The Mathematics Measures of Academic Progress and the Mathematics Washington Assessment of Student Learning

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A Special Project

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FACULTY APPROVAL

The Mathematics Measures of Academic Progress and

the Mathematics Washington Assessment of Student Learning

Approved for the Faculty

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ABSTRACT

The purpose of the project was to examine if students who passed the mathematics portion of the Measures of Academic Progress assessment in the fall of fourth grade also passed the mathematics portion of the Washington Assessment of Student Learning in the spring of fourth grade. The study was performed on 25 fourth grade students. Students took the mathematics MAP assessment in the fall of 2006 and the mathematics WASL in the spring of 2007. Students' scores were entered into a Chi Square correlation test. The study concluded fourth grade students did not show a relationship of statistical significance between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores.

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CHAPTER 1

Introduction

Background for the Project

The phenomenon of school reform has swept the nation. In 2001, United State's schools experienced one of the largest reform mandates yet (NCLB Meets, 2006). The federal No Child Left Behind Act of 2001 legislation was designed to eliminate inferior instruction and provide every child with a quality education. As a result, high-stakes assessment was a stipulation used in order to give the nation's schools a clear and detailed analysis of student performance. Schools demonstrated Adequate Yearly Progress based on high-stakes assessment results and, in turn, received federal dollars to help fund special education, student transportation, free and reduced meals, and other school needs (Cooper, 2006).

In a response to No Child Left Behind, states developed curriculum standards that supported fundamental knowledge, understandings, and skills in each discipline area that aligned with, and supported, the national standards outlined in No Child Left Behind (Moon, 2005). Each state's standards were assessed on a state-wide test. More specifically, Washington State required each school to demonstrate mandated Adequate Yearly Progress based on student performance on the Washington Assessment of Student Learning. The Washington Assessment of Student Learning was a standardized test given in grades 3-10 which was a mix of multiple choice, short answer, and extended response questions. The assessment was originally given in grades 4, 7, and 10. In the spring of 2007, the assessment was given in grades 3,4,5,6,7, and 10.

The school district used a specific assessment tool, the Measures of Academic Progress, as a predictor of students' passing the Washington Assessment of Student Learning. The Measures of Academic Progress was a computer-based multiple choice test that adjusted the difficulty of the questions to the particular student's level while the student tested.

The elementary school was located in Eastern Washington in the heart of the Columbia Basin. In October 2006, there were 701 students enrolled in grades kindergarten to fifth grade in the elementary school. The ethnic makeup of the school was comprised of 84% White, 7.1% Asian, 6.7% Hispanic, 2.1% Black, and 0.1% American Indian and Alaskan Native. In May of 2007, 13.9% of students received free or reduced price meals. Special education students made up 8.4% of the school population. Transitional bilingual students made up 4.6% of the students, while no students were migrant (Report Card, 2007).

In the 2006-2007 school year, the fourth grade students did not make progress on the reading portion of the Washington Assessment of Student Learning. In the 2005-2006 school year, 93.4% of fourth grade students passed the Washington Assessment of Student Learning. In the 2006-2007 school year, 88.2% of fourth grade students passed Washington Assessment of Student Learning. Fourth grade students did not make progress on the mathematics portion of the Washington Assessment of Student learning either. In the 2005-2006 school year, 73.3% of fourth grade students passed the mathematics portion. In the year 2006-2007, 72.7% of fourth grade students passed the mathematics portion. In writing, 80.8% of fourth grade students passed in 2005-2006. In the 2006-2007 school year

80.0% of fourth grade students passed the writing portion (Report Card, 2007). The fourth graders had not made significant gains on the Washington Assessment of Student Learning.

One mathematics program was used to teach the elementary students mathematics. The *Investigations* curriculum was a mathematics program used in grades kindergarten to fifth grade. Each lesson was designed to make students think creatively, develop problem-solving strategies, and work cooperatively to solve mathematical problems (*TERC: Investigations*).

Statement of the Problem

The purpose of this project was to determine if the Measures of Academic Progress assessment was an adequate judge of student's potential performance on the Washington Assessment of Student Learning. Teachers in the school district and the elementary school were encouraged to plan interventions for students who did not pass the Measures of Academic Progress assessment in the fall in order for the students to pass the Washington Assessment of Student Learning in the spring. Teachers wanted students to exceed standards and to achieve at a high level, so teachers spent much time and effort creating and carrying out interventions for students in need. Therefore, the Measures of Academic Progress assessment in the fall was important, specifically in mathematics, as an effective measurement tool to be a predictor of student achievement on the Washington Assessment of Student Learning in the spring.

