The Effects of After School Math Programs and *Measures of Academic Progress* on Fourth Grade Students

A Special Project

Presented to

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Heritage University

In Partial Fulfillment

of the Requirement for the Degree of

Master of Education

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July 2010

FACULTY APPROVAL

The Effects of After School Math Programs

and *Measures of Academic Progress* on Fourth Grade Students

Approved for the Faculty

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ABSTRACT

A study was conducted to examine if an improvement in student scores on the standardized *Measures of Academic Progress* assessment would result from students being enrolled in and participating in an after school mathematics club. Seventeen students were used for this study. An analysis of fall and winter *Measures of Academic Progress* test scores was used to determine whether significant progress was made by the students. After examining the data from the fall and winter test scores of the students included in this study, the researcher found that significant improvement was noted in the majority of students participating in the after school mathematics club.

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TABLE OF CONTENTS

Page

Page

Page

LIST OF TABLES

Page

CHAPTER 1

Introduction

Background for the Project

In the school district of the researcher, the mathematics and reading *Measures of Academic Progress* assessments were given in the fall, winter, and spring. These assessments were formative and the fall assessment served as a baseline for the winter and spring assessments, which were used to measure significant growth.

Over the past five years, the mathematics curriculum *Everyday Math* had been used with little or minimal success. *Everyday Math* was a spiraling curriculum that did not teach to mastery, but instead relied on brief lessons repeated each year during the student's time while attending elementary school. Given the district's high population of English language learners and migrant students, *Everyday Math's* spiraling curriculum was not suited to the district's many transfer students that came and left throughout the school year, or for the English language learners struggling to learn English. Overall, the district's mathematics scores continued to remain well below average and were stagnating.

With the help of the Summit Group, funding was provided for a new mathematics curriculum in the district. The *Math Connects* curriculum was chosen after a mathematics adoption committee selected the program as the best

mathematics curriculum aligned to the state standards. A program taught to mastery, *Math Connects*, was thought to be better suited to the students in the district, because it gave the students more time to learn and master mathematics concepts before moving on to the next concept.

Statement of the Problem

In the school district of the researcher, a new mathematics program, *Math Connects*, was adopted in the fall of 2009, for students in kindergarten through fifth grade. Low mathematics scores by students on the *Washington Assessment of Student Learning* and the *Measures of Academic Progress* led the researcher to question whether after school mathematics clubs would affect student learning and increase assessment scores on the *Measures of Academic Progress.*

Purpose of the Project

The purpose of the project was to analyze the effect an after school mathematics club, focusing on numbers and operations, would have on student learning. The fall and winter *Measures of Academic Progress* assessment, numbers and operations strand, would be used to measure, record, and document student growth.

Delimitations

In the elementary school of the researcher, 17 fourth grade students were selected for the study. The group consisted of six boys and 11 girls. Of the 17

students who participated in the study, 15 students were Hispanic and two students were Caucasian.

Assumptions

Everyday Math was adopted in the school of the researcher in 2004. *Everyday Math's* spiraling curriculum design was intended for individual students that would remain in the same school for the duration of the kindergarten through sixth grade education. In the district of the researcher, many students were often withdrawn from school and removed from the attendance rolls in the middle of the academic school year to travel to Mexico, only to return months later to reenroll back at the same school resulting in a huge gap in the individuals' educational process. The *Everyday Math* curriculum also did not have specific intervention materials as part of the *Everyday Math* curriculum, which left teachers at a loss for acquiring any type of intervention material available in order to fill individual student's educational gaps.

A new curriculum, *Math Connects,* was adopted by the district of the researcher in 2009. Unlike the spiraling curriculum of *Everyday Math*, *Math Connects* taught to mastery and gave students in the district an opportunity to master concepts before moving away. *Math Connects* also came with strategic intervention materials designed to assist low scoring students. The researcher then used these *Math Connects* intervention materials in an after school

mathematics club to increase the numbers and operations strand scores of students who scored low in those areas on the fall *Measures of Academic Progress* assessment.

Hypothesis or Research Question

The fourth grade students of the researcher, attending the after school mathematics club, would have greater than expected gains in the area of numbers and operations when measured by the winter *Measure of Academic Progress* assessment.

