Using Intervention Classes to Raise

Mathematics and Reading Assessment Scores

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A Special Project

Presented to

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Using Intervention Classes to Raise

Mathematics and Reading Assessment Scores

Approved for the Faculty

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ABSTRACT

Students with academic needs in mathematics and reading were identified through MAP test scores. They were divided by needs and assigned to small intervention classes. Students who attended the small intervention classes showed dramatic MAP score improvement in both subjects.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

Introduction

Background for the Project

Forty-four percent of an eighth grade class of a large Southwest Washington middle school were not meeting standard in reading. Sixty-five point six percent were not meeting standard in mathematics. The non-passing percentages contributed to the middle school failing to make Annual Yearly Progress (AYP) as measured by the Office of the Superintendant of Public Instruction (OSPI) of the State of Washington. The eighth grade faculty of the middle school sought a way to bring non-passing students up to standard.

Many educators assumed smaller class size and, hence, more instructor attention had proven to be good for learning and, hence, test scores (Monks & Schmidt, 2010). The eighth grade faculty and administration decided to put students who did not meet standard into smaller intervention classes in order to boost their skills in reading and mathematics. The small intervention classes had specific curriculum intended to address identified mathematical and reading needs. Assessments were administered after the intervention classes concluded and the results were analyzed.

Statement of the Problem

According to the Measurement of Academic Progress (MAP) test assessments, 65.6% of students were not performing up to state standards in

1

mathematics and 44.1% were failing in reading. The problem was how to successfully raise each student's proficiency in mathematics and reading, as measured by the MAP test.

Purpose of the Project

The researcher intended to raise students' mathematics and reading scores by placing them in extra smaller mathematics and reading classes, with significantly lower student-to-teacher ratios than the school's average daily class of 27-to-1. The classes in mathematics and reading were to be intensive, daily classes of 40 minutes each day. Faculty and staff hoped that the smaller, more intensive learning would boost students' MAP scores and, hence, mathematics and reading proficiency, to grade level.

Delimitations

The participants in the study were the 450 eighth grade students from a large middle school in Southwest Washington with a 2010 total enrollment count of 1, 483. The middle school's ethic mix as of the 2010-2011 academic year was: 0.4% Native American, 2.7% Asian, .3% Asian/Pacific Islander, 1.8% Black, Hispanic 44.8%, 44.1% White, and 2.0% Two or More Races. Forty-seven point seven percent of students were benefitting from free or reduced lunch. Ten point nine percent of the student population were special education students. Nine point three percent were classified Transitional Bilingual. The school was coed with 52.9% male and 47.1% female. As of May 2011, 3.3% were from Migrant families, 0.0% were placed into 504 programs and no one was placed in foster

care. The 2010-2011 unexcused absence rate was 0.2%. In the eighth grade of the 2010-2011 academic year, 65.6% of all eighth grade students, including special education, were not meeting state mathematics standards. And 56.8% of all students were not meeting state reading standards (OSPI, 2010).

The treatment group came from students with non-passing fall MAP tests scores in mathematics and reading. Special Education and limited English speakers were eligible for inclusion in the treatment group depending on MAP scores.

Assumptions

Given 45 minutes per day extra study, with MAP identified academic needs in mathematics and reading, in a small classroom with a qualified teacher, students' assessment scores in mathematics and reading should improve more than the usual, average MAP improvement. One assumed the general quality of teachers over a department or over time did not significantly improve or diminish.

Hypotheses

Eighth grade students with low reading and mathematics scores demonstrated greater improvement in reading and mathematics following intervention classes compared to standard MAP score improvement over the same period of time.

Null Hypothesis

Eighth grade students with low reading and mathematics scores did not demonstrate greater improvement in reading and mathematics following

intervention classes compared to standard MAP score improvement over the same period of time.

Significance of the Project

School resources were heavily invested in intervention classes. Faculty and staff took hours identifying students and designing curriculum. Curriculum materials were purchased for the intervention classes. The students who were asked to switch intervention classes every six weeks invested a great deal of time and energy.

If intervention classes improved test scores, the testing middle school would recommend similar programs in all middle schools. If not, the middle schools would re-allocate precious resources. Random assignment to enhancement, not intervention, classes, over a longer period, could be more time and cost efficient.

Procedure

Fall 2011-2012 MAP score data were collected. Students who were at or above grade level on MAP scores for mathematics and reading were allowed to take an arts or activity class. The students with below grade level MAP scores in mathematics and reading were assigned to a six weeklong intervention class. Special education students remained in special education classes.

