

Expanded Learning Opportunities Increase
Student Achievement in Math

A Special Project

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Dr. Robert P. Kraig

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Shirley Mae Andersen

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FACULTY APPROVAL

Expanded Learning Opportunities Increase

Student Achievement in Math

Approved for the Faculty

Robert P. Keady, Faculty Advisor

12/1/2010, Date

Abstract

Expanded Learning Opportunities Increase

Student Achievement in Math

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The purpose of this study was to determine the efficacy of an Expanded Learning Opportunity in Mathematics offered to low-achieving sixth and seventh grade students. Based upon the findings, conclusions were made. One conclusion was that student achievement in math was accelerated by participation in the Expanded Learning Opportunity.

The research in this report supported continuation of the intervention program. A significant recommendation was that with refinements to the model, it should be replicated in other middle schools level. During the 2010 – 2011 school year McClure Middle School should document the achievement of eighth grade students who participate in the intervention model following the Trends in Mathematics and Science (TIMSS) assessment that will be given in the spring.

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Chapter 1

Introduction

Background of the Problem

The Nation's Report Card, 2009 National Assessment of Educational Progress (NAEP), reported steady gains in mathematics student achievement at the eighth grade level over the past five years. During the past three years, Seattle Public Schools slightly outperformed state averages in mathematics on the Washington Assessment of Student Learning (WASL). While these trends indicated that there was some movement towards closing the achievement gap in mathematics, the Seattle and the United States continued to fall below the success of Asian and many European countries in mathematics.

Throughout Seattle Public Schools, individual schools recognized the need for math intervention. Math instructors were challenged to teach students Middle School content in mathematics to students who had not mastered foundational skills of number sense taught in elementary school. Differentiation of math instruction within a typical middle school schedule that offered 250 minutes of instruction per week remained a conundrum of lesson planning.

During the 2009 – 2010 school year, Seattle Public Schools central administration had not yet come forth with a coherent, district-wide model for math intervention. A specific criterion to decide who should receive intervention was not established. Aligned curriculum that identified supplemental intervention had not been solidified.

In an effort to raise student achievement and address the needs of math instruction at a middle school level, the administration and teacher leaders at McClure Middle School

collaboratively created an Expanded Learning Opportunity (ELO) program that included math intervention. Initially, assignment of students to intervention was based on Washington Assessment of Student Learning (WASL) test scores from 2009 school year. Curriculum was created to reflect the U.S. Department of Education's "What Work Clearinghouse" recommendations.

Statement of Problem

In the United States, there was an achievement gap in mathematics between students from differing ethnic groups, genders and socioeconomic levels. The outcomes associated with this gap, lower levels of employability and earnings, continued cycles of poverty, higher crime rates, cost the taxpayers of our society money. Further, from a global perspective low mathematics achievement contributed to the economic health of our country in a technological age. As consumers, citizens bought electronics, cars, and other goods from countries that had high levels of mathematic achievement, innovation of ideas and productivity. The governments of China and Japan were the largest holders of the U.S government debt.

The educational reform efforts in the United States recognized that improvement of content, teacher training and quality of instruction influenced student outcomes in math achievement. In mathematics instruction, much of the reform efforts in terms of pedagogy had been modeled after the educational systems of Asian countries. This research examined yet another factor. What was the relationship between Expanded Learning Opportunities at McClure Middle School and student growth in mathematics achievement?

Purpose of Study

The purpose of this study was to determine whether the Expanded Learning Opportunity, an additional 90 minutes of math instruction and study four days a week, resulted in mathematics achievement growth of low achieving students 6th and 7th grade students.

Delimitations

The project was delimited to 68 sixth and seventh grade students assigned to F.I.O math instruction at McClure Middle School in Seattle, Washington.

Assumptions

For the purpose of this study, the following assumptions were believed to be true:

1. The components of curriculum design were appropriate to student need.
2. Mid-course adjustments to the extended day program were necessary and appropriate to improvement of student growth in math.
3. Implementation of Measures of Academic Progress (MAP) provided data to make informed decisions and refinements to the math intervention.
4. A consistent cycle of accountability between administration and instructors was established.

