible and all variables must be considered.

Purpose

The purpose of this present study was to assess the differences in IQ scores of children of the same age but at different grade levels. More specifically, this study consisted of individuals that were 6 years of age, some of whom were in the first grade and others who were in

kindergarten. Using the Wechsler Intelligence Scale for Children - Revised, IQ scores from each group were obtained and compared. The rationale of this study was to measure an important variable that was excluded from the standardization of the WISC-R and to assess the stability of normed age levels.

It was hypothesized in the present study that individuals of the same age but at different grade levels would obtain significantly different scores on the WISC-R. Specifically, it was hypothesized that six-year-old individuals of the first grade level would demonstrate significantly higher IQ scores than six-year-old individuals in kindergarten.

Chapter 2

Method

Subjects

The sample for this study consisted of 40 subjects including boys and girls who were 6 years of age at the time of testing. Twenty of the subjects (10 boys, 10 girls) were currently enrolled in kindergarten and 20 of the subjects (10 boys, 10 girls) were currently in the first grade. The subjects were obtained through 3 school districts of small rural towns of approximately 1500 people that are located in South Central Kansas. Permission for use of the students was obtained through both the superintendent and the principal of each school. Also, a written consent form was presented to each child's parents (Appendix A). The parents must have signed and returned the consent form before the child was considered for the study.

Testing Instrument

The Wechsler Intelligence Scale for Children - Revised (WISC-R) was used to obtain the IQ of each subject. The Wechsler Intelligence Scale for Children (WISC) was developed by Wechsler in 1949 and was intended as a downward extension of the Wechsler-Bellevue II. The major purpose of the development of the children scales was to enable the assessment of intellectual abilities in children and

for the abandonment of the "mental age." Wechsler argued that intelligence should not be assessed by comparing the mental age of the individual to the chronological age but should involve the obtained score of the individual and compare it to the expected score for that particular age. In other words, an individual's IQ should be formulated by assessing one's intellectual deviation from the average score obtained by individuals of that age. Thus, with the development of the Wechsler Scales, the deviation IQ, a type of standard score, was introduced.

The revision of the WISC was primarily undertaken to preserve the positive features of the WISC, to update items, and to improve administration and scoring features (Vernon, 1984). The WISC-R consists of 12 subtests that are divided into 2 general categories, Verbal and Performance. Verbal and Performance subtests are administered in alternating order. The Verbal subtests include Information, Similarities, Arithmetic, Vocabulary, Comprehension and Digit Span. Performance subtests of the scale include Picture Completion, Picture Arrangement, Block Design, Object Assembly, Coding and Mazes. The rationale provided by Wechsler (1972) for this division into Verbal and Performance scales was that, "This dichotomy is primarily a way of identifying two principle modes by which human abilities express themselves" (p. 9).

The score obtained by an individual is compared with

the mean score of the reference group that was included in the standardization of the WISC-R. The mean score for Verbal, Performance and Full Scale IQs is 100 with a standard deviation of 15. Thus, if an individual obtained a score of 100, then that child demonstrated average performance on that scale. Scores of 85 and 115 indicate 1 standard deviation from the mean. Scores of 70 and 130 indicates 2 standard deviations from the mean. Scores must fall between 4 standard deviations from either side of the mean. The subtest scores are presented similarly. The mean score of any given subtest is 10 with a standard deviation of three.

The WISC-R was designed to measure the abilities of children between the ages of 6 years, 0 months and 16 years, 11 months, thus enabling the use of this assessment with nearly all school age children and also having slight overlap with the age range of the Wechsler Adult Intelligence Scale - Revised (WAIS-R) and the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R). To aid in the accuracy of the measurement of the WISC - R, norms for each age were obtained and sub-yearly groups were formed. Therefore, a single year is divided into three, 4-month age spans, thus creating a total of 33 age groups.

Procedure

Permission to conduct the study was obtained through the proper administrators. Also, permission for the study was obtained from the Institutional Review Board for Treatment of Human Subjects of Emporia State University. A list of eligible kindergarten and first graders was acquired through the secretary of each elementary school. The parents of each eligible subject were mailed a letter (see appendix B) explaining the project and a form granting permission to assess their child. Parents were assured in the letter of consent that strict confidentiality will be enforced with their child's results. Confidentiality was controlled by applying an identification number on each test record form. Only the identification number, age, gender, and grade level were written on the test record. Only the author of this thesis held the key to assign the names of the sample to the appropriate identification number.