In spring, the students were re-administered the MAP tests. Average MAP scores of the treatment group were compared to the standard MAP improvement.

<u>Definition of Terms</u>

enrichment class. An enrichment class was a short class period wherein students were enrolled in classes by academic need or a special interest.

intervention. An intervention was a deliberate inclusion of a special daily mathematics or reading class into a student's usual course of study.

intervention class. An intervention class was a group of students, from 10 to 20, with an identified academic need in mathematics or reading.

<u>Acronyms</u>

<u>AYP</u>. Annual Yearly Progress

<u>MAP</u>. Measure of Academic Progress

<u>MTH.</u> Mathematics

<u>NWEA</u>. Northwest Education Association

<u>OSPI.</u> Office of the Superintendent of Public Instruction

<u>PR.</u> Plugged into Reading

<u>RDG</u>. Reading

<u>SD.</u> Standard Deviation

CHAPTER 2

Review of Selected Literature

<u>Introduction</u>

Forty-four percent of an eighth grade class of a large Southwest Washington middle school were not meeting standard in reading. Sixty-five point six percent were not meeting standard in mathematics. The non-passing percentages contributed to the middle school failing to make Annual Yearly Progress (AYP) as measured by the Office of the Superintendant of Public Instruction (OSPI) of the State of Washington. The eighth grade faculty of the middle school sought a way to bring non-passing students up to standard.

Much research had shown that smaller, more intense intervention classes raised student achievement (Monks & Schmidt, 2010).   Could small intervention classes raise test scores and help the middle school meet AYP goals? The eighth grade faculty and administration decided to test these hypotheses. They put students who did not meet standard into smaller intervention classes in order to boost their skills in reading and mathematics. The small intervention classes had specific curriculum intended to address identified mathematical and reading needs.

Assessments were administered at the beginning and at the end of a twelve-week trial. Then the intervention classes concluded and the results were analyzed. Did the intervention classes work? Did the students increase reading and mathematics MAP tests scores over the usual expected amount?

The researcher found support for the project by investigating the

following: mathematics interventions, reading interventions, small class size, the

Plugged into Reading curriculum and the Measure of Academic Progress.

Mathematics Interventions

Mathematics intervention classes were generally understood to mean a place,

activity, class or class period where students, with a common concern in

mathematics, had the concern addressed. Mathematics interventions may have

included extra time on task, extra time on subject, a specialized curriculum and

individual instructions or a combination thereof (Brundage, Beckmann-

Bartlett, & Burns, 2011). The classes were often taught to specific targets, such as

state mathematics standards.

Mathematics intervention classes had proven effective. After a 16-week

intervention with 51 low-performing fifth grade students, the authors Ketterlin-

Geller, Chard and Fien found that students in both intervention groups

outperformed students in their control group on a measure of mathematics

achievement (2008). On a state accountability measure in mathematics, students

in the extended treatment group performed better on standard assessments than

non-treated students (Ketterlin-Geller, Chard, & Fien, 2008). Mathematics

intervention programs, smaller in scope, with more problem and solution-based

curriculum, had also met with success *(*Yopp *& Rehberger,* 2009*).* Mathematic

standards needed to be met. The intervention classes worked to meet the state

standards. The State of Washington, in 2005, reviewed student mathematic needs for eighth grade.

All middle school mathematics intervention classes used the core concerns identified by the state to generate learning goals, objectives and targets. The researcher's intervention classes taught to these targets.

Reading Interventions

Reading intervention classes were generally understood to imply a time, place, activity, class or class period where students, with an area of academic concern, had the concern addressed and focused upon. Reading interventions included extra time on task, extra time on subject, a specialized curriculum and individual instructions or combination thereof (Brundage, Beckmann-Bartlett, & Burns, 2011). Each intervention had various but clear learning targets. All classes were assessed, with most assessed according to state reading standards.

Research had shown older students in sixth to twelfth grade with reading difficulties benefited from reading interventions (Edmonds, Vaughn, Wexler, Reutebuch, Cable, Tackett, & Schnakenberg, 2009). Intervention treatments addressing decoding, fluency, vocabulary, and comprehension affected both mean and the variance of a continuous outcome of interest. Studies evaluating effects of educational interventions indicated that interventions not only changed average student achievement but variability in achievement as well (Konstantopoulos, 2008). Reviews of research where students were generally assigned to different

reading interventions (e.g. tutoring, mastery learning, and conventional) had also

reported better than average achievement as well as achievement on various

scales and measures, an improvement over Bloom's research in 1984 (Bloom,

1984; Konstantopoulos, 2008).