Purpose of the Project

The purpose of the project was to examine if students who passed the mathematics portion of the Measures of Academic Progress assessment in the fall of fourth grade also passed the mathematics portion of the Washington Assessment of Student Learning in the spring of fourth grade. The study was performed on 25 fourth grade students. The author predicted fourth grade students had shown a relationship between students who passed the mathematics portion of the Measures of Academic Progress at the 42nd percentile and above in the fall, and students who passed the mathematics portion of the Washington Assessment of Student Learning in the spring. The importance of the relationship between the performance on the Measures of Academic Progress in the fall and the performance on the Washington Assessment of Student Learning in spring determined the interventions performed by the school personnel for students who were struggling in the area of mathematics.

Delimitations

The project took place in a middle to upper class elementary school where parent participation was very high. For the most part, parents were very involved in the educational process. The project involved 25 fourth grade students from the elementary school. Students ranged from low to high performance in mathematics. The project was conducted between the time period of October 2006 when the fall Measures of Academic Progress was proctored and April 2007 when the Washington Assessment of Student Learning was proctored.

The district provided laptop computers for the assessment and the Measures of Academic Progress test software. Not all students were familiar with the use of a laptop computer. The students were provided with the proper environment for testing.

The state provided the materials needed for the Washington Assessment of Student Learning. The students were also provided with the proper environment for testing and the needed accommodations, such as study carrels, heavy paper to cover questions, math manipulatives, and re-reading of directions. The students felt comfortable taking the assessment in the classroom; however, at certain times, the environment was a bit noisy when students were up to get materials, students at recess made noise, or the lawn mower made noise outside. Furthermore, a delimitation was the Washington Assessment of Student Learning was a criterion-referenced test, whereas the Measures of Academic Progress was a norm-referenced test.

Maturation issues were a delimitation in the project. The fourth grade students were assessed in October 2006 and April 2007. The students were more successful at passing the Washington Assessment of Student Learning in the spring because of new learning that took place between October and April. In contrast, some students were not as academically developed as other students and may not have been able to explain thinking processes in writing, and may not have passed the Washington Assessment of Student Learning.

Additionally, the number of students was a delimitation. The project was conducted with 25 fourth grade students in the author's own classroom. The author collected data from the assessments.

Assumptions

The previous teachers were highly qualified to teach the grade level. The teachers knew the grade level expectations. The grade level expectations played an important and essential part in how the previous teachers taught in order to prepare students for fourth grade. Each student was prepared to meet grade level standards because the students were promoted to fourth grade.

The author knew the Measures of Academic Progress and the Washington Assessment of Student Learning assessments were widely used and highly esteemed by educators and officials in the school district. Both assessments were appropriate for students in fourth grade. Students were given an equal amount of time and resources needed to complete the assessments. The students' assessment results were accurate.

Each educator who proctored the assessments was given the same directions for administration of the Measures of Academic Progress and the Washington State Assessment of Student Learning. All educators were trained to follow the directions carefully and the directions were carefully followed by the author when proctoring the assessments.

Hypothesis

Fourth grade students who passed the mathematics portion of the Measures of Academic Progress in the fall with a score at the 42nd percentile would pass the mathematics portion of the Washington Assessment of Student Learning in greater numbers in spring than students who did not pass the mathematics portion of the Measures of Academic Progress in the fall.

Null Hypothesis

Fourth grade students who passed the mathematics portion of the Measures of Academic Progress in the fall with a score at the 42nd percentile would not pass the mathematics portion of the Washington Assessment of Student Learning in greater numbers in spring than students who did not pass the mathematics portion of the Measures of Academic Progress in the fall.

Significance of the Project

The need for students to be successful in mathematics in the fourth grade was important. Students needed to show significant gains during the school year to pass the Washington Assessment of Student Learning in order for the school to make Adequate Yearly Progress. Additionally, students needed to pass the Washington Assessment of Student Learning by high school to graduate with a valid diploma.

The importance of the Measures of Academic Progress was immense because the assessment gave prompt data (that very day) to teachers in regards to the student's mathematics levels. The data from the mathematics Measures of Academic Progress was used to design interventions for students who did not pass the assessment in the fall. Students not passing were involved in several mathematics interventions during the school day.

Procedure

The Northwest Evaluation Association's Measures of Academic Progress assessment was used in October 2006 in a five week testing window given by the assessment company. All 24 students participated in the mathematics assessment. The

assessment was administered in the fourth grade classroom on laptop computers. Students used the key pad and computer mouse to select the correct multiple choice answer to each question. A calculator popped up on the screen of the computer on certain questions. Students were given a pencil and scratch paper to be used to work out problems if needed. The assessment was given on one day only, and was not timed. Students were given a range of 40-60 questions. As the students worked, the assessment varied the level of the questions until the assessment program determined the student's appropriate level. A student was considered passing and on grade level with a RIT score of 201.

