The Relationship Between Measurement of Academic Progress and Washington Assessment of Student Learning in Mathematics

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FACULTY APPROVAL

The Relationship Between Measurement of Academic Progress and Washington Assessment of Student Learning in Mathematics

Approved for the Faculty

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ABSTRACT

The purpose of the study was to examine if eighth grade students who met benchmark with a 227 Rasch Unit score or above on the mathematics Measurement of Academic Progress in the fall of 2007 would also meet benchmark on the mathematics portion of the Washington Assessment of Student Learning in the spring of 2008. The study was performed on 102 eighth grade students. Students' scores were entered into a Chi Square correlation test. The study concluded that the fall mathematics MAP and the spring mathematics WASL were statistically significant to the .001 level.

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Introduction

Background for the Project

Throughout the history of American public education, the federal government has provided some level of funding. While the majority of funds have come from state and local sources, the federal government has provided dollars in support of public education. The laws regarding those federal dollars have changed throughout the years. One significant law, called the Elementary and Secondary Education Act, was passed in 1965 by President Lynden B. Johnson. The focus of the law was to provide funds for schools that served low-income populations in the hope that the funds would bring more equal opportunities to the low-income students (Cronin, 2005). The early versions of this law looked into teaching methods, curricula, and textbook adoptions to help low-income students.

By the 1980s, the law gave more latitude to the schools, which allowed schools to adopt whatever the school wished as long as the school could prove the adoption materials were appropriate and the students were learning (Cronin, 2005). The 1994 law was called the Improving America's Schools Act. This law required states to have standards and assessment systems for those standards. The states were responsible for the accountability systems.

The current law, called No Child Left Behind, was passed on January 8, 2002. No Child Left Behind required that all states respond to a federal accountability system. The law mandated that all students (100%) meet identified

standards by 2014. The law also required that schools and districts not meeting these standards be sanctioned (Paige, 2004).

Washington State created the Washington Assessment of Student Learning to meet the requirements of the 1994 Improving America's Schools Act and continued to use the assessment for No Child Left Behind. The Washington Assessment of Student Learning was a criterion-referenced test given once a year in the spring. Originally, students in grades four, seven, and ten were required to take the test in mathematics, writing and reading. Later, students in grades three, five, six, and eight were required to take the reading and mathematics portion of the test. In addition to the reading, mathematics, and writing portions of the test, a science portion was required for fifth, eighth, and tenth grade students (Office of Superintendent of Public Instruction, n.d.). Test results took between three to five months to be received by the test takers and published to the schools. Three to five months was a long period of time to get results for students' achievement. By the time the results were received, students had moved on to the next grade level and the information was not as effective in informing the teacher's instruction. The next grade level teacher could have used the results for the current year, but the teacher would have had to do remediation because the test results were for the previous year's skills.

In mathematics, the Measurement of Academic Progress was used to test students in the fall and spring of each year. Experts believed that if the eighth grade students met the grade level standard on the fall Measurement of Academic Progress test, the students would pass the Washington Assessment of Student

Learning in the spring. In the 2007-2008 school year, according to school district norms, the eighth grade level standard for the fall Measurement of Academic Progress was a Rasch Unit score of 227 (Office of Superintendent of Public Instruction, n.d.).

Statement of the Problem

Results from the Washington Assessment of Student Learning were not received by schools in a timely manner. Teachers no longer had the same students by the time the test results were returned and could no longer help the students. Teachers needed to have a test where immediate feedback was received to help guide instruction, provide intervention, and improve student learning.

The mathematics Measurement of Academic Progress provided teachers with the immediate feedback and the ability to provide intervention to the appropriate students. Administrators in the district in which this study took place regularly informed teachers that the Measurement of Academic Progress was also a predictor of student achievement and the ability to meet proficiency levels on the spring mathematics Washington Assessment of Student Learning. If the student received a Rasch Unit score of 227 on the fall mathematics Measurement of Academic Progress, then the student would meet proficiency on the spring Washington Assessment of Student Learning.

Purpose of the Project

The purpose of the project was to prove that the mathematics Measurement of Academic Progress was a predictor of passing the Washington Assessment of Student Learning. If a student met standard on the mathematics

portion of the fall Measurement of Academic Progress, then the student would pass the Washington Assessment of Student Learning in the spring. Administrators in the school district where the study took place had often reiterated this statement to their teaching staff.

Delimitations

The project took place in a low-income middle school and involved 102 eighth grade students. Maturation was not an issue because the fall Measurement of Academic Progress score was the predictor of passing the Washington Assessment of Student Learning. Therefore, a student maturing over time had nothing to do with the student's fall test score. The project was conducted between the time periods of October 2007, when the fall Measurement of Academic Progress was administered, to April 2008, when the spring Washington Assessment of Student Learning was administered.

The Measurement of Academic Progress was a norm-referenced computerized multiple-choice test where students received immediate feedback upon completion of the test. The Measurement of Academic Progress was administered in the school computer lab on desktop computers. Students were familiar with the computer lab and the use of the computers. During the administering of the Measurement of Academic Progress, the proctor had to end two students' tests and restart them on a different computer due to the students' talking while the students took the test.