<u>Small Class Size</u>

Several studies on small class size or low student-to-teacher ratios served to

persuade the Southwest Washington middle school's eighth grade faculty into

thinking that small intervention classes could improve student performance. For

example, Project STAR, a $12 million dollar, four-year study of student

achievement and development, produced results that indicated that class size

made a difference in student performance (Konstantopoulos, 2008). Scholastic

Aptitude Tests (SAT) test scores in mathematics and reading improved.

Furthermore, high quality studies had consistently demonstrated that small class

sizes, where the teacher-to-student ratio was 1 to 15, on average, improved

student achievement a statistically significant amount over classes with 1 teacher

to 22 students or more (Finn & Achilles, 1990; Krueger, 1999; Nye, Hedges, &

Konstantopoulos, 2004).

Numerous experimental and quasi-experimental studies had investigated the

correlation between class size reductions and higher student achievement (Monks

& Schmidt, 2010). Overall, the indications were that low student-to-teacher ratios

had positive effects on student achievement (Konstantopoulos, 2008). The main

criticism of the class reduction studies was that they were of small scale and

limited duration (Monks & Schmidt, 2010).

When the education community read the long-term STAR project results, class reduction was seen as a real avenue to student achievement. The excitement generated by Project STAR and other class size reduction studies motivated many education and legislative communities. Many districts and states hoped that class size reductions would provide the academic boost they needed. Lower teacher-to-student ratios were achievable and concrete goals (Finn, 2002).

Class size reduction generated interest as a panacea that gave all disadvantaged learners a boost (Anderson, 1998). The State of Wisconsin implemented statewide class reductions (Jacobson, 2002). Small class size was something all schools could do for the students regardless of a student's ethnicity, (Nye, 2004) demographics or socio-economic situation (Jacobson, 2002). No matter what else was going on in the school, lower classes sizes seemed to help test scores and the lower the class size, the better (Konstanopoulos, 2011). So, the researcher's middle school staff saw intervention classes with low student-to-teacher ratios as a possible solution to boosting assessment scores.

Plugged into Reading

The Southwest Washington middle school's school district adopted Plugged into Reading (PR) for sixth to eighth grade in the 2010-2011 school year. When it chose the reading curriculum, the school district included teachers in the process of adopting the reading curriculum. The researcher and colleagues determined how closely the proposed reading curriculum aligned to Washington State

standards. The researcher and colleagues affirmed PR to be closely aligned to the state standards.

What impressed the teachers especially was Plugged into Reading's (PR) ability to offer a variety of lessons from whole class to literature circles to intervention groups. PR was a guided reading curriculum with a mix of reading sets. Every teacher was equipped with sets of books for entire classes, literature circles and independent reading. Teachers were supplied with teacher-directed materials, resources and student-directed learning materials for every book. The books came with pre-recorded audio books on mp3 players with ear buds. With the audio books, slow readers followed along at a reasonable pace. PR also covered the range of material, as required by the core curriculum mission statement as specified by the State of Washington (OSPI, 2011).

PR was in alignment with the State of Washington vision of interstate cooperation. In 2005, Washington State revised its reading standards. Washington State's reading standards needed to be stronger in content and more rigorous. The state attempted to align its reading standards with other states. These alignments were intended to guide the Office of Superintendent of Public Instruction (OSPI) in revising the reading standards. Some of the recommendations included developing a student assessment system aligned to the Common Core State Standards in English Language Arts and Mathematics (OSPI, 2011).

Forty-six of the fifty states were cooperating in creating common core reading assessments. PR was active and adopted in all of those states. PR

materials had a proven record of effectiveness and were in line with state standards.

<u>Measure of Academic Progress</u>

Measure of Academic Progress (MAP) was a standardized test that allowed students to be compared horizontally (Cronin, Kingsbury, Dahlin, & Bowe, 2007) across schools, districts, states and even across the nation (Langdon, 2010). The Northwest Education Association (NWEA) regularly conducted assessments to ensure the MAP and the Washington State Measure of Standardized Progress (MSP) correlated to student achievement (Cronin et al., 2007). The MAP was a multiple choice, computer implemented test that demonstrated stability over a thirty-year period (Cronin et al., 2007). The reliability of the MAP test was determined "in terms of a Pearson product-moment correlation coefficient (r)" (NWEA, 2012). Evidence in the form of the Pearson correlation coefficient determined concurrent validity and a statistically significant relationship (NWEA, 2012).