The Washington State Assessment of Student Learning was administered in the fourth grade classroom under strict guidelines (Directions for Administration) mandated by the state. The mathematics assessment was given over the course of three days in three sections. The testing window of dates was determined by the state. Students were to complete each section of the assessment in one day only. The assessment was a criterion-referenced test. The assessment was made up of a mix of multiple choice, short answer, and extended response questions. The students completed the assessment and showed all work in test booklets using a pencil. All posters and academic tools visible to the students were covered up, removed, or unavailable. Only select mathematics manipulatives were used during the assessment, such as counters, geoboards, rulers, play money, etc. Calculators were only allowed to be used on the third day of the assessment. The assessments were signed out of the administrator's office each morning before the assessment and were counted and returned to the administrator's locked office immediately after the assessment. Students who scored 400 points or more on the Washington

Assessment of Student Learning were identified as meeting the benchmark to identify the student was on grade level and passed the assessment.

Definition of Terms

benchmark. Students who met the benchmark were identified as on grade level.

criterion-referenced assessment. A criterion-referenced assessment scored students based on how well students demonstrated mastery of subject matter. Scores were determined solely based on how many questions were answered correctly.

intervention. Interventions were used as small groups of students or individual students were pulled to a table in the classroom to receive extra mathematics skill practice.

manipulatives. Hands-on mathematics tools such as geoboards, beans for counting, geometric shapes, etc. were used as mathematics manipulatives.

norm-referenced assessment. A norm-referenced assessment translated the score a student received based on the assessment scores of a population of students. A norm-referenced test reported how the student correctly answered questions compared to other students in the group.

Acronyms

AYP. Adequate Yearly Progress

GLE. Grade Level Expectation

MAP. Measures of Academic Progress

NCLB. No Child Left Behind

NWEA. Northwest Evaluation Association

OSPI. Office of the Superintendent of Public Instruction

RIT. Rasch Units

WASL. Washington Assessment of Student Learning

CHAPTER 2

Review of Selected Literature

Introduction

Literature selections reviewed for the study were related to school reform, assessment, and mathematics. The No Child Left Behind Act (NCLB), which initiated the need for assessment to show AYP, was discussed. While the focus of the literature primarily related to assessment, the discussion of mathematics curriculum used in the school to prepare students for the assessments was important.

No Child Left Behind (NCLB)

The Elementary and Secondary Education Act (ESEA) of 1965 was the first federal aid program for the reform of public schools (Henderson, 2002). Then, President Ronald Regan's *A Nation at Risk* report in 1983 gave the United States of America a grave picture of the nation's schools: American schools were failing miserably, and local, state, and federal reform efforts were needed immediatly (Nation at Risk,1983). There was a call for more and better assessment measures to compare American students with the economic competitors of the United States of America. *A Nation at Risk* called for the use of test scores and a diagnosis for the reform measures needed in our nation's schools (Testing and Reform, 1993). The No Child Left Behind Act gave the ESEA a new name. President George W. Bush made strict accountability changes for schools, and NCLB was enacted by Congress in 2001 and signed into law in January 2002 (Henderson, 2002).

Major changes to federal education programs were made by NCLB. By the year 2005, all teachers had to be highly qualified, meaning a bachelor's degree and the

successful completion of rigorous tests in core subjects. If a student was taught by a teacher who was not highly qualified for more that four weeks, parents were notified. The law required states to set high standards for student achievement and use tests to assess how well students met the standards. States were called to inform parents and the public about school and district performance through annual report cards issued by the state education agency. Schools were required to make Adequate Yearly Progress (AYP) in improving student achievement, and schools were held accountable if AYP was not shown (Henderson, 2002). The goal of NCLB was to boost student achievement and ensure success for all students (Berkas & Pattison, 2006). The Education Commission of the States called NCLB the progressive reform waves which, "… built the basic structure of public education in the United States, those that guaranteed access for all students, and, now, those focused on ensuring the success for all students" (Education Commission, 2004, p. vi).

Washington Assessment of Student Learning (WASL)

In 1993, before the wave of reform created by NCLB, the Washington State legislature enacted House Bill 1209. The bill required that Washington State create common learning standards, assessments, and student graduation requirements. The common standards for learning and teaching were called Essential Academic Learning Requirements (EALRs), and were broken down into Grade Level Expectations (GLEs). The WASL was developed as the common assessment used to assess student proficiency in core skills, and both school and district performance (Reaching Higher, 2006). The purpose of the WASL was two-fold. The WASL provided data about how each student and

each school performed each year. The WASL was also used to improve teaching so each child's academic needs were met (Washington Assessment, 2007). The WASL gave both schools and districts an incentive to improve, as the WASL identified struggling schools. Funds were then directed towards schools who did not meet standards based on the WASL (Reaching Higher, 2006).

In 1997, the first group of fourth graders took the WASL in reading, writing, listening, and mathematics. Then, in 1998, seventh and tenth graders were required to take all four sections of the WASL as well. The bar was raised when the State Board of Education created new graduation requirements in 2000, which required the Class of 2008 and beyond to pass the WASL in order to graduate. Since then, the State Legislature called for alternative assessments and retakes, eliminated the listening test, added a science test, added tests in grades third through tenth, and provided money to help struggling students (Reaching Higher, 2006).