Null Hypothesis

The fourth grade students of the researcher, attending the after school mathematics club, would not have greater than expected gains in the area of numbers and operations when measured by the winter *Measure of Academic Progress* assessment.

Significance of the Project

The purpose of the project was to determine whether a focused after school mathematics club could effectively improve student learning and provide greater than expected academic gains. If the results were positive, the school of the researcher could adopt the methods to increase student achievement throughout all grade levels by implementing the successful teaching strategies used in the after school mathematics clubs.

Procedure

The *Measures of Academic Progress* mathematics assessment was given in the fall of 2009 to all fourth grade students. The results were then evaluated to identify specific areas where students scored low. The *Measures* of *Academic Progress* strand, entitled numbers and operations, was by far the strand in which students scored the lowest. Students close to achieving the median score on the mathematics *Measures of Academic Progress* assessment, and also scoring low in the strand, numbers and operations, were selected to participate in an after school mathematics club. The mathematics club focused exclusively on numbers and operations for a period of eight weeks, and met two days per week. At the end of the eight week period, the winter mathematics *Measures of Academic Progress* assessment was given. The results of the winter *Measures of Academic Progress* assessment were then analyzed to see if the students that participated in the after school mathematics club increased scores in the strand of numbers and operations.

Definition of Terms

The following terms were used throughout this research project. The terms were defined for their application of this project.

alignment of curriculum. Alignment of curriculum occurs when curriculum is arranged parallel to performance expectation.

differentiated instruction. Differentiated instruction is instruction which requires accommodating differences to help all students learn.

interventions. Interventions occur when an instructor sees that a student is in need of help in a subject above what can be given in one class period. At that time the instructor will arrange for extra time to be spent teaching the student outside of the prescribed time of instruction.

math club. Math club is an after-school program made up of students who scored low on the numbers and operations strand on the MAP assessment.

meta-anaylsis. Meta-analysis combines the results from earlier research studies on a given topic to determine the average effect on the intervention (Edwards, Lois, 2009).

No Child Left Behind Act of 2001. The No Child Left Behind Act is federal legislation that enacts the theories of standards-based education reform, which is based on the belief that setting high standards and establishing measurable goals can improve individual outcomes in education. The Act requires states to develop assessments in basic skills to be given to all students in certain grades, if those states are to receive federal funding for schools. The Act does not assert a national achievement standard; standards are set by each individual state (Lewis, B. 2010).

Acronyms

The following section included a list of acronyms which were included in chapters two through five of the project.

Acronyms

AYP. Annual Yearly Progress.

ELL. English Language Learner.

MAP. Measures of Academic Progress.

ME. Multicultural Education.

NWEA. Northwest Evaluation Association.

OSPI. Office of Superintendent of Public Instruction.

PE. Performance Expectation.

WASL. Washington Assessment of Student Learning.

CHAPTER 2

Review of Selected Literature

Introduction

For the purpose of this project, literature addressing student progress on standardized testing was addressed via an after-school intervention math club. Areas which were examined included the Northwest Evaluation Association and its benefits, the Measures of Academic Progress or MAP test which was given throughout the nation to students in a variety of districts, alignment of state standardized scores with RIT scores which were developed for use with the MAP tests, achievement gaps and how this was reflected on standardized testing, Math Connects, a new mathematics curriculum which the author's school district adopted the previous year and how and why intervention strategies worked or did not work with elementary students. The literature addressed was used to develop background as to why or why not an after-school mathematics club would or would not increase test scores for students in the fourth grade.