Students who were granted permission by their parents to participate in the study were then assessed. All assessments were conducted within one month to reduce further affects of maturation and education. The assessments were conducted by two individuals who were trained in the administration and scoring procedures of the WISC-R. The subjects were tested in a room adequate for assessment procedures according to Wechsler (1974).

Each test protocol was scored closely adhering to the standard procedures stated in the administration manual. To control for possible Rosenthal affects, a third individual who had been trained in administrating and scoring the WISC-R reassessed the scored protocols to insure accurate results.

Statistical Design

The statistical design for the current study consisted of three 2 X 2 Analysis of Variance (ANOVA) measures. The variables included in the ANOVAs were male vs. female and kindergarten vs. first grade. The three separate ANOVAs were conducted to statistically assess the Full Scale IQ, Verbal IQ, and Performance IQ.

It was planned that if the ANOVAs revealed no gender differences, the scores of boys and girls were to be combined. Analysis by *t*-tests would be conducted between grade levels for each of the IQ scores.

Chapter 3

Results

The present study was designed to assess the effect of grade level on IQ scores derived from the Wechsler Intelligence Scale for Children - Revised (WISC-R). The study included six-year-old children who were presently enrolled in either kindergarten or first grade at the time of testing. The testing results were analyzed through a 2 X 2 analysis of variance. The variables measured were

Table 1

WISC-R Full Scale IQ Descriptive Statistics for Grade Level and Gender

Grade and Gender	M	SD	Range
Kindergarten	101.5	14.08	78-131
Male	105.7	13.52	85-131
Female	97.3	13.34	78-121
First Grade	111.7	12.38	82-124
Male	117.7	11.10	100-124
Female	105.7	12.31	82-120
Total Group	106.6	14.02	78-131
Male	111.7	12.61	85-131
Female	101.5	13.51	78-121

kindergarten vs. first grade and male vs. female. A 2 X 2 ANOVA was individually conducted on Full Scale, Verbal, and Performance Intelligence Quotients.

The Full Scale mean IQ score for the total group was 106.6, with a standard deviation of 14.02. For a summary of the descriptive statistics from the Full Scale IQ results, see Table 1. The statistical analysis of the Full Scale IQs yielded significance, $F(1, 34) = 6.50$, $p < .05$, between kindergarten and first grade groups (see Table 2). The analysis also indicated significance, $F(1,36) = 6.50$, $p < .05$ between males and females. There was not a significant interaction of the four groups $F(1,36) = .2$, $p > .05$.

Table 2

ANOVA Summary Table for Full Scale IQ

Source of Variability	SS	df	MS	F
Grade Level	1040.40	1	1040.40	6.50*
Gender	1040.40	1	1040.40	6.50*
Interaction	32.40	1	32.40	.20
Within Groups	5760.40	36	160.01	

* $p < .05$

The mean Verbal IQ score was 102.5, with a standard deviation of 14.02. The descriptive statistics for the

Verbal IQ results are listed on Table 3. The ANOVA conducted on the Verbal Intelligence Quotient scores resulted in finding significance, $F(1,36) = 8.05$, $p < .05$, between male and female groups (see table 4). Significance was not found, $F(1,36) = 3.54$, $p > .05$ between kindergarten and first grade groups. The difference in interaction between the four groups was also insignificant, $F(1,36) = .005$, $p > .05$.

Table 3

WISC-R Verbal IQ Descriptive Statistics for Grade Level and Gender

Grade and Gender	M	SD	Range
Kindergarten	98.5	14.73	72-139
Male	104.5	15.14	85-139
Female	92.5	11.53	72-112
First Grade	106.5	13.45	75-131
Male	112.6	11.74	88-131
Female	100.4	12.24	75-117
Total Group	102.5	14.02	72-139
Male	108.5	14.14	85-139
Female	96.4	12.53	72-117

The mean Performance IQ score for the total group was 10.17, with a standard deviation of 13.75 (see Table 5). The analysis of the Performance IQ scores found significance, $F(1,36) = 7.247$, $p < .05$, between kindergarten and first

Table 4

ANOVA Summary Table for Verbal IQ

Source of Variability	SS	df	MS	F
Grade Level	640.00	1	640.00	3.54
Gender	1464.10	1	1464.10	8.05*
Interaction	.10	1	.10	.0005
Within Groups	6501.80	36	180.60	

* $p < .05$

grade groups. See Table 6 for the statistical summary for ANOVA results from the Performance IQ scores. Significance was not indicated $F(1,36) = 2.277$, $p > 05$, between male and female groups. Finally, significance was not found with the interaction of the four groups $F(1,36) = .295$, $p > .05$.