The NWEA (2012) posed a rigorous proof over several months to a year to determine reliability, and stability. The retest was comparable to the first in content and structure, but differed in the difficulty level of items (NWEA, 2012). Over a two to three week period, the retest reliability maintained an average of .80 (NWEA, 2012).

A strong relationship was indicated in the MAP test in the mid .80s (NWEA, 2012). Relationship within mathematics was stronger, ranging between

an average of .82 and .86 in a study comparing a number of state assessments to the MAP (Cronin et al., 2007).

Standardized testing had served the purpose of sorting students along a continuum of achievement. MAP assessment served as a tool for educators to assess students' achievement efficiently and more frequently. Later refinements allowed educators to identify topics of weakness (Langdon, 2010). In the middle school where the testing took place, students took the MAP test twice a year, in fall and spring quarters.

The MAP generated a report on the progress made and areas in which the student needed to make gains. Educators used the MAP to assign students to intervention classes (Langdon, 2010).

<u>Summary</u>

The research demonstrated that interventions in both mathematics and reading were effective. One of the most effective of interventions was instituting small class size or class reduction. Konstantopoulos' meta research proved that small class size with low student-to-teacher ratios improved academic achievement for a variety of learners saddled with a variety of challenges that hurt their mathematics and reading scores (Konstantopoulos, 2011). Small class size interventions were effective in mathematics (University of Illinois at Urbana-Champaign, 2009) and reading (Edmonds et al., 2009) at the middle school levels (Anderson, 1998). Research proved that while small class sizes were generally effective, teacher materials were a key variable (Konstantopoulos, 2008). Plugged

into Reading was determined by the researcher and colleagues to be an effective

reading curriculum for the intervention classes. The research supplied an

examination of the validity of the measurement instrument, the MAP (Langdon,

2010).

CHAPTER 3

Methodology and Treatment of Data

<u>Introduction</u>

In the fall, eighth grade students were administered the Measurement of Academic Progress (MAP) test. Students were sorted by scores. Students with mathematics and reading scores below grade level were put into treatment groups, otherwise known as intervention classes or enhancement classes.

Students in the treatment group were assigned intervention classes in mathematics and reading. Intervention classes were small classes, of ten to twenty participants, that received daily instruction of forty minutes. The course of study for each mathematics and reading intervention class was six weeks. One half of the total treatment group took mathematics; meanwhile the other half took reading. The groups were switched after six weeks.

At the end of the twelve weeks, in the spring, all students were given a second MAP test. Students who had attended the intervention classes should show an improvement in MAP scores over the usual amount predicted by the MAP.

<u>Methodology</u>

The researcher employed a single blind experimental research method to compare a group of students' achievement on the MAP test. The experimental method "can test hypotheses to establish cause-effect relationships" (Gay, Mills, & Airasian, 2006, p. 223). The treatment group received special instruction in

mathematics and reading, the independent variable. The dependent variable, the MAP test data, produced a measurable outcome. The MAP test results were used to measure the effect of the independent variable, the intervention classes, on the treatment group.

Participants

In the eighth grade of the 2010-2011 academic year, 65.6% of all eighth grade students, including students in special education, were not meeting state mathematics standards. Fifty-six point eight percent of all students were not meeting state reading standards.

The treatment group came from students with non-passing fall MAP tests scores in mathematics and reading. Special Education and limited English speakers were equally included in either of the treatment groups depending on MAP scores.

Instruments

The MAP test was the measuring instrument. The Northwest Evaluation Association (NWEA) proved the MAP test was a valid and reliable proficiency test that measured academic progress in various subjects. The NWEA determined the MAP had a reliability coefficient of .80 when compared with state test results (NWEA, 2012). In 2007, the MAP's reliability coefficient score averaged .80 (Cronin et al., 2007). The study compared several state assessments to the MAP. The assessment's average reliability coefficient score ranged between .82 and .86 (Cronin et al., 2007).

The MAP test provided the researcher and colleagues with a diagnostic tool to sort intervention classes. MAP scores were used to identify students not meeting academic standard in mathematics and reading. MAP tests provided baseline pre-intervention test scores, dependant variable and post-intervention test scores. Then MAP test data was used to determine what the usual, average improvement should have been over the same amount of time.

Design

The researcher implemented a single blind experimental study. The study compared and contrasted pre-intervention and post-intervention scores to determine the effectiveness of the intervention treatment.