New standards and assessments were not seen as positive by all. In an article in the *Educational Researcher*, the writer stated high-stakes assessment could be a positive or negative force depending on the relationship the assessment has with the curriculum. The writer also observed that high-stakes tests affected the subject matter and the way in which the content was taught (Schoenfeld, 2002).

The WASL was a standards-based assessment, which was given in several content sections in grades third through tenth in 2006. The assessment was a mix of multiple choice, short answer, and extended response questions. A strong emphasis was placed on

short answer and extended response questions because students were required to demonstrate understanding (Reaching Higher, 2006).

The Office of the Superintendent of Public Instruction (OSPI) in Washington State used rigorous methods to ensure the WASL provided valid and reliable results. Several control measures were used when open-ended questions were scored, such as item by item scoring, double scoring, supervisors' rereading of student work, blindly inserted validity papers, protocols to handle unique responses, and communication between OSPI and the contracted scoring company (Frequently Asked, 2007). Catherine S. Taylor, from the University of Washington, presented to the Washington Roundtable regarding the reliability and validity of the WASL. Taylor's presentation stated early results suggested the score scale was extremely stable over time and the scores were reliable. In addition, several studies had begun to test the validity of the WASL (Taylor, 2002). However, another study found coefficients suggested a moderately strong relationship between student performance on a norm-referenced test (Iowa Test of Basic Skills) and the WASL. The study's data showed inconsistencies in the difficulty of the performance standards on the WASL across grade levels and content areas. The author stated, "The overall difficulty of the mathematics standards also makes it hard to believe that they are reasonable" (MacQuarrie, 2003, p. 1). The findings questioned the reasonableness of the performance standards for the WASL.

Despite controversy in the academic community, the WASL was mandated to be used throughout the state as an assessment vehicle. In response to NCLB, Washington State had demonstrated the mandated AYP by student performance on the WASL.

Measures of Academic Progress (MAP)

After NCLB, educators became aware of the drawbacks of statewide standardized testing, such as timely reporting of scores and testing which measured students only at a single point in time. Subsequently, alternative assessments began to be used across the nation. One such alternative assessment was the Measures of Academic Progress assessment, a formative assessment based on student growth over time. The MAP could be administered several times during a school year, allowing educators to quickly see student growth from quarter to quarter or year to year (Olson, 2007). Student scores were available to teachers as soon as the student completed the assessment.

A national nonprofit organization, NWEA, which specialized in researched based assessments, created the MAP more than twenty years ago. According to NWEA, more than 3000 school districts and educational partners used MAP Mathematics, Reading, and Language Usage tests every year. The assessments offered by the NWEA to school districts were touted as unique, in that the assessments adapted to each student's ability as the student took the assessment, and the assessment accurately measured what a child knew and what the child still needed to learn. The MAP assessed academic growth over a period of time chosen by each individual school or teacher, unlike criterion-referenced or state mandated tests. The NWEA stated the results had timely and practical application to teaching and learning because the results were immediate enough to guide instruction (Measures, 2008).

The NWEA used a stable measurement scale which had been proven stable and valid over time. The scale aligned student achievement levels with the difficulty of the test

item on the same scale. The scale, called the Rasch Unit (RIT), was divided into equal parts, much like rungs on a ladder or centimeters on a ruler. The RIT scale was said to have several beneficial characteristics: it was grade-independent, equal-interval, and stable. The equal interval scale measured an individual's growth over time with the same measurement tool. Identical scores in different grade levels meant the same thing. All test items were placed on a RIT scale according to the difficulty of the item. When a student took an assessment, the MAP system determined the difficulty level at which the student was competent and assigned an overall RIT score to the student (Researched-based, 2007).

The test design process included many facets, such as item banks and ongoing evaluation. Test items were chosen from a bank of over 15,000 items, and each year hundreds of items had been added. Most items were developed by teachers who received thorough training in how to write test items. Before being put in the item bank, each item passed a bias and content review, field testing, and statistical screening procedures (Researched-based, 2007).

A publication released by the NWEA in March of 2004 addressed the reliability and validity of the MAP assessment. The NWEA used a test-retest reliability statistical test and found the Person correlation coefficient (r) to be in the mid .80's to low .90's, which is above .80. A correlation coefficient of .80 was the minimum where the correlation was considered significant. The multiple concurrent validity tests with non-NWEA assessments showed a strong correlation as determined by a Person correlation coefficient of .80 or higher. In a concurrent validity test, which used data from the WASL and the MAP assessment in fourth grade, the correlation in reading was .81 and .80 in mathematics

(Northwest Evaluation Association, 2004). NWEA found that the MAP and the WASL had concurrent validity.