The Washington Assessment of Student Learning was a criterion-referenced test administered with pencil, paper, and lengthy directions. For the

mathematics portion of the tests, students were allowed to use calculators, rulers, and protractors, which each student had. The students were not allowed to get up during the test sessions. The Washington Assessment of Student Learning was administered in the students' second period classroom. To accommodate for special education students, one second period eighth grade class was spread among three other second period eighth grades classes with a teacher familiar with the students.

In the 2007-2008 school year, the middle school was made up of 678 students from five different ethnic groups. The groups were 82.2% White, 9.1% Hispanic, 4.1% Black, 3.7% Asian, and 0.9% American Indian/Alaskan Native. Forty and seven-tenths percent of the school population was on free or reduced lunch and 12.7% was in special education. The school had 45 teachers on staff with an average experience of 14.4 years. Sixty-eight and four-tenths percent of the teaching staff held Master's degrees. All of the teaching staff were considered highly qualified by No Child Left Behind standards (Report Card, 2008).

The community surrounding the middle school was made up of middle class to lower middle class families with 37% in a lower socio-economic bracket. Parent involvement was minimal. The community also had a high Eastern European population.

The students that took part in this research project were all general education students in eighth grade. The students were of mixed ability levels. Some of the students were below grade level in mathematics, some were at grade

level, and some were above grade level. The students' behaviors were age appropriate. Each student had six 55 minute class periods each day.

Assumptions

The students' previous mathematics teachers were highly qualified to teach mathematics. The previous teachers knew the Grade Level Expectations and used these expectations during instruction to prepare students for the next grade level's mathematics. The highly qualified eighth grade mathematics teacher used a research-based Prentice Hall Pre-Algebra program. The Northwest Education Association test called Measure of Academic Progress used to measure the students' academic progress was research-based. The students who participated were willing to work.

During the test sessions, students were given enough time to complete each test. The assessment results were accurate for each student. The proctors for each test were trained in how to administer both the Measurement of Academic Progress and the Washington Assessment of Student Learning. All tests were administered with appropriate testing conditions.

Hypothesis

Eighth grade students who passed the mathematics Measurement of Academic Progress with a Rasch Unit score of 227 or above in the fall would pass the mathematics portion of the Washington Assessment of Student Learning in greater numbers than students who did not pass the mathematics Measurement of Academic Progress in the fall.

Null Hypothesis

Eighth grade students who passed the mathematics Measurement of Academic Progress with a Rasch Unit score of 227 or above in the fall would not pass the mathematics portion of the Washington Assessment of Student Learning in greater numbers than students who did not pass the mathematics Measurement of Academic Progress in the fall.

Significance of the Project

The Washington Assessment of Student Learning was a requirement for high school graduation and receiving a diploma. The mathematics portion of the Washington Assessment of Student Learning had proven to be a difficult test for many students to pass. In fact, so many students were not passing the test that the legislature decided to get rid of the mathematics portion of the test as a graduation requirement, but the mathematics portion still remained for third through eighth grade students (Office of Superintendent of Public Instruction, n.d.).

Educators needed a test that would give immediate feedback and help to identify areas of need for students. The Measurement of Academic Progress gave educators immediate feedback and helped educators make decisions on what interventions to put in place for students of need. Therefore, the project was significant because educators would be able to identify which students would meet state standards and pass the mathematics portion of the Washington Assessment of Student Learning, and which students would not meet state standards but could benefit from interventions to get the students to standard.

Procedure

The fall Measurement of Academic Progress testing window started in October 2007, and ended November 30, 2007. During the test window, students could only take the reading, mathematics, and science portion of the test once because each day the results of the tests were uploaded to Northwest Evaluation Association, the assessment company that created the test. All 102 students participated in the mathematics assessment. The assessment was not timed, but for the sake of scheduling the students were given a 55 minute class period to complete the assessment. If the student was not finished after those 55 minutes, the teacher held the student into the next class period and sent the student to the student's next class when the assessment was complete. Each student took the test on a desktop computer and used a mouse to complete the test. The test was 55 multiple-choice questions that adjusted to the student's understanding as the test was being taken. The test started with one grade level question and, depending on the student's correct or incorrect response, the test adjusted until the student's level of understanding was found. A calculator appeared on the screen for questions that allowed a calculator, and scratch paper and pencil were provided for all students to use. A Rasch Unit score of 227 was considered to be on 8th grade level.

The Washington Assessment of Student Learning was administered in three different eighth grade classrooms during the student's second period class. Each teacher followed strict guidelines on administering the test. The classroom teachers removed or covered all posters on the walls. The test was not timed, but

the teachers had the students test for 40 minutes, gave the students a break, and had the students test for another 40 minutes. If the students were not done by the end of the 80 minutes, the students finished the tests in the library where the students had to eat lunch and stay until the test was completed. Students were able to use rulers and protractors. Calculators were only allowed during the first testing session. The assessment was comprised of multiple-choice, short answer, and extended response questions. Students who scored a 400 or more were considered to be meeting standard and passing.

Definition of Terms

benchmark. The benchmark was identified as the grade level standard.

criterion-referenced assessment. A criterion-referenced assessment evaluated students on mastery of the subject. Students' scores were based on how many questions were answered correctly.