History, maturation, testing, instrumentation and selection were controlled for within the design (Gay et al, 2006). Events outside the experiment were judged not to have had an effect on the study. Over the course of the twelve weeks of the experiment, there were no unexpected interruptions that compromised the validity of the experimental research. The same test and circumstances were provided for all treatment groups. The participants in the research were comparable, as both groups drew from the same available demographic. Using MAP scores, the selection of students for intervention was controlled for. Mortality was not a probable threat to validity (Gay et al., 2006) as only mean improvements in scores were compared to predicted improvement.

<u>Procedure</u>

All students were administered the MAP test in the fall of the 2010-2011 academic year. Students with below eighth grade level standard scores in mathematics and reading were assigned intervention classes. Due to a variety of time constraints, it was decided to break the intervention classes into six-week intervals with the students switching reading and mathematics intervention classes after six weeks as the spring MAP test took place at the end of the twelve weeks.

MAP reading scores determined the order of intervention classes. Those who scored in the lowest fifty percent were assigned to take the reading first. The logic of the researcher and colleagues was that students needed the extra reading more urgently since the current mathematics curriculum relied heavily on word problems. Those scoring in the higher fifty percent of reading were assigned to mathematics intervention classes first. At the end of the six weeks, the two groups switched.

The results from the MAP tests provided a means for identifying instruction to suit student needs. The teachers taught to the state standards in mathematics and reading. The teachers used district-approved curriculum. The reading classes used materials from Plugged into Reading, and sample questions from the OSPI website. The mathematics intervention used teacher generated math curriculum materials. The teachers coordinated lessons in weekly meetings so all students received the same curriculum in different classrooms.

The treatment group received six week-long intervention classes in mathematics and reading for a combined total time of 12 weeks. The classes took place daily between 9:04 a.m. and 9:44 a.m. At the end of six weeks, the mathematics and reading groups switched classes. School closures and fire drills were not considered a major disruption. Each treatment group received the same number of days of instruction.

The reading teachers used Plugged into Reading (PR) resources, such as class readers and mp3 players, and supplemental assessment materials from the OSPI website and the Federal Way School District. The mathematics teachers taught lessons from the standard teacher-generated materials.

At the end of the 12 weeks, in the spring, all students were re-administered a new MAP test. The treatment group took the MAP assessment on a computer in the computer lab. Multiple-choice answers were entered into the computer. The treatment group took the MAP test under the same conditions and in the same computer lab as the rest of the eighth grade.

MAP scores of the treatment groups were tallied. The groups were examined to see if there was a greater average improvement in the treatment versus the MAP national average predicted improvement. Mean improvement was what was compared.

The researcher gathered the data from the MAP assessment. The data was used to measure the significance between the pretest and the posttest of the treatment groups. The value of *t* determined the improvement the intervention

classes had on student's mathematics and reading compared to the MAP expected improvement.

Treatment of the Data

The MAP test scores of the treatment group were subjected to measures of significance between the groups' improvements. The value of t accepted or rejected the null hypothesis. As a consequence, the hypothesis was either supported or not supported by the value of t. Significance was determined for $p \geq$ .05, .01, and .001 (Gay et al., 2006).

Summary

The research followed a standard experimental procedure; pretest, treatment and posttest, measuring the result of treatment. The experimental research provided evidence as to the effectiveness of small intervention classes on student achievement in the mathematics and reading portion of the MAP tests. The improvement in the MAP tests should translate to improved achievement overall. The significance was determined for $p \geq$ .05, .01, and .001 (Gay et al., 2006). The value of t determined whether a significant difference existed between the mean improvement of the treatment group and the usual improvement as predicted by the MAP.

CHAPTER 4

Analysis of the Data

<u>Introduction</u>

Forty four percent of an eighth grade class of a large Southwest

Washington middle school were not meeting standard in reading. The majority

were not meeting standard in mathematics. The non-passing percentages

contributed to the middle school failing to make Annual Yearly Progress (AYP)

as measured by the Office of Superintendant of Public Instruction (OSPI) of the

State of Washington. The eighth grade faculty of the middle school sought a way

to bring non-passing students up to standard.

The researcher conducted an experimental study to determine if small

intervention classes improved student learning. The experimental research

provided support for the effectiveness of small intervention classes on student

achievement in mathematics and reading.