Investigations in Number, Data, and Space Math Curriculum

Investigations math curriculum was developed as a kindergarten though fifth grade math curriculum at TERC in Cambridge, Massachusetts. The curriculum was designed to guide inquiry (or problem) based instruction in order to help all children understand number sense, geometry, data, measurement and early algebra. The curriculum provided teachers with activity based investigations in each session. *Investigations* promoted creative thinking, cooperative work, and problem solving strategies and skills. Teachers were encouraged to have students use write, draw, and talk about math, and use manipulatives, calculators, and even computers (Investigations in Number, 2007).

The ARC Center Tri-State Student Achievement Study provided the most recent evidence that *Investigations* had a positive impact on student achievement. In the study conducted in three states, the schools that fully implemented *Investigations* scored significantly higher than students that did not use the curriculum. The study found students performed better on calculation problems, number relationship problems, and word problems (Impact of the, 2008). Additional research supported the use of manipulatives in a mathematics curriculum. A study conducted in Nigerian schools, published by Educational Research Quarterly, concluded students taught using mathematics manipulatives scored higher on a multiple choice test than students taught without mathematics manipulatives. The results showed the importance of using manipulatives in order to increase student mathematics achievement (Aburime, 2007).

Summary

Quality literature was reviewed. The No Child Left Behind Act and the impact the act had on education was discussed. The NCLB act required states show Adequate Yearly Progress. The goal of NCLB was to boost student achievement and ensure success for all students. In 1993, before the wave of reform created by NCLB, the Washington State legislature enacted House Bill 1209, which led to the creation of the WASL.

The WASL was developed as the common assessment used to assess student proficiency in core skills, and both school and district performance (Reaching Higher, 2006). The WASL provided data about how each student and each school performed each year and provided data used to improve teaching so each child's academic needs were met (Washington Assessment, 2007).

After the institution of standardized tests, it became apparent there were drawbacks to statewide standardized testing, such as timely reporting of scores and testing which measured students only at a single point in time. The MAP test was utilized to measure student growth over time. The MAP provided teachers with immediate scores on an equal interval scale.

The author reviewed research on the *Investigations* math curriculum. *Investigations* was designed to foster inquiry in students using manipulatives, cooperative learning, and creative thinking. The curriculum was found to be supported by research.

CHAPTER 3

Methodology and Treatment of Data

Introduction

A correlation study was conducted. In the correlation study, the Chi Square was used to see if there was a relationship between the fall mathematics MAP scores and the spring mathematics WASL scores. The study was performed on fourth grade students.

Methodology

For the project, a correlation study was used as the research method. The correlation study required that data be collected and a statistical test be performed to determine the relationship between two specific variables, which in this project were MAP and WASL scores. The Chi Square was used as a statistical test to determine if there was a relationship of statistical significance between the two variables.

Participants

The participants in the study were fourth grade students in the author's classroom. The elementary school was located in Eastern Washington in the heart of the Columbia Basin. In October 2006, there were 701 students enrolled in grades kindergarten to fifth grade in the elementary school. The ethnic makeup of the school was comprised of 84% White, 7.1% Asian, 6.7% Hispanic, 2.1% Black, and 0.1% American Indian and Alaskan Native. In May of 2007, 13.9% of students received free or reduced price meals. Special education students made up 8.4% of the school population. Transitional bilingual students made up 4.6% of the students, while no students were migrant (Report Card, 2007). The project was conducted between the time period of October 2006 and May 2007.

Instruments

The instruments used to conduct the project were the MAP and WASL assessments. The data gathering devices used for the MAP assessment included a computer for each child, access to the NWEA MAP assessment, and the NWEA printout of student scores after the completion of the assessment by all students. The data gathering devices used for the WASL assessment included an assessment provided by the state, math manipulatives, and a pencil. After the assessment was completed the WASL assessments were sent to the state for processing. The results were received from the principal in August 2007.

The validity of an assessment was defined as the degree to which a test measured what it was supposed to measure. The reliability was the degree to which a test consistently measured what it was said to measure. Students should have received the same score if they were to have retaken the test, however, if the scores were very different each time the test was taken, the test would be deemed unreliable (Gay, Mills, & Airasian, 2006, p. 134).

According to the NWEA website, the MAP assessment has shown to be both valid and reliable. A publication released by the NWEA in March of 2004 addressed the reliability and validity of the MAP assessment. The NWEA used a test-retest reliability statistical test and found the Person correlation coefficient (r) to be in the mid .80s to low .90s, which is above .80. A correlation coefficient of .80 was the minimum where the correlation was considered significant. The multiple concurrent validity tests with non-NWEA assessments showed a strong correlation as determined by a Person correlation coefficient of .80 or higher. In a concurrent validity test, which used data from the WASL

and the MAP assessment in fourth grade, the correlation in reading was .81 and .80 in mathematics (Northwest Evaluation Association, *2004).* NWEA found that the MAP and the WASL had concurrent validity.