Table 5

WISC-R Performance IQ Descriptive Statistics for Grade Level and Gender

Grade and Gender	M	SD	Range
Kindergarten	104.6	15.01	73-129
Male	106.6	13.75	82-129
Female	102.6	15.93	73-128
First Grade	115.7	10.26	91-131
Male	120.0	6.69	109-131
Female	111.5	11.38	91-130
Total Group	110.2	13.75	73-131
Male	113.3	12.72	82-131
Female	107.1	14.54	73-130

Table 6

ANOVA Summary Table for Performance IQ

Source of Variability	SS	df	MS	F
Grade Level	1243.22	1	1243.22	7.24*
Gender	390.62	1	390.62	2.27
Interaction	50.63	1	50.63	.29
Within Groups	6175.30	36	171.53	

* $p < .05$

Chapter 4

Discussion

The purpose of the present study was to assess the difference in IQ scores of children of the same age but at different grade levels. Specifically, this study utilized subjects who were six years of age at the time of testing and who were currently enrolled in either kindergarten or first grade. The rationale for this research was to examine the need for a variable (grade level) that possibly should have been included in the standardization of the Wechsler Intelligence Scale for Children - Revised (WISC-R). In the past, grade level has not been included in the test's standardization procedures. However, through previous research, highlighted in Chapter 1, it was noted that education may have a positive influence on IQ scores.

The findings from the present study suggest that education does in fact have an effect on IQ scores. Through the statistical analysis, it was found that six-year-old children currently enrolled in the first grade demonstrated significantly higher Full Scale IQs than did kindergarten children. Furthermore, there was a significant difference between kindergarten and first-grade scores on the Performance IQ scores. This study found that first grade subjects scored higher than did kindergarten subjects.

However, it also was found that the difference between scores on the Verbal Intelligence Quotients failed to reach the level of significance.

In concurrence with these findings, it appears that education does have an effect on the scores achieved on the WISC-R. Although significance was not achieved on the Verbal section of the assessment, the fact that higher scores were achieved by first grade subjects on the Performance section demonstrates that education as a variable should be considered. More important is the fact that first grade subjects obtained higher scores than did kindergarten children on the Full Scale IQ of the WISC-R. With this, it is apparent that level of education affects testing results sufficient to justify the inclusion of grade level as a variable to be utilized in the standardization of the instrument.

Interestingly, the analysis of these data also indicated a significant difference between male and females. Utilizing the results of the Full Scale IQ scores, males were significantly higher than females. These gender differences were found both with kindergarten and first grade groups. One explanation for such findings is that at this particular age level, males are at a higher stage of development than females. However, this is not supported by the standardizational results of the WISC-R. A second

explanation for such findings is that there may have been a biasing factor in which males who were used in the sample were were simply at a higher level of intellectual functioning. However, this explanation is debatable in that no indication of intellectual ability was provided prior to testing. Secondly, this explanation is debatable in that the differences in the mean scores of both kindergarten and first grade males, when compared to the female results, were similar.

There were also significant differences between gender within the analysis of the Verbal Scores. Again, these results are not congruent with the descriptive statistics presented from the scores obtained in the standardization of the instrument. Finally, there was no significant difference between male and female results with the Verbal IQ scores.

To summarize, results of this study clearly indicated that education level did have a significant effect on obtained WISC-R IQ scores. More specifically, six-year-old first grade subjects scored substantially higher than did those subjects who were six years of age, in kindergarten. Thus, consideration of grade level should have been held as a variable when standardizing the WISC-R.

It must be noted that some element of caution should be used when reviewing this study. This is apparent in

that the data collected clearly do not represent the national norms presented in the WISC-R manual. Regardless of the discrepancies between the data collected for this study and the national norms, additional research, including a larger number of subjects and a more representative sample are needed to further investigate the effect of grade level on WISC-R results. Also, future research might also investigate the effect of education at higher age and grade levels.

This research, questioning the the need for grade level to be included as a variable in the standardization of the WISC-R, has indicated that education does have a significant influence on WISC-R IQ scores. Extensive research is needed to either support or refute these findings.

References

Bayley, N. (1949). Consistency and variability in the growth of intelligence from birth to eighteen years. Journal of Genetic Psychology, 75, 165-196.

Bayley, N. (1955). On the growth of intelligence. American Psychologist, 10, 805-818.

Bradway, K. P. (1945). An experimental study of factors associated with Stanford-Binet IQ changes from the preschool to the junior high school. Journal of Genetic Psychology, 66, 107-128.

Bradway, K. P., & Robinson, N. M. (1961). Significant IQ changes in twenty-five years: A follow up. Journal of Educational Psychology, 52, 74-79.