<u>Description of the Environment</u>

The research was conducted in a large Southwest Washington middle school

in eighth grade. The research took place over the 2010-2011 academic year. The

eighth grade faculty and administration provided instruction for the 2010-2011

students not meeting grade level on the MAP tests in mathematics and reading.

The students were taught using teacher-generated mathematics curriculum and

Plugged into Reading. Each of the intervention classes lasted 40 minutes per

school day for six weeks. The intervention classes were taught in the eighth grade

wing and portable classrooms, where the students normally received instruction. Students that met or passed grade level on the MAP mathematics and reading tests were assigned an arts, activity or advanced science class in other parts of the facility.

Hypothesis

Eighth grade students with low reading and mathematics scores demonstrated greater improvement in reading and mathematics following intervention classes compared to standard MAP score improvement over the same period of time.

Null Hypothesis

Eighth grade students with low reading and mathematics scores did not demonstrate greater improvement in reading and mathematics following intervention classes compared to standard MAP score improvement over the same period of time.

Results of the Study

The results of the study provided data to address the hypothesis of the research. The treatment group first completed the MAP test in the fall. Students with below average MAP scores in reading and mathematics were assigned to intervention classes. After two alternating six-week long intensive mathematics and reading classes, the treatment group was re-tested with MAP in the spring. MAP test results were analyzed using the Statpak, producing statistics and

associated values. Based on the analysis, the treatment group demonstrated better than average progress on both the mathematics and reading MAP.

In the fall, the treatment group's reading and mathematics MAP score mean was 204 and 217 respectively. In the spring, the group's reading and mathematics mean jumped to 212 and 222. Reading MAP scores improved an average of eight points. Mathematics MAP scores improved an average of five points (Gay et al, 2006). The expected growth was three points (NWEA, 2012). The evidence proved the intervention classes had a better than expected result. The result was more significant when one considered that the gain was achieved in a population of students with low and/or declining MAP scores. Clearly, intervention classes had made a significant, positive impact on student learning as measured by the MAP assessment.

Using the Northwest Education Association recommended method to determine the t-scores, this formula was used: (intervention groups' mean score – standard mean) / standard deviation. Standard mean was the eighth grade expected fall mean and expected spring mean of a norm group, and SD was the expected standard deviation of the spring eighth grade. Expected scores were drawn from the NWEA growth norms. T-scores were calculated using the NWEA recommended method (NWEA 2012).

The norms were drawn from the table with thirty-two instructional weeks. The treatment group's beginning mean score in reading was 204 and in mathematics was 217. The norms for a student beginning with a MAP score of

204 was a standard deviation of 6.85. This was based off a sample of 16,886. The norm for a score of 217 was a standard deviation of 5.90. In spring of eighth grade the norm mean score in both reading and mathematics was 220.3. The reading standard score was then (212 – 220.3) / 11.75 for a t-score of -.71, up from -1.39 in the fall. True, it was still below the mean but improvement was remarkable, almost 50%. The improvement in mathematics was even more dramatic. The t-score in the spring was a positive 1.42, up from a .02 in the fall. The degrees of freedom was 151.

Table 1.

Statpak Analysis

Comparing Means [t-test assuming equal variances (homoscedastic)]			
Descriptive Statistics			
VAR	*Sample size*	*Mean*	*Variance*
	153	211.84314	141.4094 4
	153	222.09804	226.1284 8
Summary			
Degrees Of Freedom	304	*Hypothesized Mean Difference*	0.E+0
Test Statistics	6.61647	*Pooled Variance*	183.7689 6
Two-tailed distribution			
p-level	0.	*t Critical Value (5%)*	1.9678
One-tailed distribution			
p-level	8.29318E-11	*t Critical Value (5%)*	1.64988
G-criterion			
Test Statistics	0.12981	*p-level*	0.06137
Critical Value (5%)	0.18367		
Pagurova criterion			
Test Statistics	6.61647	*p-level*	1.
Ratio of variances parameter	0.38475	*Critical Value (5%)*	0.02509

Significance was determined for $p \geq .05$, .01, and .001 (Gay et al, 2006).

The calculated value of *t*, which was 1.65, was smaller than the threshold value

for *t* at .05, 1.960. The calculated value of *t* was less than the threshold value at

.01, 2.576, and less than the threshold value of .001, which was 3.291. The null

hypothesis was rejected at $p \geq .05$, thus supporting the hypothesis (Gay et al.,

2006). There was a significant difference between intervention classes and the general population taking the MAP.

Table 2.