Northwest Evaluation Association

School districts are always in need of a way to show to parents as well as state and federal authorities that students have learned. Standardized testing was a traditional way in which this was done. However, there were constant disagreements with the accuracy and fairness of standardized testing. Do

standardized tests show what any student has learned or will only Anglo-Saxon upper middle class students who have been exposed to certain activities and vocabularies do well? Because of this and other questions, the Northwest Evaluation Association was formed. The Northwest Evaluation Association, (NWEA) was created as a nonprofit organization based in Portland, Oregon. NWEA was founded in 1977 as a company that was dedicated to helping all kids learn. The organization created an assessment tool to measure and track student progress. With more than 3,400 partners in all 50 states, nearly 4 million students take NWEA assessments each year. These assessments were known as Measures of Academic Progress or MAP (Our History: Northwest Evaluation Association (NWEA), 2008.). Information collected from these assessments were then placed into the Growth Research Database (GRD), so assessment results of districts with similar demographics could be compared (Ezarik, 2005). The Growth Research Database includes over 4.5 million pieces of information that can be aggregated for socio-economic, race, and gender (NWEA Media Fact Sheet: Northwest Evaluation Association (NWEA), 2008). This information helped districts allocate resources so that those resources, in the form of teachers or supplies, were best used to benefit all students within a school district.

Measures of Academic Progress

The Northwest Evaluation Association (NWEA) developed an assessment called Measures of Academic Progress. The *Measures of Academic Progress,* (MAP) assessments, were online assessments, given in the fall, winter, and spring, to measure student growth over the course of the year (Dessoff, 2008). MAP assessments were given in the subjects of mathematics, reading, language arts, and science for grades 3 through 12. A primary version was also available for grades K through 2. School districts had the opportunity to select the MAP assessment areas needed to be assessed. The mathematics MAP assessment results were broken down into four categories or strands. The strands were; numbers and operations, algebra, geometry and measurement, and probability and data.

The MAP assessment was computer–adaptive, drawing from a large database of questions which were then adapted to the student's unique abilities and the questions subsequently became harder or easier depending on the student's ability to answer the previous question (NWEA Media Fact Sheet: Northwest Evaluation Association (NWEA), 2008). The MAP assessment was not designed for determining mastery of skills. However, the results provided the instructor or administrator scope and sequence information toward achieving mastery. The design of the MAP assessment was to have challenging, and developmentally

appropriate questions which provided accurate data to measure growth. The assessment was untimed, but students usually took approximately 30-40 minutes to complete the assessment. Immediate results were given to both the student and the teacher and objective results were given within 24 hours (Dessoff, 2008). The data from the assessment was then used to make informed decision about instruction. As Raymond Yeagley, vice-president of product and business development, Northwest Evaluation Association states, "Just taking a test doesn't make a kid learn more. It's how you use the data in your classroom instruction that will make a difference," (Dessoff, 2008). Proper instructions needed to improve student learning and that's reflected and shown in higher tests scores. The forms of instruction were classroom instruction or through after-school programs such as the one researched in this paper.

Northwest Evaluation Association RIT and Washington Assessment of Student Learning Alignment

At the point in time when this project was being created the state of Washington was changing the standardized testing procedure. At the beginning of this project the Washington Assessment of Student Learning (WASL) was the title of the standardized test that was given to students in grades 3-12. During the completion of this project the standardized testing was changed. The test was similar, but shortened and was called the *Measurement of Student Progress*

(MSP) for students in grades 3-8 and *High School Proficiency Exam* (HSPE) for students in high school (State Testing- OSPI, 2010). As the MSP and HSPE are in the initial stages, no literature was available at the time of the implementation of the project. Therefore, the research was limited to information pertaining to the WASL and the MAP and the alignment of the scores from the assessments and how student growth was revealed within the project.

In 2007, NWEA developed a scale which would connect the WASL and the MAP tests. The study was used to "establish performance-level scores on the RIT scale that would indicate a good chance of success on these tests" (Dahlin, 2007). The scores linked aggregated WASL scores with NWEA test results for all schools whose NWEA test count for a grade and subject was between 95% and 105% of the count tested on the WASL. This made it so that schools which had similar populations on both test were included (Dahlin, 2007). The Northwest Evaluation Association scored students using a Rausch or RIT scale. The RIT scores were used to determine where students placed in one of the four categories: (a) well below standard, (b) below standard, (c) meets standard, and (d) above standard. Fourth grade students with fall mathematics scores well below standard scored less than 195 points, while students below standard scored 195 points. Students that were in the meets standard category scored 202 points while students in the above standard category scored 211 points. Students scoring well

below standard and below standard were then to be identified for additional interventions. In the spring, students were tested again and students who were well below standards scored less than 201 points. Students that scored in the meets standards category scored 209 points, while students scoring in the above standards category scored 220 points. The cut scores were the result of an alignment between the NWEA and WASL assessments using an equipercentile method to estimate the equivalent RIT score and the Washington state performance level (Dahlin, 2007). This meant that if 40% of the study population in grade three mathematics performed below the proficient level on the WASL the RIT score that was equivalent to the 40th percentile for the study population would be used. This was not the same as the 40th percentile on the NWEA norms (Dahlin, 2007).