Hypothesis

Low achieving sixth and seventh grade students will achieve more than one-year growth in mathematics achievement as a result of participation in an Expanded Learning Opportunity.

Null Hypothesis

Low achieving sixth and seventh grade students will not achieve more than one-year growth in mathematics achievement as a result of participation in an Expanded Learning Opportunity.

Significance of the Project

A positive outcome of this study provided administrators at McClure Middle School justification and possibly funding for the continuation of an Expanded Learning Opportunity in mathematics. At a district level the model of intervention could be replicated at other Middle Schools. For students, continuation of the Expanded Learning Opportunity might result in higher achievement in math.

If the results of this study were not positive, the administration and math department at McClure Middle School may examine the components of the program and make adjustments to the model. Curriculum, pacing, attendance, and a deeper look at student progress monitoring could lead to further refinements of the initial model. The efficacy of the program might be further measured as their eighth grade students participate in the TIMSS assessment in the spring 2011.

Procedure

For the purpose of this project, the following procedures were implemented:

1. A review of selected literature was conducted with Keisha Scarlett, Vice Principal of McClure Middle School and TuesD Chambers, coordinator of McClure Middle School ELO Program.
2. Permission to conduct research on students was received from McClure Middle School Vice-Principal, Keisha Scarlett. (see appendix A)
3. Sixth and seventh grade student math achievement data was reviewed.
4. Students were assigned to ELO instructors for math intervention, ninety minutes a day for four days a week.
5. The data was subjected to standard statistical technique.
6. Summary, conclusion, and recommendations concluded the study.

Definition of Terms

For the purpose of this study, the following words were defined:

Common Core State Standards. Common Core Standards were academic standards that have been designed using a composite of national standards from high-performing countries such as Singapore, Hong Kong and Korea

Expanded Learning Opportunity: Expanded Learning Opportunity was an intervention model that supplements core curriculum at McClure Middle School. Low achieving students receive an additional ninety minutes of instruction, four days a week

Measures of Academic Progress. The Measures of Academic Progress was the benchmark assessment given to students in Seattle Public Schools. It was administered three times a year, beginning during the 2009 – 2010 school year.

Trends in International Mathematics and Science Study. The Trends in International Mathematics and Science Study was an international assessment that measures student learning in math and science. It was given every four years. More than 60 nations participated in this assessment. In the 2011, eighth grade students from McClure Middle School will participate in this assessment.

Washington Assessment of Student Learning. The Washington Assessment of Student Learning was the state assessment given annually to students up until the 2010 school year.

Acronyms

ARRA. American Recovery and Reinvestment Act

ELL. English Language Learner.

ELO. Expanded Learning Opportunity.

HTLM. High Leverage Teacher Moves.

KIPP. Knowledge is Power Program.

MAP. Measures of Academic Progress.

NAEP. National Assessment of Education Progress.

NCTM. National Council of Teachers of Mathematics.

RttT. Race-to-the-Top.

TIMSS. Trends in International Mathematic and Science Study.

WASL – Washington Assessment of Student Learning

CHAPTER 2

Review of Selected Literature

Introduction

This chapter has been focused around issues of math education and causal factors that influence math achievement levels and intervention. The review of literature compared math education in top achieving Asian countries and the United States. This chapter has been organized around the following topics: (a) The Trends in International Mathematics and Science Study (TIMSS), (b) Curriculum Components and Mathematics Standards, (c) Teacher Preparation and Pedagogy, (d) Student Instructional Time and Expanded Learning Opportunities, (e) Additional Issues In Math Education.

The Trends in International Mathematics and Science Study

The Trends in International Mathematics and Science Study (TIMSS) was an international assessment that measured student learning in math and science. This international assessment has been given every four years to fourth and eighth graders from 60 countries since 1995. While the 2007 assessment reported gains for American fourth and eighth graders, at both levels U.S. students continued to rank below the Asian countries of Chinese Taipei, Korea, Singapore, Hong Kong and Japan as well as European countries. Educational researchers have continued to examine the factors that contributed to the mathematical success of students from a global perspective using TIMSS as a primary resource for such work. Along with more than 60 other nations, the United States will participate in the 2011 assessment, as it has done every four years since 1995. (U.S. Department of Education, 2010) The International Association for the

Evaluation of Educational Achievement (IEA) has served as the international coordinating body for the research. Given the longitudinal nature and enormity of this study, educational policy and reform efforts in content areas of math and science have been shaped by the TIMSS.