The Office of the Superintendent of Public Instruction (OSPI) in Washington State used rigorous methods to ensure the WASL provided valid and reliable results. Several control measures were used when open-ended questions were scored, such as item by item scoring, double scoring, supervisors' rereading of student work, blindly inserted validity papers, protocols to handle unique responses, and communication between OSPI and the contracted scoring company (Frequently Asked, 2007). Catherine S. Taylor, from the University of Washington, presented to the Washington Roundtable regarding the reliability and validity of the WASL. Taylor's presentation stated early results suggested the score scale was extremely stable over time and the scores were reliable. In addition, several studies had begun to test the validity of the WASL (Taylor, 2002). However, another study found coefficients suggested a moderately strong relationship between student performance on a norm-referenced test (Iowa Test of Basic Skills) and the WASL. The study's data showed inconsistencies in the difficulty of the performance standards on the WASL across grade levels and content areas. The author stated, "The overall difficulty of the mathematics standards also makes it hard to believe that they are reasonable" (MacQuarrie, 2003, p. 1). The findings questioned the reasonableness of the performance standards for the WASL.

Despite controversy in the academic community, the WASL was mandated to be used throughout the state as an assessment vehicle. In response to NCLB, Washington State has demonstrated the mandated AYP by student performance on the WASL.

Design

A correlation study was utilized for the design method. The MAP and WASL scores of fourth grade students were used to conduct the correlation. The author desired to determine if there was a relationship between the fall mathematics MAP scores and the spring mathematics WASL scores. A Chi Square was chosen to determine the statistical significance of the relationship between MAP and WASL scores.

Procedure

The author used the NWEA's MAP assessment in October 2006 in a five week testing window given by the assessment company. All 25 students participated in the mathematics assessment. The assessment was administered in the fourth grade classroom on laptop computers. Students used the key pad and computer mouse to select the correct multiple choice answer to each question. A calculator popped up on the screen of the computer on certain questions. Students were given a pencil and scratch paper to be used for working out problems if needed. The assessment was given on one day only, and was not timed. Students were given a range of 40-60 questions. As the students worked, the assessment varied the level of the questions until the assessment program determined the student's appropriate level. A student was considered passing and on grade level with a RIT score of 201.

The WASL was administered in the fourth grade classroom under strict guidelines (Directions for Administration) mandated by the state. The mathematics assessment was given over the course of three days in three sections. The testing window of dates was determined by the state. Students were to complete each section of the assessment in one day only. The assessment was a criterion-referenced test. The assessment was made up of a mix of multiple choice, short answer, and extended response questions. The students completed the assessment and showed all work in test booklets using a pencil. All posters and academic tools visible to the students were covered up, removed, or unavailable. Only select mathematics manipulatives were used during the assessment, such as counters, geoboards, rulers, play money, etc. Calculators were only allowed to be used on the third day of the assessment. The assessments were signed out of the administrator's office each morning before the assessment and were counted and returned to the administrator's locked office immediately after the assessment. Students who scored 400 points or more on the WASL were identified as meeting the benchmark to identify the student was on grade level and passed the assessment.

Treatment of the Data

The Chi Square correlation test was used to statistically calculate the data. The number of students who passed and did not pass the MAP in the fall was calculated. Then, the number of students who passed the MAP and the WASL, the number of students who passed the MAP and not the WASL, the number of students who did not pass the MAP and passed the WASL, and the number of students who did not pass the MAP and did not pass the WASL were calculated. The data was run through the Stat Pak to conduct the Chi

Square correlation to see if there was a relationship between the two assessments (Stat Pack).

Summary

The fourth grade students took the MAP mathematics assessment in the fall of 2006 and the WASL mathematics assessment in the spring of 2007. The MAP and WASL scores of the fourth grade students were used to determine if there was a relationship between the assessments. The data was calculated and gathered using the Chi Square correlation statistical device in the Stat Pak.

CHAPTER 4

Analysis of the Data

Introduction

Fourth grade students were involved in the project. The parameters discussed were materials, maturation issues, and number of students. The hypothesis and null hypothesis were restated. The data was represented with a table. Results of the study and the findings of the study were discussed. Data from the MAP and the WASL were analyzed. Student scores were analyzed using the Chi Square correlation.

Description of the Environment

The project took place in a middle to upper class elementary school where parent participation was very high. For the most part, parents were very involved in the educational process. The project involved 25 fourth grade students from the elementary school. Students ranged from low to high performance in mathematics. The project was conducted between the time period of October 2006 when the fall Measures of Academic Progress was proctored and April 2007 when the Washington Assessment of Student Learning was proctored.