Northwest Evaluation Association and Achievement Gaps

In a study conducted by the Northwest Evaluation Association, researchers concluded there are definite achievement gaps between students from different socio-economic groups. When compared, students in poor schools showed less growth than students from more affluent schools (Northwest Evaluation Association announces research on achievement gaps, 2006). "This study should be a wake-up call for educators, as it reveals real differences in student achievement based on socio-economic status," said Allan Olson, president of

NWEA. For the study, researchers used 569,564 students for reading and 542,057 students for mathematics in 24 states. The study also showed African-American and Hispanic students showed less growth than the European-American peers. "This study shows that minority and non-minority students who start at the same place are growing at different rates, so the achievement gap between them actually widens over time," said NWEA's Chief Research and Development Officer, G. Gage Kinsbury, Ph.D (Northwest Evaluation Association announces research on achievement gaps, 2006).

Math Connects

The *No Child Left Behind Act* of 2001, mandated that federal funds be used for instructional materials that have been show to be scientifically based with proven evidence of effectiveness. It was with this mandate in mind and the fact that in 1989, the National Council of Teachers of Mathematics developed the first kindergarten through twelfth grade mathematics curriculum standards that the researcher's school district adopted *Math Connects* as the district elementary mathematics curriculum (Appendix: Table of Standards - Number and Operation, 1989).

The mathematics curriculum, *Math Connects*, was created for both an elementary and a middle school program. In the district of the researcher, the mathematics curriculum, *Math Connects*, was adopted as a kindergarten through

fifth grade mathematics program. The top twelve mathematics curricula were researched and ranked in order of effectiveness. The mathematics curriculum with the highest final composite score of 0.724 was *Math Connects* (2008 mathematics k-8 core/comprehensive instructional materials review, 2008).

The other mathematics curricula that were reviewed by the Office of Superintendent of Public Instruction were as follows: (a) *Bridges in Mathematics* with a composite score of .687, (b) *Investigations* with a composite score of .635, (c) *Math Expressions* with a composite score of .621, (d) *Everyday Mathematics* with a composite score of .593, (e) *Saxon Math (Elem.)* with a composite score of .581, (f) *Growing with Mathematics* with a composite score of .575, (g) *Envision* with a composite score of .568, (h) *Progress in Math* with a composite score of .547, (i) *Math Out of the Box* with a composite score of .521, (j) *Math Trailblazers* with a composite score of .521, and (k) *Singapore Math Standards* with a composite score of .365 (2008 mathematics k-8 core/comprehensive instructional materials review, 2008). The categories in which these curricula were reviewed were: (a) content/standards alignment, (b) program organization and design, (c) balance of student experience, (d) assessment, (e) instructional planning and professional support, as well as (f) equity and access. (2008 mathematics k-8 core/comprehensive instructional materials review, 2008). From the scores in these categories a composite score was developed. Thus schools

could compare curricula looking at what the specific district needed and gage what would be the best choice for the school district.

Intervention Strategies

A common thought throughout the education community was that if a student was having difficulty with a subject, additional help or interventions would remedy the situation. Structured after-school activities have been associated with higher educational outcomes (Coden, M., Morrison, G., Gutierrez, L., & Brown, M., 2004). The researcher's project was based on this commonly held belief. Several reasons are believed to mediate this belief. These reasons include; other children, teacher factors, such as increases in the child's self-esteem and school bonding and changes in teacher perceptions regarding the effort and capabilities of the student (Coden, M., et al.,2004). Students do better academically when the students feel comfortable or at ease. Students spending time in rigidly or loosely structured after-school programs begin to feel at ease in the school environment, thus an important goal was to create an atmosphere where the students were more comfortable learning and were not as worried about doing or saying the wrong thing. Two studies quoted in "The Effects of Homework Programs and After-School Activities on School Success" stated that the studies found that participation gave students greater confidence in the students abilities and provided an opportunity to develop positive, school related, adult attachments.