Distribution of t

		p	
Df	.05	.01	.001
151	1.960	2.576	3.291

Findings

On average, students who received intervention classes realized greater improvement on the MAP test than those who did not receive intervention classes. The Statpak analysis calculated a *t* score of 1.69 (Gay et al, 2006). The results suggested that students who received intervention classes had a high probability of greater academic growth, as measured by MAP test scores, than the norm, as measured by the NWEA.

Significance was determined for $p \geq .05$, .01, and .001 (Gay et al, 2006). The calculated value of *t*, which was 1.69, was larger than the threshold value for *t* at .05, .01 and .001. The null hypothesis, that there was no significant difference in MAP test scores between those who received intervention classes and those who did not, was rejected at $p \geq .05$ (Gay et al, 2006). The hypothesis, that

students who received intervention classes realized significantly higher achievement at .05 on the MAP test than the norm, was supported.

Discussion

Previous research suggested that focused learning targets, small class size and tailored supportive materials, positively impacted student achievement. Students taught in classes with an emphasis on targets, with small class size and appropriate materials, demonstrated growth in mathematics and reading, as measured by the MAP test, than the norm.

Summary

Research supported the positive effect of intervention classes on student learning. Intervention classes incorporated principles of focused learning targets, small class size, quality materials and rigorous teaching. Faculty and administration at a Southwest Washington middle school decided to implement intervention classes. From 2010 to 2011 eighth grade students completed the MAP test as a pretest and post-test, before and after an intervention class, to measure academic progress. The MAP tests from each group provided valuable data for the measurement of student learning.

The researcher hypothesized that eighth grade students who received intervention classes achieved significant improvement in academics, as measured by scores on the MAP test. Students receiving intervention classes demonstrated significant growth on the MAP test compared to the norm. The average improvement was statistically significant. Clear learning targets, small class size,

appropriate materials, and rigorous teaching positively increased student learning.

The hypothesis was supported.

CHAPTER 5

Summary, Conclusions and Recommendations

<u>Introduction</u>

Forty-four percent of an eighth grade class of a large Southwest Washington middle school were not meeting standard in reading. Sixty-five point six percent were not meeting standard in mathematics. The non-passing percentages contributed to the middle school failing to make Annual Yearly Progress (AYP) as measured by the Office of the Superintendant of Public Instruction (OSPI) of the State of Washington. The eighth grade faculty of the middle school sought a way to bring non-passing students up to standard.

Many faculty and administration assumed smaller class size and, hence, more instructor attention had proven to be good for learning and, hence, test scores (Monks & Schmidt, 2010). The eighth grade faculty and administration decided to put students who did not meet standard into smaller intervention classes in order to boost their skills in reading and mathematics. The small intervention classes had specific curriculum intended to address identified mathematical and reading needs. Assessments were administered after the intervention classes concluded and the results were analyzed.

The purpose of the study was to gather evidence either supporting or discounting the effectiveness of intervention classes on student learning. Faculty and administration hoped that the smaller, more intensive learning would boost students' MAP scores and, hence, mathematics and reading proficiency, to grade

29

level. Students who had not passed MAP in reading and mathematics were administered a MAP test in the fall. Students with lower than expected scores were placed in a treatment group. The treatment group was assigned to alternating six-week, forty-minutes-a-day, intervention classes in reading and mathematics. The intervention classes had smaller class size and carefully selected materials. In the spring, the treatment group was re-administered the MAP test. The results were compared to MAP norms as published by the NWEA.

Summary

In the fall, the treatment group's reading and mathematics MAP score mean was 204 and 217 respectively. In the spring, the group's reading and mathematics mean jumped to 212 and 222. Reading MAP scores improved an average of eight points. Mathematics MAP scores improved an average of five points. The established norm expected growth was three points (NWEA, 2012). The evidence proved the intervention classes had a better than expected result. The result was more significant when one considered that the gain was achieved in a population of students with already low and/or declining MAP scores. Clearly, intervention classes had made a significant, positive impact on student learning as measured by the MAP assessment.

Conclusions

Intervention classes appeared to be a worthwhile investment of time and resources. The null hypothesis, that there was no significant difference in MAP test scores between those who received intervention classes and those who did

not, was rejected at $p \geq .05$. The hypothesis, that students who received intervention classes realized significantly higher achievement at .05 on the MAP test than the norm, was supported (Gay et al, 2006).

Reading and mathematics MAP scores demonstrated greater growth than the norm (NWEA 2012) and mathematics showed double the expected growth. This was especially significant in that the treatment group had low or declining reading and mathematics scores to begin with. Intervention classes seemed a worthwhile investment of resources.