Bradway, K. P., Thompson, C. W., & Cravens, R. B. (1958). Preschool IQs after twenty-five years. Journal of Educational Psychology, 49, 278-281.

Brown, W. R. & McGuire, J. M. (1976). Current psychological assessments practices. Professional Psychology, 7, 475-484.

Buck, C., Gregg, R., Harper, M., & Snider, S. (1971) The effect of kindergarten experience upon IQ tests performance. Psychology in the Schools, 8, 62-64.

Cahan, S. & Cohen, N. (1989). Age versus schooling effects on intelligence development. Child development, 60, 1239-1249.

Conklin, R. C. & Dockrell, W. B., (1967). The predictive

validity and stability of WISC scores over a four year period. Psychology in the Schools, 4, 263-266.

Harnqvist, K. (1968). Relative changes in intelligence from 13-18: II. Results. Scandinavian Journal of Psychology, 9(2), 65-82. (From Psychological Abstracts, 1968, 42, Abstract No. 15461)

Hopkins, K. D., & Bracht, G. H. (1975). Ten-year stability of verbal and nonverbal IQ scores. American Educational Research Journal, 12, 469-477.

Honzik, M. P., Macfarlane, J. P., & Allen, L. (1948). The stability of mental test performance between 2 and 18 years. Journal of Experimental Education, 17, 309-324.

Irwin, D. O. (1966). Reliability of the WISC. In Zimmerman, B. J., & Woo-Sam, J. (1972) Research with the Wechsler Intelligence Scale for Children: 1960-1970. Psychology in the Schools, 9, 232-271.

Klonoff, H. (1972). IQ constancy and age. Perceptual And Motor Skills, 35, 527-534.

Lauderbach, J. C., & Hause, E. (1932). On the reliability and validity of derived scores yielded by the McCall multi-mental scale. Journal of Applied Psychology, 16, 322-323.

Lithauer, D. B., & Klineberg, O. (1933). A study in the variation in IQ of a group of dependent children in institution and foster home. Journal of Genetic Psychology, 42, 236-242.

Lubin, B., Larsen, R. M., & Matarazzo, J. D. (1984). Patterns of psychological test usage in the United States: 1935-1982. American Psychologist, 39, 451-454.

Magnusson, D. & Backteman, G. (1978). Longitudinal stability of person characteristics: Intelligence and and creativity. Applied Psychological Measurment, 2, 481-490.

Matarazzo, J. D. (1972). Measurement and Appraisal of Adult Intelligence (5th ed.). New York: Oxford University Press.

McCall, R. B., Appelbaum, M. I., & Hogarty, P. S. (1973). Developmental changes in mental performance. Monographs of the Society for Research in Child Development, 38(3, Serial No. 150).

Quereshi, M. Y. (1968). Practice effects on th WISC subtest scores and IQ estimates. Journal of Clinical Psychology, 24, 79-85.

Roszkowski, M. J. (1984). Stability of IQ's from group administered tests: Some further data. Psychological Reports, 54, 482.

Roy, A. & Tiwari, M. (1977). A study of the adjustment pattern of first grade children with and without kindergarten experiences. Indian Psychological Review, 15, 25-30. (From Psychological Abstracts, 1977, 62 Abstract No. 4461)

Seagoe, M. V. (1934). An evaluation of certain intelligence tests. Journal of Applied Psychology, 18, 432-436.

Smith, M. D. (1978). Stability of WISC-R subtest profiles for learning disabled children. Psychology in the schools, 15, 4-7.

Smith, M. D., & Rogers, C. M. (1978). Relability of standardized instruments when used with learning disabled children. Learning Disabled Quarterly, 3, 23-31.

Svancarova, L. (1982). Vyvolove tendy zobrazovacich schopnosti od predskolniho veku do dospivani / Developmental trends of representational abilities from preschool age to adolescence. Ceskoslovenska Psychologie, 26, 547-557. (From Psychological Abstracts, 1982, 71, Abstract No. 9205)

Swanson, H. L. & Watson, B. L. (1982). Educational and Psychological Assessment of Exceptional Children; Theories, Statagies, and Applications. St. Louis: Mosby.

Thorndike, R. L. (1940). Constancy of the IQ. Psychological Bulletin, 37, 167-186.

Vance, H. B., Blixt, S., Ellis, R., & DeBell, S. (1981). Stability of the WISC-R for a sample of exceptional children. Journal of Clinical Psychology, 37, 397-399.

Vance, H. B. Hankins, N., & Brown, W. (1987). A longitudinal study of the Wechsler Intelligence Scale for Children - Revised over a six year period. Psychology in the Schools, 24, 229-233.