These studies suggested that homework completion positively effected students' perceptions of themselves and teachers' expectations of students in a meaningful way.

Not only were the students increasing overall abilities in a given subject, but the students were beginning to understand that someone outside the student's families believed that the students were worthwhile. Self-esteem was enhanced resulting in the student's willingness to try different and more difficult tasks. After-school programs which were designed to build self-esteem had positive effects on standardized test scores where just receiving extra school time to complete homework did not have the same positive effect on student achievement (Coden, M., et al.,2004).

There were some drawbacks to after-school interventions. One of these was taking the parent out of the homework "loop" leading to reduced opportunities for the parent to communicate with the school about the child. Parents often felt inadequate when they discussed their child with staff members, but after-school interventions have been adapted to create conversations with the parent just as any school related activity can. One variable was that individual teacher or staff could have been a drawback depending on member involvement. Another obstacle to after-school interventions was that the homework support was not always coordinated with the classroom teachers. There must be some type of

communication to make the interventions successful. Also, required participation in homework activities may prevent participation in other activities that would benefit student bonding to peers and school (Coden, M., et al., 2004).

Summary

Through the research, the author has found that the Northwest Evaluation Association has developed an assessment known as the Measure of Academic Progress or MAP test and that this assessment was aligned with the state standardized test or WASL which has now been changed to MSP a shorter modified version of the WASL. This MAP test was used by the researcher to show growth by the students who participated in the project. Research was also done on achievement gaps and how this affects student performance on standardized testing. The researcher also looked at the research on *Math Connects* the curriculum that was adopted by the district of the researcher. The researcher looked at why this curriculum would be better than others proposed and how it would help students meet the goals for achievement that had been set for them. Finally, information on intervention strategies was examined. It was shown through the research that extra help through after-school programs does effect achievement in students who struggle in mathematics. The entirety of the topics researched helped to develop the premise that after-school programs will have an effect on standardized testing.

CHAPTER 3

Methodology and Treatment of Data

Introduction

In the school of the researcher, the researcher wanted to determine whether after school mathematics clubs had positive effects on student learning. Students were given the fall mathematics *Measures of Academic Progress* assessment to establish a baseline for future growth. Student growth and achievement was measured using the numbers and operations strand on the winter mathematics MAP assessment.

Methodology

The research method used by the researcher on this project was quantitative. Fall and winter mathematics MAP assessments were used. The strand numbers and operations was used to measure student growth on the fall and winter mathematics MAP assessments. Student's fall and winter scores were then compared and used to determine the effectiveness of the after school mathematics program.

Participants

In the elementary school of the researcher, 17 fourth grade students were selected for the study. The group consisted of six boys and 11 girls. Of the 17 students who participated in the study, 15 students were Hispanic and two

students were Caucasian. Two Hispanic females and one Caucasian male moved out of the district before taking the winter MAP assessment and were excluded from the study.

Instruments

Fall and winter mathematics MAP assessments were used. The strand of numbers and operations on the fall and winter mathematics MAP assessment was used to measure student growth. A *t*-test was used to record student results.

Design

In the month of September 2009, the fall mathematics MAP assessment was given to students as a pre-test. In the month of January 2010, the winter mathematics MAP assessment was given to students as a post-test. A *t*-test was used to determine the amount of growth obtained by students and to verify the effectiveness of the after school mathematics program.

Procedure

In the school of the researcher, all fourth grade students were given the fall mathematics MAP assessment. Students scoring low in the numbers and operations strand with overall mathematics RIT scores between 185 and 205 were selected for the after school mathematics club. A total of seventeen students were selected to participate in the after school program. Students were then given a pretest to determine each individual student's needs. The mathematics curriculum

Math Connects Intervention Program was used as the primary source of curriculum and materials for the after school mathematics club. Students in the after school mathematics club met for an hour after school, two days a week, for a period of eight weeks. At the end of the eight week period, students were given a post-test, which was identical to the pretest, so students were able to visibly see how much improvement was made from the beginning to the end of the after school mathematics club. Students were then given the winter mathematics MAP assessment. A *t*-test was then used to record and compare student scores in the strand numbers and operations on the fall and winter mathematics MAP assessment, documenting student growth.