Curriculum Components and Mathematics Standards

The National Council of Teachers of Mathematics (NCTM) stated that balance ought to exist between conceptual and procedural learning in mathematical classrooms. (Bosse, Bahr, 2008). Math teachers in the high-achieving nations of Hong Kong and Japan offered more conceptual support to students in linking a better-known math concept to a less familiar one. Teachers in the United States offered less of such supports (Lindsey, 2007). American students were more likely to develop math skills in isolation and then apply skills to problem solving. Asian students learned skills within a primary focus of problem solving. Further, the Asian approach to curriculum stressed depth of comprehension with fewer skill sets leading to mastery. American curriculum in contrast has often been characterized as “a mile wide and an inch deep” (Schmidt, Houang, & Cogan, 2002). U.S. curriculum has been characterized as unfocused, not coherent or rigorous while top achieving Asian curriculum had the opposite description.

Educational researchers, policy makers, and organizations have continuously examined why American students continue to be out-performed on the TIMSS assessment. There has been a clear consensus that one factor that contributed to achievement in high-ranking countries is that they all have highly defined national curriculums based on centralized standards. The education reform effort of the 1980's led

to individual states adoption of core standards. In math, the resulting documents were not equitable in terms of content, clarity and deductive reasoning. In 1989 the National Council of Teachers of Mathematics issued Curriculum and Evaluation Standards for School Mathematics. These focal points provided an outline for states to develop their standards with the aim of improving the teaching and learning of mathematics in U.S. schools (Raimi & Braden, 1998).

The Fordham Institute, a leading national think tank on the advancement of American Education has been tracking and analyzing math standards in all fifty states. Their first report in 1998 evaluated state standards in math. At that time, only three states (California, North Carolina, and Ohio) earned "A" grades, and just nine states earned "B's.". Sixteen states received failing marks (and seven "C's" and 12 "D's"). Math standards were examined and evaluated based on four criteria, clarity, content, reasoning and negative qualities. Their second report issued in 2000 found that of the 47 states that were evaluated in 1998, fifteen of the states had not made any revisions at all. Nine states had raised their math standards grade by two levels.

The No Child Left Behind legislation of 2001 required that all states develop cohesive standards if they were to receive federal funding for education. More than forty states replaced, revised, or augmented their standards. In 2005, the Thomas B. Fordham Institute again reviewed the quality of state math standards for content, writing quality, and clarity of K-12 math standards in each state. The results of the third report yielded a national average grade of "D". One of the recommendations made by the institutes

expert panel lead by David Klein, Professor of Mathematics at California State University-Northridge was that states that did not receive high ratings should look to the standards of the states that did and try to replicate the documents.

The large variance in these findings has led to a movement towards the adoption of one set of national standards. Supporting this movement is the U.S. Department of Education's \$4.3 billion Race-to-the-Top (RttT) competition under the American Recovery and Reinvestment Act (ARRA) and the Common Core State Standards Initiative sponsored by the National Governors Association and the Council of Chief State School Officers. This movement was an opportunity to model U.S. standards from a composite of standards from high-performing countries such as Singapore, Hong Kong and Korea. Standards from these countries were chosen for international benchmarking because of their consistent high performance on the Trends in International Mathematics and Science Study (TIMSS) assessments. (Ginsburg and Leinwand 2009). All of the countries that were ranked above the United States on the TIMSS assessment have one set of centralized standards in contrast to the U.S.