Measurement of Academic Progress. The Measurement of Academic Progress was a computer-based multiple-choice test students took in mathematics. The test measured student knowledge of number sense, geometric sense, measurement, probability and statistics, and algebraic sense.

No Child Left Behind. No Child Left Behind was federally-mandated legislation that required state accountability systems to improve student performance.

norm-referenced assessment. The norm-referenced assessment scored students based on how well the student scored compared to other students that took the assessment.

Rasch Unit. A rasch unit was the unit of measure used by the assessment Measurement of Academic Progress.

Washington Assessment of Student Learning. The Washington Assessment of Student Learning was a criterion-referenced test administered by the state of Washington every April to the entire student population.

Acronyms

AYP. Adequate Yearly Progress

CTBS. California Test of Basic Skills

ESEA. Elementary and Secondary Education Act

GLE. Grade Level Expectation

IASA. Improving America's Schools Act

MAP. Measurement of Academic Progress

NCLB. No Child Left Behind

NWEA. Northwest Evaluation Association

OSPI. Office of Superintendent of Public Instruction

RIT. Rasch Units

RtI. Response to Intervention

TAC. National Technical Advisory Committee

WASL. Washington Assessment of Student Learning

CHAPTER 2

Review of Selected Literature

Introduction

The review of selected literature was narrowed to legislation on education reform, the Washington Assessment of Student Learning (WASL) and Measurement of Academic Progress (MAP), and the mathematics curriculum used in the school. The education reform legislation discussed involved the most current version of the Elementary and Secondary Education Act (ESEA), and the federal legislation called No Child Left Behind (NCLB). Assessment literature focused on the WASL and MAP because these were the two assessments that were being compared in the study. The last pieces of literature that were selected involved the mathematics curriculum, the Prentice Hall Pre-Algebra program.

Legislation on Education Reform

The No Child Left Behind Act of 2001 did not come as a surprise, when the history of education reform was examined. The first piece of legislation that dealt with education reform was the Elementary and Secondary Education Act (ESEA) of 1965. The ESEA of 1965 focused on giving funds to schools with poor and minority children to work on academic basics to improve student achievement and not work on job skills and training (Barone, 2007). The funding from the federal government was called Title I. The ESEA has been reauthorized every six years since 1965.

The next big step in education reform happened in 1983, when a report from the National Commission of Education called *A Nation at Risk* was released,

which began high-stakes testing and standards-based education reform (Amrein, 2002). *A Nation at Risk* reported that among all 17-year-olds in the United States 13 percent were functionally illiterate, 40 percent could not draw inferences from written material, only one-fifth could write a persuasive essay, and only one-third could solve a mathematics problem requiring several steps (Hoffman, 2003). *A Nation at Risk* also reported that remedial mathematics courses in four year colleges had increased by 72 percent, which took up one-fourth of all mathematics courses taught in four year colleges. The findings from *A Nation at Risk* were that the content in the curriculum was watered down and did not have a central purpose, there were no clear expectations in what was expected of students, time was ineffectively used by the schools and by the students, and teaching was not attracting enough "academically able students" in teacher preparation programs (Hoffman, 2003). The report recommended that in content areas a minimum foundation of English, mathematics, science, social science, and computer science were necessary; in expectations schools were to adopt measurable standards and higher expectations in academic performance; more time was to be devoted to learning foundation curriculum by a longer school day and year; and for teaching the report wanted improvement in teacher preparation courses (Hoffman, 2003).

In 1994, a new version of the ESEA was passed called the Improving America's Schools Act (IASA) (Bowe, 2005). The IASA coincided with the Goals 2000: Educate America Act, which called for a focus on all students, instead of just the disadvantaged students. The IASA required states to develop

content and performance standards; assessments that aligned with the content and performance standards in grade spans three through five, six through nine, and ten through twelve, with one grade from each span tested; and an accountability system that identified schools that were not helping all students meet standard on the assessments (Hoffman, 2003). The IASA left the accountability systems for the Title I programs up to the states to figure out (Bowe, 2005).

No Child Left Behind only added to the education reform legislation that was already in place from the years' past. The four main elements that NCLB added onto previous education reform legislation were that a single federal accountability system was used for all states; all students must meet standards by 2014; a set of sanctions were devised for schools and districts that did not meet standard; and sanctions were placed on a school, not just for a whole group not meeting standard. Other requirements for NCLB were that teachers must be highly-qualified to teach and all students in grades three through eight must be tested in reading and mathematics and show improvement under the Adequate Yearly Progress (AYP) provisions (Hoffman, 2003). High-stakes testing was of the utmost importance and schools had to show AYP to not be put into school improvement. In order to meet AYP, the district looked to MAP because MAP gave immediate feedback and was supposed to be a predictor of success on the WASL.

Washington Assessment of Student Learning (WASL)

In 1993, House Bill 1209 passed through the Washington State legislature. This bill required a change in the Washington State assessment system. House

Bill 1209 was the beginning of the WASL. The bill required that the new assessment system be criterion-referenced, phased-in with a mathematics assessment first, and participation was to be optional, then mandatory. The assessment was not biased toward race, gender, ethnicity, and learning style, and the needs of highly capable students had to be addressed (Washington Assessment of Student Learning, 2008).