Treatment of the Data

The fall and winter mathematics MAP assessment was given to students in the computer lab, by the computer lab teacher. The classroom teacher stayed in the computer lab while students tested to monitor the testing process. At the completion of the winter testing a *t*-test was used to compare student's fall and winter mathematics MAP assessment scores in the strand of numbers and operations.

Summary

This study was developed in order to find out if an after school mathematics club would aid students in the development of mathematics skills which could

then be quantitatively measured through examination of data comparing scores from a pre and post MAP assessment. The strand that was used for comparison was the numbers and operations strand. The numbers and operations strand was examined in both the fall and winter testing cycles. Students who scored within the range of 185 to 205 were included in the study. A total of seventeen students were included in the study, of which fifteen were Hispanic and 2 Caucasian. Students met twice weekly for 1 hour for a period of 8 weeks. At the end of the 8 weeks students were given the post test, by the computer lab teacher with the classroom teacher present as well. The data was then compared using a *t*-test.

CHAPTER 4

Analysis of the Data

Introduction

Seventeen low scoring students on the fall mathematics *Measures of Academic Progress* assessment, in the strand numbers and operations, took part in a study to determine the effectiveness of after school mathematics programs. The study was conducted over a period of eight weeks with the winter mathematics MAP assessment given as a post-test to measure student growth when compared to the fall mathematics MAP assessment.

Description of the Environment

In the elementary school of the researcher, 17 fourth grade students were selected for the study. The group consisted of six boys and 11 girls. Of the 17 students who participated in the study, 15 students were Hispanic and two students were Caucasian.

Hypothesis/Research Question

The fourth grade students of the researcher, attending the after school mathematics club, would have greater than expected gains in the area of numbers and operations when measured by the winter *Measure of Academic Progress* assessment.

Null Hypothesis

The fourth grade students of the researcher, attending the after school mathematics club, would not have greater than expected gains in the area of numbers and operations when measured by the winter *Measure of Academic Progress* assessment.

Results of the Study

Table 1.

t-test of Pre and Post Mathematics MAP Scores for the Researcher's Classroom

Test	N	Mean	Standard deviation
Pre	14	188.14	8.55
Post	14	203.14	10.45
df = 13		t = 5.05	p < .001

Table 1 compares the pre and post mathematics MAP scores for the researcher's classroom. Table 1 shows there was statistical significance between the fall and winter mathematics MAP assessment results. The mean scores in Table 1 supported the hypothesis and showed a significant mean increase of 15 points between the fall and winter mathematics MAP assessment for students in the researcher's after school mathematics club taking part in the study. The null hypothesis was rejected.

Findings

The findings of the study showed there was statistical significance between the pre and post mathematics MAP assessments given to the researcher's students in the after school program. Subsequent to the eight week after school mathematics program, thirteen students improved scores, while only one student failed to improve. Upon completion of the after school program Students increased scores by an average of fifteen points in the mathematics MAP assessment strand numbers and operations, and two students made significant gains and increased scores by twenty-nine points. As a result of the study, the null hypothesis was rejected. The hypothesis was correct, because the fourth grade students of the researcher, attending the after school mathematics club, did have greater than expected gains in the area of numbers and operations measured by the winter *Measure of Academic Progress* assessment.

Discussion

In the fourth grade classroom of the researcher, greater than expected growth was made by the students participating in the study. Thirteen of the fourteen students made growth averaging an increase of fifteen points when measured between the fall mathematics MAP assessment and the winter mathematics MAP assessment. The null hypothesis was rejected. The hypothesis was correct. After school mathematics programs were an effective way to increase individual

student's mathematics scores in the strand numbers and operations on the mathematics MAP assessment. The fifteen point average increase by students after only eight weeks of participating in the after school program showed a much greater than normal and expected increase. An increase of 4.6 points was typical mean growth for the fall to winter time period as found in the NWEA 2008 Normative Data, with a mean of 8.4 points typical growth for the entire year (NWEA 2008). When compared to the NWEA mean fall to winter score of 4.6 points, the fifteen point increase in student scores as a result of the study, was over three times normal typical growth, which clearly shows the benefits of after school mathematics programs.