Vernon, P. A. (1984). Wechsler Intelligence Scale for Children. In Keyser, D. J. & Sweetland, R. C. Test

Critiques, 2, 740-749.

Wechsler, D. (1950). Intellectual development and psychological maturity. Child Development, 21, 45-50.

Wechsler, D. (1974). Manual for the Wechsler Intelligence Scale for Children - Revised. New York: Psychological Corporation.

Wechsler, D. (1981). WAIS-R manual: Wechsler Adult Intelligence Scale - Revised. San Antonio, TX: Psychological Corporation.

Zimmerman, I. L., & Woo-Sam, J. (1972) Research with the Wechsler Intelligence Scale for Children: 1960-1970. Psychology in the Schools, 9, 232-271.

Appendix A

Consent Form

Consent Form

I hereby grant my permission for_____
to participate in the study being conducted by Larry Roth. I have been informed that as a participant in the study, my child will be administered the Wechsler Intelligence Scale for Children - Revised. It is my understanding that approximately one hour of time during the Fall semester of 1990 will be needed to complete the testing. Anonymity will be preserved, and the scores will be kept confidential although I will have access to my child's scores after the completion of the project. Also, results will be provided to the School District for any future needs. If I so desire, my child may be withdrawn from the project at any time by informing the director of the project, Larry Roth, 342-6173.

_____ _____
Signature of Parent Date

Appendix B

Letter To Parents

Appendix B

Dear Parents,

Currently, I am completing a Master of Science Degree in Clinical Psychology, at Emporia State University. As a critical element of completing the degree, I am obligated to write a Master's thesis. I have chosen a topic that I feel is very important in the assessment and education of elementary aged children. Your child is eligible to participate in this study which involves the Wechsler Intelligence Scale for Children -Revised (WISC-R).

The Wechsler Intelligence Scale for Children - Revised is today's most widely used intelligence scale for children. In many cases, this scale plays a critical role in a child's education. Therefore, one can realize the importance of this scale to be as accurate as possible. This research endeavor in which your child may participate, is designed to critically test the accuracy of the instrument.

When being assessed by this instrument, a child is compared to other children of the same age. However, there are cases where children can be the same age but be at different grade levels. For example, this thesis is comparing 6 year old children who are in kindergarten with 6 year old children who are in first grade. Obviously, it would seem to be unfair to compare the two because of the difference in educational experience. Surprisingly, this question has never been answered though research. Howard Carvajal, an expert in testing and assessment at Emporia State University, is confidant that this study will break new ground in the area of individual assessment. Thus, this study has the possibility of improving the accuracy of the instrument, therefore enhancing the educational opportunities of children.

It can be assured that the results from your child's assessment will be held strictly confidential. Being the parents of a child involved in the study, you will have access to your child's results. Also, the results of the

(over)

assessment will be conveyed to the appropriate school officials. By providing the results to the School District, valuable time and money will be saved if there ever is a need to assess any of the children that have been included in the study. A minimal of time will be required from your child to participate and all testing will be conducted at your child's school. Finally, permission to conduct the study has been granted by the School District.

I believe that this study is very important in that it has the potential to improve that value of an instrument that is heavily relied upon in our educational system. Your child has the opportunity to participate in this study. By doing so, they will be contributing very important knowledge that may enhance their education and children to come. In order to be considered for the study, your signature is needed on the consent form that has been provided with this letter. Please return the consent form using the stamped and addressed envelope. Your cooperation is greatly appreciated and if there are any questions, feel free to contact me at any time (316) 342-6173. If you agree to allow your child to participate in the study, please respond by November 10, 1990.

Sincerely,

Larry A. Roth

TO: All Graduate Students Who Submit a Thesis or Research Problem/Project as Partial Fulfillment of the Requirements for an Advanced Degree

FROM: Emporia State University Graduate School

I, Larry A. Roth, hereby submit this thesis/report to Emporia State University as partial fulfillment of the requirements for an advanced degree. I agree that the library of the University may make it available for use in accordance with its regulations governing materials of this type. I further agree that quoting, photocopying, or other reproduction of this document is allowed for private study, scholarship (including teaching) and research purposes of a nonprofit nature. No copying which involves potential financial gain will be allowed without written permission of the author.

Larry A. Roth
Signature of Author

Feb 7, 1991
Date

The Effect of Grade Level On WISC-R IQs of 6 Year Olds
Title of Thesis/Research Project

Signature of Graduate Office Staff Member

Date Received

Distribution: Director, William Allen White Library
Graduate School Office
Author