<u>Recommendations</u>

The research strongly suggested that intervention classes were productive and should continue. Results should be shared and a process implemented to streamline the assignment of students into intervention classes.

Further research should be done. Another study, with tighter controls, needed to be conducted to confirm the results were not unique but part of a repeatable pattern of success.

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APPENDIX

Appendix 1.

Fall and Spring Intervention Class MAP scores in Reading and Mathematics

Fall 2010 Rdg MAP	Spring 2011 Rdg MAP	Fall 2010 Mth MAP	Spring 2011 Mth MAP
157	166	166	208
187	199	171	207
159	178	173	186
164	170	175	169
192	196	176	182
179	188	183	192
181	210	186	207
192	192	191	191
170	185	192	190
190	202	192	208
175	211	194	217
203	205	197	206
188	194	197	215
200	212	199	202
172	187	199	205
202	222	199	207
195	208	199	198
206	190	199	190
195	197	199	196
203	208	201	238
194	209	201	201
186	191	202	200
199	218	202	211
202	211	203	208
204	210	204	217
199	205	204	210
188	197	205	210
179	189	205	209
205	220	205	226

Fall 2010 Rdg MAP	Spring 2011 Rdg MAP	Fall 2010 Mth MAP	Spring 2011 Mth MAP
197	193	205	198
190	189	206	194
215	214	206	214
197	199	206	227
202	211	207	210
197	212	207	202
207	212	207	217
211	212	207	208
208	204	207	208
201	208	208	211
212	197	208	218
211	198	209	210
214	220	209	212
203	218	210	217
204	208	210	212
215	226	211	224
215	227	211	222
205	210	211	218
199	201	211	218
208	223	211	214
202	215	211	210
181	196	212	214
209	196	212	208
210	219	212	207
210	216	213	216
211	215	213	235
201	217	213	217
214	226	213	217
207	207	214	219

Fall 2010 Rdg MAP	Spring 2011 Rdg MAP	Fall 2010 Mth MAP	Spring 2011 Mth MAP
202	197	214	222
215	218	214	219
211	215	214	204
195	221	214	213
209	212	214	223
213	221	215	219
206	223	215	217
207	212	215	218
207	210	216	225
206	230	216	217
214	218	216	233
193	214	216	220
200	213	217	219
214	218	217	230
214	222	217	237
207	220	217	235
198	201	217	230
205	218	217	223
209	214	217	225
213	215	218	234
200	215	218	223
198	205	218	220
200	211	218	229
205	225	220	220
213	208	220	226
213	217	221	236
193	210	221	214
208	204	221	228
206	212	221	215
209	219	221	225

Fall 2010 Rdg MAP	Spring 2011 Rdg MAP	Fall 2010 Mth MAP	Spring 2011 Mth MAP
207	215	221	214
210	223	221	227
210	228	221	225
208	221	222	233
206	222	222	234
205	204	222	236
215	209	222	220
204	202	222	221
214	212	222	238
213	216	223	223
194	216	223	230
207	217	223	225
209	215	223	223
212	213	223	233
211	215	223	218
202	207	223	231
208	211	223	235
209	224	224	228
209	235	224	242
212	218	224	233
213	211	225	222
200	213	225	225
209	229	226	232
215	230	227	232
214	218	227	228
213	215	227	231
212	222	228	240
212	213	228	228
205	211	228	221
209	212	229	233

Fall 2010 Rdg MAP	Spring 2011 Rdg MAP	Fall 2010 Mth MAP	Spring 2011 Mth MAP
215	218	229	239
213	207	229	228
210	234	230	245
209	205	230	230
213	205	230	227
210	203	231	241
210	210	231	230
208	214	231	232
209	221	231	239
211	214	232	220
211	213	232	241
209	213	232	238
214	215	232	226
215	232	233	223
215	220	233	233
215	232	233	236
184	206	233	238
210	219	234	232
214	223	234	235
214	222	235	245
215	220	235	237
209	201	237	237
207	205	237	237
208	224	238	243
210	211	238	223
206	216	239	258
203	214	239	243
214	225	240	247
209	227	240	236

Fall 2010 Rdg MAP	Spring 2011 Rdg MAP	Fall 2010 Mth MAP	Spring 2011 Mth MAP
215	223	240	242
215	221	241	246
214	224	242	241
215	222	243	249
205	229	246	251
215	230	250	250