One of the parameters for the project included materials provided by the school district and the state. The district provided laptop computers for the assessment and the Measures of Academic Progress test software. Not all students were familiar with the use of a laptop computer. The students were provided with the proper environment for testing. The state provided the materials needed for the Washington Assessment of Student Learning. The students were also provided with the proper environment for testing and the

needed accommodations, such as study carrels, heavy paper to cover questions, math manipulatives, and re-reading of directions. The students felt comfortable taking the assessment in the classroom; however, at certain times, the environment was a bit noisy when students were up to get materials, students at recess made noise, or the lawn mower made noise outside. Furthermore, a delimitation was the Washington Assessment of Student Learning was a criterion-referenced test, whereas the Measures of Academic Progress was a norm-referenced test.

An additional parameter was maturation issues. The fourth grade students were assessed in October 2006 and April 2007. The students were potentially more successful at passing the Washington Assessment of Student Learning in the spring because of new learning that took place between October and April. However, some students were not as academically developed as other students and may not have been able to explain thinking processes in writing, and may not have passed the Washington Assessment of Student Learning.

Furthermore, the number of students was a parameter of the project. The project was conducted with 25 fourth grade students in the author's own classroom. The author collected data from the assessments.

Hypothesis

Fourth grade students who passed the mathematics portion of the Measures of Academic Progress in the fall with a score at the 42nd percentile would pass the mathematics portion of the Washington Assessment of Student Learning in greater

numbers in spring than students who did not pass the mathematics portion of the Measures of Academic Progress in the fall.

The table showed data on student fall mathematics MAP scores and spring mathematics WASL scores. The hypothesis was not supported by the table. The table did not display a statistically significant correlation between the MAP and WASL assessments as measured by student scores. Therefore, the hypothesis was rejected.

Null Hypothesis

Fourth grade students who passed the mathematics portion of the Measures of Academic Progress in the fall with a score at the 42nd percentile would not pass the mathematics portion of the Washington Assessment of Student Learning in greater numbers in spring than students who did not pass the mathematics portion of the Measures of Academic Progress in the fall.

The data was analyzed using the Chi Square correlation and was displayed on the table. The data showed there was not a statistically significant correlation between the MAP and WASL assessments as measured by student scores. Therefore, the null hypothesis was accepted.

Results of the Study

Table 1.

Chi Square Test of Mathematics Scores of the Fall MAP and Spring WASL

WASL score	Passed (19)	Did Not Pass (6)
Passed MAP	12	2
Did Not Pass MAP	7	4
df=1	x= 1.98	p>.50

The Chi Square correlation test was used to statistically calculate the data. The number of students who passed and did not pass the MAP in the fall was calculated. Then, the number of students who passed the MAP and the WASL, the number of students who passed the MAP and not the WASL, the number of students who did not pass the MAP and passed the WASL, and the number of students who did not pass the MAP and did not pass the WASL were calculated. The data was run through the Stat Pak to conduct the Chi Square correlation to see if there was a relationship between the two assessments (Stat Pack). A two dimensional Chi Square was used, which resulted in a Chi Square value of 1.98. The degrees of freedom was 1. Table A.6 in *Educational Research: Competencies for Analysis and Applications* was used to determine the level of significance. The author concluded the Chi Square of 1.98< 3.841 at the .5 level. Table A.6 was also used to analyze the Chi Square cell values. The highest value of 0.65 was also less than 3.841 at

the .5 level (Gay, Mills, & Airasian, 2006). Therefore, the relationship between the MAP and WASL scores was not significant at any level.

Findings

After the data was analyzed, there was not a correlation or statistically significant relationship between the fall mathematics MAP assessment and the spring mathematics WASL assessment. The data on the table documented the lack of statistical significance. The fourth grade students involved with the project showed there was not a relationship between the fall mathematics MAP assessment and the spring mathematics WASL assessment. The hypothesis was rejected and the null hypothesis was accepted.

Discussion

A relationship between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores was not found when the scores were calculated into the Chi Square correlation. The data was analyzed and recorded into the table. The data on the table showed there was not a correlation between the students' fall mathematics MAP scores and the students' spring mathematics scores.

Summary

The materials, maturation issues, and number of students were parameters for the project. After careful analysis of the data, the null hypothesis was accepted. After the data was entered into the Chi Square correlation, the results were used to create the table. The table did not show a relationship of statistical significance between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores. The hypothesis was rejected. The fourth grade students did not show a relationship of

statistical significance between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores.

CHAPTER 5

Summary, Conclusions and Recommendations

Introduction

Conclusions and recommendations based on the analyses of the data for the project were made. The findings of the data were discussed. The fourth grade students did not show a relationship of statistical significance between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores. The author discussed a few recommendations based on the conclusions of the findings.

Summary

The No Child Left Behind Act and the impact the act had on education was discussed. The NCLB act required that states show Adequate Yearly Progress. The goal of NCLB was to boost student achievement and ensure success for all students. In 1993, before the wave of reform created by NCLB, the Washington State legislature enacted House Bill 1209, which led to the creation of the WASL.