House Bill 1209 also established state standards called the Essential Academic Learning Requirements (EALRs) and the Grade Level Expectations (GLEs). Essential Academic Learning Requirements were written for reading, writing, communication, mathematics, science, social studies, the arts, and health and fitness. Assessments were written for reading, writing, communication, mathematics, and science. Each assessment contained a variety of test items, which included multiple-choice, short answer, and extended response. The assessments were given to students in the fourth, seventh, and tenth grades (House Bill Report, n.d.). In 1997, fourth grade students piloted the reading, mathematics, writing, and listening assessments. Seventh grade students followed the fourth grade students in 1998, and tenth grade students followed in 1999. The science WASL was not implemented until 2002 for eighth and tenth grade students, and in 2003 for fifth grade students (Taylor, n.d.).

In 2001, NCLB was passed and new requirements were placed on the WASL. Students in grades three through eight and one time in high school had to be tested each year in reading and mathematics. Washington State chose tenth grade to test high school students because a test had already been established

(House Bill Report, n.d.). From 2002 to present, students were tested in reading and mathematics in third through eighth and tenth grade; writing in fourth, seventh, and tenth grade; and science in fifth (not in 2002), eighth, and tenth grade.

In 2004, the National Technical Advisory Committee (TAC) reviewed the validity and reliability of the WASL by using the technical requirements outlined by Standards for Educational and Psychological Testing. To show validity each content area within the WASL had to reflect each content area within the EALRs. The content areas were taught throughout the entire school year. The TAC reviewed reports on test development methods, item content review, item analyses, methods for setting performance standards, evidence for score and inter-rater reliability, evidence for validity of scores, methods of scaling and equating, annual descriptive data regarding statewide performance on the WASL tests, and statewide performance for students in categorical programs, by ethnic groups, and by gender. The TAC found that "the level of validity and reliability for reporting individual student and school results is acceptable for reading, mathematics, and writing" (National Technical Advisory Committee, 2004, p. 50). The TAC stated that "the test design and the test and item specifications for each individual year indicate that the items on the test adequately represent the EALRs for the state of Washington" (National Technical Advisory Committee, 2004, p. 50). The TAC also found that performance standards remained stable within subject and grade over time. Overall, the findings were that the reading, mathematics, and writing

WASL scales were stable over time (National Technical Advisory Committee, 2004).

Measurement of Academic Progress (MAP)

The Measurement of Academic Progress was a computerized multiple-choice test that had been in existence for over 20 years. The MAP was not the typical mastery test that presented all students with the same problems at a particular grade level. The MAP test was created to assess if a student had or had not met the benchmark for a particular grade level. The test was individualized according to the student's ability level. The purpose of MAP was to assess the student's instructional level (Instructional Measure, 2004-2008).

The MAP was a norm-referenced test that was composed of an equal-interval scale, like a ruler. Instead of inches on a ruler, the MAP had Rasch Units (RIT). Rasch Units were how the students were scored. The MAP test had over 15,000 items in the test bank, and each item was given a RIT value according to the item's level of difficulty. When a student took the test, the first question was a grade level question. Then, based on the student's correct or incorrect response, the test adjusted to find the student's ability level. As the student took the test, the student was asked a range of different RIT scored items. After the test had collected enough data on the student's ability, the test gave the student an overall RIT score that informed the teacher of the student's instructional level. The MAP test also scored students across grade levels, meaning that a third grade student could be asked above or below grade level questions depending on the student's ability level. This meant that if a third grade student and a fourth grade student

took the MAP test and received the same overall RIT score, the third and fourth grade students had the same ability level (Research-based Accuracy, 2004-2008).

The MAP had proven to be valid and reliable over time. The Northwest Evaluation Association (NWEA) evaluated MAP's reliability and validity over a course of 12 months. The NWEA performed a Pearson product-moment correlation coefficient on the MAP test. In a Pearson product-moment correlation, the minimum acceptable correlation was .80. A correlation was performed for each grade level starting at second grade and stopping at tenth grade. The findings were that each grade level, except for second grade, had a correlation in the mid 80s and mid 90s, which made the test reliable. The MAP test was also found to be valid over time. To prove this, NWEA used a Pearson product-moment correlation between another test that measured the grade level expectations in reading, mathematics, and language usage. The correlation was in the mid .80s, which proved the MAP to be valid (Reliability and Validity Estimate, 2004).

Prentice Hall Pre-Algebra Program

The Prentice Hall Pre-Algebra program was designed for eighth grade students. The textbook was divided into 13 chapters with several subsections in each chapter. Each chapter had at least one section called "Math Toolbox" or "Standardized Test Prep," where the students were exposed to using manipulatives, a graphing calculator, and standardized test questions. The beginning of the textbook had an overview that taught strategies that helped solve the problems in the textbook. The textbook also came with a kit of resources such

as entry tasks for each lesson, Daily Cumulative Reviews, two different versions of the chapter tests, a CD-ROM with all of the extra resources, and another set of practice problems for students that needed more practice with a particular concept (Davison, 2001).