The latest report issued by the Fordham Institute in 2010 compared individual state standards to the standards set forth by the Common Core Initiative. Twelve of the fifty states standards were characterized as "to close to call". The significance of the establishment of Common Core math standards beyond RttT funding was that they provided math educators a more rigorous instructional framework when accompanied by aligned, content-rich curriculum. It was expected that states that have not yet established such standards would look to the Common Core standards as a template for developing high quality standards.

Standards alone did not ensure student learning however. New standards required a new kind of teaching. When setting higher standards for student learning it was requisite that instruction reflects higher standards. Darling-Hammond (2005) stated that teachers “..... should understand learning as well as teaching, who can address students’ needs as well as the demands of their discipline, and who can create bridges between students’ experiences and curriculum goals” (p. 5).

Teacher Preparation and Pedagogy

The quality and type of programs that prepared teachers for teaching Middle School mathematics in the United States varied widely by state and by institution. The Mathematics Teaching in the 21st Century study (2007) indicated that there was significant differences in how United States middle school teachers were prepared to actually teach compared to preparation programs in Chinese Taipei, South Korea, Bulgaria, Germany and Mexico. Mathematical knowledge of future teachers was found highest in Taiwan and Korea. Emphasis on mathematics pedagogy was also highest in the two countries. General pedagogy such as classroom management was highest in teachers from Taiwan. In Germany, teacher preparation was only moderately focused on mathematical content with very little emphasis placed on pedagogy. Teacher preparation in Mexico had little focus on content and with more courses in practical pedagogy.

There was significant concern in the United States in how middle school math teachers come to be qualified. In most states teachers were licensed as K-8 generalists. The National Council of Teachers of Mathematics (NCTM) position was that middle-

school math teachers have what an equivalent to a minor in mathematics at the undergraduate level. The other pathways to becoming a middle school math teacher were to be trained in a secondary education program which lead to a grade sixth or seventh grade through twelfth grade license. There are also teacher preparation programs focused specifically on the middle school in about half of the states. (MT21 Report, 2007) Schmidt (2010) when interviewed by Education Week stated “U.S. future teachers are getting weak training mathematically, and are just not prepared to teach the demanding mathematics curriculum we need especially for middle schools if we hope to compete internationally”. (P.1).

While the teacher preparation gap greatly contributed to differences in middle school math achievement globally, there were significant differences in how teachers continued to develop their practice after receiving their license. Teachers spent 15-20 hours a week working with colleagues, observing other teachers and participating in study groups in other countries such as Germany, Japan and China (Jackson & Davis, 2000). The National Staff Development Council (2009) stated that high-achieving nations offered educators 3 to 5 times the amount of time U.S. teachers have for independent planning. Regular time, 15 – 25 hours per week for activities such as developing curriculum, evaluating student learning, observing classrooms and engaging in study groups supported educator professional development abroad. Teachers who received substantial professional development—an average of 49 hours can boosted their students’ achievement by about 21 percentile points (Yoon, 2007)

The Asian educators approach to teaching and student learning was a

collaborative effort. In Japan and Taiwan, for example, teachers were in charge of classes only about 60% of the time they are in school. The remaining time was dedicated to collaboration with colleagues. Goal setting, planning lessons, assessing student needs and sharing strategies to approach content were components of their activities. Subject matter specialists, such as university faculty may have participated in this type of collaborative effort. (Lewis, 2002).

Instructional Time and Expanded Learning Opportunities

When looking at the average number of school days per year in Asian countries who participate in the TIMSS assessment and U.S., American students have had the shortest school year. An examination of the number of instructional hours per year however yielded a different view. The United States compared relatively close to Korea. There was a significant difference however, to how students in Asian countries spend their time out of school.

All of these high performing countries had well-developed and rigorous “cram schools” where students received additional instruction in various subjects. Mathematics was consistently offered as coursework. In Japan, 90.8% of the parents sent their children to a *juku* or cram school. While tuition for these expanded learning schools varied by age and individual schools they were affordable. At a middle school level, Japanese students could study up to five additional subjects per week for a cost of approximately \$200.00 a month. In South Korea, parent spending on cram schools

represented 2.8 percent of their nation's gross domestic product in 2004 (Economic Cooperation and Development Report 2004). In China, coursework was focused entirely on test taking strategies and practice in content area to pass promotion exams.