Summary

The researcher developed a study in which the hypothesis was put forth that students involved in an after school math club would show significant improvement on the numbers and operations strand of the MAP test. The researcher pre-tested the students in order to have a baseline for the data which would prove or disprove the hypothesis. When pre-testing was complete, low scoring students were included in an eight week after school math club. After the eight week period the students were tested again. The researcher then compared the pre and post tests scores, showing that the majority of students made statistically significant improvement, averaging fifteen points per student. This

improvement was shown to be greater than the typical growth shown through a normative study done by the Northwest Evaluation Association. Through analyzing the data the researcher was able to determine that the hypothesis which was put forth for examination was valid, while the null hypothesis was not valid and therefore was rejected.

CHAPTER 5

Summary, Conclusions and Recommendations

Introduction

The purpose of the project was to analyze the effect an after school mathematics club, focusing on numbers and operations, would have on student learning. The fall and winter *Measures of Academic Progress* assessment, numbers and operations strand, was used as a pre and post test. The *Measures of Academic Progress* assessments were used to measure, record, and document student growth.

Summary

The researcher, after teaching in a school district where students were not showing growth on standardized MAP tests, developed a hypothesis which analyzed the effect an after school math club would have on such students. Students with low test scores were included in an after school math club in order to help the students make growth in the specific strand of numbers and operations. The math club met twice weekly for a period of eight weeks and included seventeen students, fifteen Hispanic and two Caucasian. The individuals were tested in the fall giving the researcher a baseline from which to work. Students were then asked to participate in the math club. After an eight week period the students were post tested. The researcher then used the test scores from both the

pre and post tests to compare and analyze; thus seeing if any improvement in student scores were noted. After careful analysis of the data, the researcher showed that the individual's scores were raised by an average of fifteen points in numbers and operations thus proving the validity of the hypothesis.

Conclusions

Students in this study were given the mathematics Map test as both a pre and post test to measure academic progress. Of the fourteen students completing, the study, thirteen students made significant gains in the understanding of mathematics concepts as demonstrated in the numbers and operations strand of the MAP test. Only one student made negative growth. Results of the study can be seen in table 2 proving the hypothesis that students involved in after school mathematics clubs make greater gains on the MAP test than students not in after school mathematics clubs. Because of the results of this study the null hypothesis was rejected.

Recommendations

Success was seen in the researcher's study of after school mathematics programs. The author of the project thus recommends that after school mathematics clubs be continued in the school district of the researcher. Funding by the district should be provided considering the significant student gains. The after school mathematics programs should also be expanded to include more

students, not only in the fourth grade, but in all grades first through fifth. However, the researcher suggests that further studies should be made evaluating the length and subject matter of the after school clubs. Would the same results be obtained if the mathematics club lasted a shorter period of weeks or would even greater gains be obtained by having the club last for an even longer period of time? Other potential items to be considered would be to examine if a mathematics club concentrated on the other remaining strand areas in algebra, geometry and measurement, or probability and data, would the outcomes be different or similar? The researcher also thinks that studies should be done over a period of several years with students attending after school mathematics clubs throughout the first through the fifth grades to see if after school mathematics clubs would have a cumulative effect on student learning.

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Appendices

Table 2. Numbers and Operations Strand, Mathematics MAP Results

Student	Fall Pretest	Winter Post-test	Point Increase
A	185.0	214.0	29.0
B	194.5	195.0	0.5
C	194.0	205.5	11.5
D	183.5	201.0	17.5
E	194.5	204.5	10.0
F	183.5	200.0	16.5
G	194.5	187.0	-7.5
H	180.0	206.0	26.0
I	188.0	211.5	23.5
J	164.5	184.0	19.5
K	195.0	203.5	8.5
L	189.0	211.0	22.0
M	194.0	197.5	3.5
N	194.0	223.5	29.5
Mean	188.1	203.1	15.0
Standard Deviation	8.6	10.5	
df = 13	t = 5.05	p < .001	