Pearson Prentice Hall performed a program efficacy study to prove the superiority of the Prentice Hall program to other pre-algebra textbooks. The study was conducted in three states with 120 eighth grade participants. The study used a treatment group, who received the Prentice Hall Pre-Algebra program, and a control group, who received the other pre-algebra program. The study used a *t*-test with a pre-test and post-test to prove their significance. The test selected for the *t*-test was the TerraNova California Test of Basic Skills (CTBS) Complete Battery Plus. Before the students received instruction from the curricula, the pre-test was given in September 2000 and significance between the two groups was performed. The two groups were found to be of equal ability with a significance of 95%. In May 2001, the post-test was performed and the treatment group showed significant improvement in the test scores from the pre-test to post-test. The control group did not show significant improvement from pre-test to post-test (Prentice Hall Mathematics Grade 6-12, n.d.)

Summary

The literature reviewed for this project was legislation on education reform, the WASL, the MAP assessment, and Prentice Hall Pre-Algebra program used in the classroom where the study took place. The two pieces of legislation on education reform that had the greatest impact on the project were the IASA

and NCLB. The IASA required states to develop content and performance standards and assessments that aligned with the content and performance standards in each grade span. No Child Left Behind added to the IASA with a federal accountability system that came with sanctions or loss of funds for schools or districts that had not met the accountability system (Hoffman, 2003).

In response to IASA, Washington State enacted House Bill 1209, which created the EALRs and the WASL. The results for the WASL were given to districts and schools four months after the assessment was administered. Washington State also had responded to NCLB with an accountability system, known as school report cards, which reported how the schools performed on the WASL (House Bill Report, n.d.). Besides taking the WASL, many districts had turned to MAP testing, an alternative assessment that helped to inform instruction on a regular basis. The MAP assessment was administered to the students in the fall and spring and results that informed instruction were returned within 24 hours. The district had also informed teachers that the MAP assessment was a predictor of the WASL. The MAP assessment was a computerized multiple-choice test that adjusted to the student's ability level (Research-based, 2004-2008).

The last subset of literature reviewed was the Prentice Hall Pre-Algebra program used in the classroom in this study. The curriculum was compared to other pre-algebra curricula. At the time of publication, the Prentice Hall Pre-Algebra program was found to have a more significant impact on student

learning, compared to other pre-algebra curricula (Prentice Hall Mathematics Grades 6-12, n.d.).

CHAPTER 3

Methodology and Treatment of Data

Introduction

The study was performed on eighth grade students. A Chi Square was used to conduct the correlation of the project. A Chi Square was used to establish the possibility of statistical significance between the fall mathematics MAP and the WASL. The author wanted to prove the possibility that the fall MAP score predicted a student's success to pass the WASL.

Methodology

The research method for the project was a correlation study. The correlation study used a Chi Square for the statistical test that was performed. For the Chi Square, the author compared MAP and WASL scores. The statistical test was used to establish the relationship between MAP and WASL and the possibility that the relationship had statistical significance.

Participants

The participants in the study were 102 eighth grade students in the author's classes. The participants attended a middle school in Eastern Washington with sixth, seventh, and eighth grade students. In the 2007-2008 school year, the middle school was made up of 678 students from five different ethnic groups. The groups were 82.2% White, 9.1% Hispanic, 4.1% Black, 3.7% Asian, and 0.9% American Indian/Alaskan Native. Forty and seven-tenths percent of the school population was on free or reduced lunch and 12.7% was in special education. The school had 45 teachers on staff with an average experience

of 14.4 years. Sixty-eight and four-tenths percent of the teaching staff held Master's degrees. All of the teaching staff were considered highly qualified by No Child Left Behind standards (Report Card, 2008).

Instruments

The instruments used in the study were the MAP and WASL assessments. The MAP mathematics assessment was a computer-based test that was comprised of multiple-choice questions. Students were not timed and were allowed to use a calculator when a calculator appeared on the screen. The results of the MAP assessment were printed out immediately after the students finished the test. The author also used the NWEA report website where the MAP results were reported. The website allowed the author to view the students' results and the students' MAP testing history. The WASL mathematics assessment was a paper, pencil test created by the state of Washington. The assessment was comprised of multiple-choice, short answer, and extended-response questions. Students were not timed and were allowed to use calculators, scratch paper, and manipulatives at designated sections of the assessment. The WASL assessment was scored in two ways. The multiple-choice questions were scored by computer, but the short answer and extended-response questions were scored by more than one person. The results were received by the school district in August of 2008.

The MAP and WASL assessments were both found to hold validity and reliability. According to *Educational Research: Competencies for Analysis and Application*, validity was "the degree to which a test measures what it is intended to measure" (Gay, Mills, & Airasian, 2006, p. 603), and reliability was "the

degree to which a test consistently measures whatever it measures (Gay et al., 2006, p. 601). This meant that a test was valid if the test measured what was suppose to be measured, and a test was reliable if the test consistently measured what was supposed to be measured.

The MAP had proven to be valid and reliable over time. The NWEA evaluated MAP's reliability and validity over a course of 12 months. The NWEA performed a Pearson product-moment correlation coefficient on the MAP test. The findings were that each grade level, except for second grade, had a correlation in the mid 80s and mid 90s, which made the test reliable. The MAP test was also found to be valid over time. To prove this, NWEA used a Pearson product-moment correlation between another test that measured the grade level expectations in reading, mathematics, and language usage. The correlation was in the mid .80s, which proved the MAP to be valid (Reliability and Validity Estimate, 2004).