American students were receiving more instructional time in a variety of ways. Many school districts have adopted the Response to Intervention Framework (RTI). In this pyramid framework, at the core classroom level, all students received high quality instruction and all students are screened to identify struggling students. At the second tier, students who were "at risk" received additional instruction in small groups, focused on discreet, foundational skill building for a minimum of twenty to forty minutes a day. In the top tier, students may have qualified for special education services, ELL or other services received one-to-one tutoring or other more intensive forms of instruction. Typically, student progress was assessed every eight weeks to determine the effectiveness of instruction and as needed adjustments were made. (Fuchs, Fuchs, Compton et al 2007).

Another way students in the United States may have received expanded learning opportunities is through enrollment in charter schools. It was estimated that there were 4,700 charter schools in forty states. One of the salient features of many charter schools was expanded learning opportunities. The Knowledge Is Power Programs (KIPP) was founded on five core principles, referred to as "Pillars". One of the core principals was that students spend more time in class. Students spent as much as nine and half hours per day in class as well as at least half day Saturdays, similar to the model found in Japan. Additionally, many other charter schools offer expanded learning time.

There were also some states that have implemented expanded learning opportunities. The state of Massachusetts had increased student time in school by as much as 300 hours per year. Similar initiatives have occurred in New York, Connecticut and other states. President Obama as well as Education Secretary, Arne Duncan advocated for extending the school days by minutes or making school summer vacations shorter. "We can no longer afford an academic calendar designed when America was a nation of farmers who needed their children at home plowing the land at the end of each day," Obama said. He continued to say "That calendar may have once made sense, but today, it puts us at a competitive disadvantage. Our children spend over a month less in school than children in South Korea. That is no way to prepare them for a 21st century economy."

Additional Factors that Influence Mathematic Achievement

Cultural homogeneity, and socio-economic status/norms influenced achievement in mathematics. Students from culturally homogeneous countries such as Japan, Korea and Taiwan received instruction in first language. In United States, it is estimated that there were 3.8 million either English Language Learners or ESL students. While ELL students were given accommodations on the TIMSS assessment, the validity of the accommodations has been questioned (Keiffer and Lesaux 2009). Further, ELL students may not have had sufficient content coverage to be successful on assessments even when given accommodations (Abedi et al 2006). The conjecture has been made that sharp decline in the 2007 TIMSS scores in Malaysia may have been attributed to the countries unresolved educational issue of whether to teach in English or the native Malay language.

The support ELL students received in America was considered a civil rights issue. The Equal Educational Opportunities Act of 1974 is a federal law that was created to ensure the right to appropriate language support service until students achieve English proficiency. The Justice Department's Civil Rights Division enforced it. Since President Barack Obama took office in 2009; the Justice Department opened 15 investigations into violations of the law. It is the position of the U.S. Education Department that ELL students should receive special language services until they can participate in all aspects of a schools curriculum without the use of simplified English materials.

Socio-economic status/norms also influence student achievement in mathematics. At the eighth grade, higher levels of parents' education and the presence of books, computers and Internet access in the home were associated with higher average mathematics and science achievement (TIMSS study 2007). The benefits of home computer access with internet is supported by research conducted at Duke University with the caveat that in households where parents monitor computer use effectively students benefit with higher achievement. (Vigor, Ladd 2010).

Summary

The focus of this chapter was to examine the factors that contribute to high mathematical achievement. The components of math education in higher ranking Asian countries and the United States were compared and contrasted. The topics included (a) overview of the TIMMS study, (b) mathematics curriculum components and standards, (c) teacher preparation and pedagogy, (d) instructional time and extended learning

opportunities, (e) additional factors that influence mathematical achievement. The methodology and treatment of data are reported in chapter 3.

Chapter 3

Methodology and Treatment of Data

Introduction

This chapter has been organized around the following topics: (a) Methodology, (b) Participants, (c) Instruments, (d) Design, (e) Procedure, (f) Treatment of the Data and (g) Summary.