The WASL was developed as the common assessment used to assess student proficiency in core skills, and both school and district performance (Reaching Higher, 2006). The WASL provided data about how each student and each school performed each year and provided data used to improve teaching so each child's academic needs were met (Washington Assessment, 2007).

After the institution of standardized tests, it became apparent there were drawbacks to statewide standardized testing, such as timely reporting of scores and testing which measured students only at a single point in time. The MAP test was utilized to measure

student growth over time. The MAP provided teachers with immediate scores on an equal interval scale.

The author reviewed research on the *Investigations* math curriculum. *Investigations* was designed to foster inquiry in students using manipulatives, cooperative learning, and creative thinking. The curriculum was found to be supported by research.

The purpose of the project was to examine if students who passed the mathematics portion of the Measures of Academic Progress assessment in the fall of fourth grade also passed the mathematics portion of the Washington Assessment of Student Learning in the spring of fourth grade. The study was performed on 25 fourth grade students. The author predicted fourth grade students had shown a relationship between students who passed the mathematics portion of the Measures of Academic Progress at the 42nd percentile and above in the fall, and students who passed the mathematics portion of the Washington Assessment of Student Learning in the spring. The importance of the relationship between the performance on the Measures of Academic Progress in the fall and the performance on the Washington Assessment of Student Learning in spring determined the interventions performed by the school personnel for students who were struggling in the area of mathematics.

The fourth grade students took the MAP mathematics assessment in the fall of 2006 and the WASL mathematics assessment in the spring of 2007. The MAP and WASL scores of the fourth grade students were used to determine if there was a relationship between the assessments. The data was calculated and gathered using the Chi Square correlation statistical device in the Stat Pak.

The materials, maturation issues, and number of students were parameters for the project. After careful analysis of the data, the null hypothesis was accepted. After the data was entered into the Chi Square correlation, the results were used to create the table. The table did not show a relationship of statistical significance between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores. The hypothesis was rejected. The fourth grade students did not show a relationship of statistical significance between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores.

Conclusions

After the data was analyzed, a relationship of statistical significance between the students' fall mathematics MAP scores and the students' spring mathematics WASL scores was not found. The data on the table showed the Chi Square of 1.98< 3.841 at the .5 level, which was not statistically significant. The data was not statistically significant at any level. Therefore, a student's score on the MAP in the fall did not ensure the student would also pass the WASL in the spring. Additionally, a student who did not pass the MAP in the fall was not ensured a score which did not pass the WASL in the spring. The fourth grade students involved with the project showed there was not a relationship between the fall MAP scores and the spring WASL scores.

Additionally, the author believed the seven students who did not pass the mathematics MAP in the fall but passed the mathematics WASL in the spring passed because of the interventions conducted between October 2006 and April 2007. The author believed that the reason two students passed the mathematics MAP in the fall but did not

pass the mathematics WASL in the spring could be attributed to a lack of written communication skills needed to pass the WASL.

Recommendations

Based on the conclusions drawn, the author understands there is not a relationship between student's fall MAP and spring WASL scores. The author believes the study done on the fourth grade students could generalize to all schools in the district in third, fourth, and fifth grade. It is recommended that a random sample test be conducted on one hundred intermediate students. The author believes the results would show a relationship between passage of the fall mathematics MAP assessment and the passage of the spring mathematics WASL assessment.

The author would like the MAP assessment administered on hard-wired computer desktops rather than laptop computers, as many of the students were unfamiliar with their use. The scores should turn out to be slightly better due to the familiarity to the testing equipment. If the environment was quiet when the students were being assessed compared to the environment being a little noisy, the author believes the scores would not have been significantly different.

To replicate the study, there would need to be some similarities including ethnicity, environment, age of students, number of students, ELL students, special education students, and interventions. Persons wanting to replicate the study would need to follow the exact procedure used in the project in order for the project to be duplicated.

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APPENDIX

2006 Fall Mathematics MAP and 2007 Spring Mathematics WASL Scores

Student	2006 Fall MAP score	Pass with a score of 201	2007 Spring WASL score	Pass with a score of 400
A	167	N	427	Y
B	206	Y	405	Y
C	204	Y	421	Y
D	200	N	417	Y
E	188	N	382	N
F	211	Y	435	Y
G	215	Y	452	Y
H	210	Y	452	Y
I	167	N	314	N
J	198	N	409	Y
K	217	Y	452	Y
L	200	N	405	Y
M	218	Y	452	Y
N	195	N	385	N
O	216	Y	459	Y
P	200	N	413	Y
Q	198	N	417	Y
R	194	N	375	N
S	208	Y	452	Y
T	202	Y	400	Y
U	224	Y	452	N
V	210	Y	435	Y
W	201	Y	395	N
X	205	Y	421	Y
Y	199	N	421	Y