In 2004, the TAC reviewed the validity and reliability of the WASL by using the technical requirements outlined by Standards for Educational and Psychological Testing. To show validity each content area within the WASL had to reflect each content area within the EALRs. The TAC found that "the level of validity and reliability for reporting individual student and school results is acceptable for reading, mathematics, and writing" (National Technical Advisory Committee, 2004, p. 50). The TAC stated that "the test design and the test and item specifications for each individual year indicate that the items on the test adequately represent the EALRs for the state of Washington" (National Technical

Advisory Committee, 2004, p. 50). The TAC also found that performance standards remained stable within subject and grade over time. Overall, the findings were that the reading, mathematics, and writing WASL scales were stable over time (National Technical Advisory Committee, 2004).

Design

The design method used for the project was a correlation study. The fall mathematics MAP scores and the spring mathematics WASL scores were used to conduct the study. The author wanted to prove the validity of fall mathematics MAP scores predicting student success on passing the spring mathematics WASL. The author chose a Chi Square for the study to determine if the MAP and WASL assessments had a statistically significant relationship.

Procedure

The fall MAP testing window started in October 2007, and ended November 30, 2007. All 102 students participated in the mathematics assessment. The assessment was not timed, but for the sake of scheduling the students were given a 55 minute class period to complete the assessment. If the students did not finish, they were given more time. Each student took the test on a desktop computer and used a mouse to complete the test. A RIT score of 227 was considered to be on 8th grade level.

The WASL was administered in three different eighth grade classrooms during the student's second period class. Each teacher followed strict guidelines on administering the test. The test was not timed, but the teachers had the students test for 40 minutes, gave the students a break, and had the students test

for another 40 minutes. If the students were not done by the end of the 80 minutes, the students finished the tests in the library where the students had to eat lunch and stay until the test was completed. Students were able to use rulers and protractors. Students who scored a 400 or more were considered to be meeting standard and passing.

Treatment of the Data

The StatPak was used to calculate the data for the Chi Square. The data for the Chi Square was divided in five ways. The first way was the number of students who passed and did not pass the WASL. The second way was the number of students that passed the MAP and the WASL. The third way was the number of students that passed the MAP, but did not pass the WASL. The fourth way was the number of students that passed the WASL, but did not pass the MAP. The fifth way was the number of students that did not pass the MAP or the WASL. A two-dimensional Chi Square was performed (StatPak).

Summary

In the fall of 2007, eighth grade students took the MAP mathematics assessment. Then, in the spring of 2008, eighth grade students took the mathematics WASL assessment. The students' MAP and WASL scores were compared to conduct the correlation study. To compare the scores, the author used a Chi Square to find if the MAP and WASL assessment had a statistically significant relationship.

CHAPTER 4

Analysis of the Data

Introduction

The project involved 102 eighth grade students. The parameters of the project were maturation, testing materials, and Response to Intervention (RtI) tiering of the students. The hypothesis and null hypothesis were addressed. The MAP and WASL test data was analyzed by a Chi Square correlation, where results were represented in a table.

Description of the Environment

The project took place in a low-income middle school and involved 102 eighth grade students. Parent involvement was minimal. The students were of mixed ability levels. Some of the students were below grade level in mathematics and considered special education students, some were at grade level, and some were above grade level. The project was conducted between the time periods of October 2007, when the fall Measurement of Academic Progress was administered, to April 2008, when the spring Washington Assessment of Student Learning was administered.

Another parameter of the project involved the testing materials and the administering of the test. The Measurement of Academic Progress was a norm-referenced computerized multiple-choice test where students received immediate feedback upon completion of the test. The students took this test in the computer lab on desktop computers. The test took place during a regular school day. Every 55 minutes a bell signaled the beginning and ending of class. During this time,

the hallway was noisy for four minutes as students were entering the computer lab because the students were in the author's next class. Other students who were finished taking the test were exiting to go to their next class.

The Washington Assessment of Student Learning was a criterion-referenced test administered with pencil, paper, and lengthy directions. For the mathematics portion of the tests, students were allowed to use calculators, rulers, and protractors, which each student had. The students were not allowed to get up during the test sessions. The Washington Assessment of Student Learning was administered in the students' second period classroom. To accommodate for special education students, one second period eighth grade class was spread among three other second period eighth grades classes with a teacher familiar with the students.

The next parameter was maturation. Maturation was not an issue in this study because the study focused on the fall MAP score to predict the students' ability to pass the WASL. The project did not implement a new instructional strategy or manipulate a variable over the course of the school year to try to get students to pass. Students could have passed the WASL because of the new learning that occurred over the course of the school year, but the WASL tested the students' understanding in many areas that were taught in grades previous to eighth.

The last parameter was RtI. All of the students in the entire school were placed in mathematics, science, language arts, and social studies according to reading MAP scores. This allowed the students to be grouped according to

reading ability. Each class had a six point range in reading MAP scores. The mathematics classes did not have a six point range in mathematics MAP scores. The mathematics classes had a 50 point range, which made the classes mixed in ability. To accommodate the RtI tiering process, the author took all of the students that had a mathematics RIT score of 210 or lower and put the students into the same class. This created a class with very low mathematics abilities and a high number of special education students because the school had also gone to full inclusion in the fall of 2007. This change allowed the author to have more of a true RtI tiering system with Tier I, Tier II, and Tier III students in the same class where more accommodations occurred.

Hypothesis

Eighth grade students who passed the mathematics Measurement of Academic Progress with a Rasch Unit score of 227 or above in the fall would pass the mathematics portion of the Washington Assessment of Student Learning in greater numbers than students who did not pass the mathematics Measurement of Academic Progress in the fall.

The table showed data from the Chi Square performed on the students' fall mathematics MAP scores and the spring mathematics WASL scores. The hypothesis was supported by the table because statistical significance was reached in this correlation between the MAP and WASL assessments. Therefore, the hypothesis was accepted.

Null Hypothesis

Eighth grade students who passed the mathematics Measurement of Academic Progress with a Rasch Unit score of 227 or above in the fall would not pass the mathematics portion of the Washington Assessment of Student Learning in greater numbers than students who did not pass the mathematics Measurement of Academic Progress in the fall.

The table showed the analysis of the data from the Chi Square performed on the students' fall mathematics MAP scores and the spring mathematics WASL scores. The data showed that statistical significance was reached in this correlation between the MAP and WASL assessments. Therefore, the null hypothesis was rejected.

Results of the Study

Table 1.

Chi Square Correlation of Fall MAP and Spring WASL Mathematics Scores

WASL score	Passed (27)	Did Not Pass (75)
Passed MAP	24	21
Did Not Pass MAP	3	54
df=1	x^2=30.8533	p<.001

The two-dimensional Chi Square correlation was used to calculate the data to find statistical significance. The table was divided into two columns by the number of students that passed the WASL and the number of students that did not pass the WASL. The data was also divided into two rows by the number of

students that passed the MAP and the number of students that did not pass the MAP. This created four cells within the table. The first cell was the number of students that passed the WASL and the MAP. The second cell was the number of students that did not pass the WASL, but passed the MAP. The third cell was the number of students that passed the WASL, but did not pass the MAP. The fourth cell was the number of students that did not pass the WASL or the MAP. All of the data was calculated in the two-dimensional Chi Square that was run through the StatPak to see if the MAP and WASL scores had a statistically significant relationship. The degree of freedom was 1 and the Chi Square value was 30.8533 (StatPak). The level of significance was checked by using Table A.6 Distribution of X^2 in *Educational Research: Competencies for Analysis and Applications.* The author found 30.8533>3.841 at the p-value of .05, which meant the level of significance was less than 95%. The author went to the last column of Table A.6 and checked the Chi Square value to the p-value of .001 and found 30.8533>10.827, which meant that statistical significance was found at 99.9% (Gay et al., 2006).

Findings

The analysis of the data demonstrated that there was a statistically significant relationship between fall mathematics MAP scores and spring mathematics WASL scores. The data supported the hypothesis of the project, which was accepted. Therefore, the null hypothesis was rejected.

Discussion

The author tested the same hypothesis as a project that was done the previous year. The author expected to find that the null hypothesis was accepted because the previous project did not support the hypothesis. A limitation of the previous project was the number of participants was at 25, which was a small sample to test the hypothesis. For this project, the author was able to use a larger sample of 102 participants.

Summary

The purpose of the project was to find statistical significance between fall mathematics MAP scores and spring mathematics WASL scores. The parameters of the project were testing materials, maturation, and RtI tiering of the students. The data was entered into a Chi Square correlation, which proved a statistical significance of 99.9%. This showed that there was a significant relationship between fall MAP scores and spring WASL scores. The hypothesis was supported by these findings and the null hypothesis was rejected.

CHAPTER 5

Summary, Conclusions and Recommendations

Introduction

The purpose and nature of the research project were re-emphasized. The findings were discussed and recommendations were made. The project found a statistically significant relationship between fall mathematics MAP scores and spring mathematics WASL scores. Final conclusions were made and reiterated in the recommendations for the project.

Summary

Legislation on education reform had been occurring for many years. In 1994, the IASA was passed. The IASA required states to create content and performance standards and an assessment that aligned with the standards, which allowed the standards to be measurable. In 2001, the IASA was altered by the passage of NCLB. NCLB added to IASA by creating a single federal accountability system that placed sanctions on schools and districts that did not meet AYP (Hoffman, 2003).

The Washington State legislature passed House Bill 1209 in 1993 in response to the IASA. From this House Bill, the EALRs and WASL were created. The WASL was a criterion-referenced assessment created for the EALRs and continued to be the chosen assessment to meet AYP (Washington Assessment of Student Learning, 2008).

The WASL was given once a year and performance scores were reported to districts in four months. The stakes for many districts were very high and four

months was a very long time for many districts to wait on test scores. The districts needed a test that gave immediate feedback and would help with predicting the students' potential of passing the WASL. Many districts turned to the MAP test. The MAP test was used as a predictor for passing the WASL and the test gave immediate feedback, which guided instruction.

The Prentice Hall Pre-Algebra program was examined in the project as well. The Pre-Algebra program was research-based and found to be superior to other pre-algebra textbooks published at the same time.

The purpose of the project was to prove that the fall mathematics MAP was a predictor to passing the spring mathematics WASL. The study was performed on 102 eighth grade students. The author hypothesized that the students that passed the fall mathematics MAP with a RIT score of 227 or higher would pass the spring mathematics WASL. All of the students received the same curriculum and instruction throughout the school year and the Tier 3 students received a more interventions in gap areas. The students' test scores were used to run a Chi Square correlation to determine the statistical relationship between MAP and WASL. The parameters of the project involved maturation, testing materials, and RtI tiering of the students.

The analysis of the data proved that a statistically significant relationship existed between the fall mathematics MAP and the spring mathematics WASL. Therefore, the hypothesis was accepted and the null hypothesis was rejected. The Chi Square correlation was represented in a table and results showed statistical significance at the .001 level, which means the project was 99.9% significant.

Conclusions

The results of the data analysis showed a statistically significant relationship between fall mathematics MAP scores and spring mathematics WASL scores. A Chi Square value of 30.8533 showed statistical significance to the .001 level. Therefore, a student that scored 227 or higher on the fall mathematics MAP had a significantly better chance of passing the spring mathematics WASL than a student that did not pass the fall mathematics MAP. Of the students that did not pass the fall mathematics MAP, only three students out of 57 students passed the spring mathematics WASL. This finding was of major significance to the project.

Recommendations

Based on the conclusions, the author recommends that the study be replicated. This project was a replication of a previous project that did not find a significant relationship. The previous project participants were 25 fourth grade students, which was a limitation of that project. In order to properly replicate this project, the same size sample or a larger sample of participants needs to be a key ingredient. The replication could take place in any grade level because the hypothesis is supposed to hold true for any grade level that the MAP tests. The author recommends using the entire grade level's data, not limiting the project to the person replicating the project's own students. There would need to be similarities in ethnicity, environments, and special education students. The person replicating the project would also need to follow the same procedures.

The second recommendation is for the students that did not pass the fall mathematics MAP. The students that did not pass need strategic and intensive interventions in the students' gap areas identified by the MAP. The author would identify those areas and put in place interventions to get the students up to grade level. The interventions would need to be progress-monitored at least every two weeks with a research-based test. The author would also monitor the students' progress every six weeks with the MAP test to determine if the interventions were working. If the students were not progressing in six weeks, the interventions would need to be changed.

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APPENDIX

2007 Fall Mathematics MAP Scores and 2008 Spring Mathematics WASL Scores

Student	2007 Fall MAP Score	Passed with a score of 227	2008 Spring WASL Score	Passed with a score of 400
1	221	N	376	N
2	235	Y	378	N
3	233	Y	402	Y
4	233	Y	402	Y
5	198	N	351	N
6	215	N	341	N
7	252	Y	416	Y
8	220	N	383	N
9	217	N	366	N
10	223	N	390	N
11	214	N	381	N
12	219	N	366	N
13	235	Y	390	N
14	226	N	385	N
15	232	Y	423	Y
16	218	N	409	Y
17	226	N	392	N
18	216	N	392	N
19	231	Y	360	N
20	232	Y	402	Y
21	217	N	341	N
22	236	Y	416	Y
23	236	Y	426	Y
24	225	N	360	N
25	222	N	348	N
26	241	Y	405	Y
27	215	N	381	N
28	204	N	319	N
29	197	N	293	N
30	212	N	337	N
31	223	N	354	N
32	198	N	351	N
33	222	N	314	N
34	221	N	337	N
35	210	N	368	N
36	199	N	329	N
37	192	N	329	N
38	225	N	376	N
39	205	N	360	N

40	208	N	368	N
41	206	N	337	N
42	208	N	324	N
43	219	N	348	N
44	207	N	314	N
45	225	N	368	N
46	208	N	381	N
47	210	N	376	N
48	238	Y	418	Y
49	222	N	378	N
50	223	N	368	N
51	235	Y	409	Y
52	232	Y	392	N
53	219	N	368	N
54	212	N	375	N
55	229	Y	407	Y
56	235	Y	414	Y
57	229	Y	383	N
58	222	N	348	N
59	235	Y	402	Y
60	223	N	392	N
61	222	N	341	N
62	227	Y	375	N
63	237	Y	387	N
64	230	Y	381	N
65	216	N	390	N
66	219	N	354	N
67	209	N	366	N
68	228	Y	366	N
69	228	Y	378	N
70	223	N	357	N
71	210	N	354	N
72	227	Y	385	N
73	227	Y	360	N
74	239	Y	405	Y
75	235	Y	423	Y
76	231	Y	371	N
77	234	Y	407	Y
78	248	Y	426	Y
79	224	N	378	N
80	236	Y	405	Y
81	226	N	414	Y
82	250	Y	478	Y
83	241	Y	432	Y
84	238	Y	376	N

85	222	N	357	N
86	227	Y	392	N
87	218	N	357	N
88	223	N	381	N
89	220	N	409	Y
90	234	Y	381	N
91	222	N	345	N
92	244	Y	411	Y
93	237	Y	394	N
94	239	Y	396	N
95	245	Y	414	Y
96	229	Y	402	Y
97	215	N	381	N
98	230	Y	418	Y
99	202	N	324	N
100	239	Y	390	N
101	236	Y	394	N
102	228	Y	376	N