Methodology

This quasi-experimental study examined the efficacy of providing an E.I.O to raise student achievement in math instruction at a middle school level. Low achieving students 6th and 7th grade students received an additional 90 minutes of math instruction and study four days a week. Direct instruction in remedial skills, computer based instruction and homework support was given to participants. Pretest and posttest MAP scores were used to measure mean student achievement growth in math.

Participants

A total of 68 low achieving sixth and seventh grade students participated in the E.I.O. The sixth grade students totaled 40 participants. Of the sixth grade students, 20 were female and 20 were male. By ethnicity, the sixth grade participants were comprised of eight Asian, eight Hispanic, 11 Caucasian and 13 African-American. The seventh grade students totaled 28 participants. Of the seventh grade students, 14 were female and 14 were male. By ethnicity, two were Hispanic, six were Caucasian, six were Asian and 14 were African-American.

Instruments

The MAP assessment was utilized as a pretest and posttest to measure mean

student growth. As a computer-adaptive benchmark assessment in reading and math, it was administered 3 times per year during the 2009 – 2010 school year. Teachers were able to access student scores immediately after students completed the tests. The test included detailed teacher reports that showed the specific skills students had mastered or need to work on. In Washington state, 131 school districts used MAP. In the Puget Sound area, these districts included Auburn, Clover Park, Highline, Lakewood and Mercer Island. Across the country, thousands of districts used MAP.

Design

This quasi-experimental study used MAP assessment as a pretest and posttest to measure mean student growth by grade level of the participants. Student growth was defined by the Northwest Evaluation Association's 2008 status Norms. (see table 1)

Procedure

Review of selected literature. A review of literature was conducted and shared with McClure Middle School, Vice Principal, Keisha Scarlett. Additional information was attained from periodicals, the "What Works Clearinghouse", books, government documents, professional journals and Internet articles.

Permission to conduct research. Permission to conduct action research was granted by vice principal, Keisha Scarlett (see Appendix A).

The structure of the McClure Middle School ELO was created through a Professional Learning Community comprised of four middle school math teachers, a math coach, and the Vice Principal. Student data was reviewed. The 2008 – 2009 Math Washington Assessment of Student Learning (WASL) and the Measure of Academic

Progress (MAP) scores were used to determine student placement in the extended day intervention math program. All students who did not pass the math portion on the WASL and scored below grade level norms on the MAP assessment were assigned to the math intervention. Students received an additional one and a half hours of instruction, four days a week. Weekly goals were set towards mastery of number sense. Students received computer-based instruction that was differentiated by skill, using I Can Learn™ software for 30 minutes, problem solving instruction and practice for 30 minutes and lastly, homework assistance for 30 minutes. The expanded day program began in October 2009 and ended in the beginning of May, 2010

The administrative math instructional leader met with each teacher weekly. Lesson plans were reviewed with emphasis on establishment of clear teaching points, student engagement strategies, and formative assessments. Additional team collaboration with the math coach was focused on content knowledge, incorporation of High Level Teacher Moves (HLTMs) and student abilities.

Additional district provided professional development was provided through studio classes, observations and debriefs. Further, the math department had bi-weekly lesson study. Common formative assessments were created using student data from core curriculum as well as Measures of Academic (MAP) data.

Treatment of Data

MAP Growth. The impact of the expanded day math program for sixth and seventh grade participants was evaluated by the mean student growth from fall to spring on the MAP scores. By grade level, the mean student score was calculated.

Summary

This chapter was designed to review the methodology and treatment of data related to the efficacy of the extended day math program for sixth and seventh grade low achieving students at McClure Middle School. The analysis of data and findings from this study are reported in Chapter four.

Chapter 4

Analysis of Data

Introduction

Chapter 4 has been organized around the following topics: (a) Introduction, (b) Description of the Environment, (c) Hypothesis, (d) Null Hypothesis, (e) Results of the Study, (f) Findings, (g) Discussion, (h) Summary.

Description of Environment

McClure Middle School was located in the city of Seattle, in Washington State. McClure was located in the Queen Anne neighborhood. The school was comprised of 552 students represented by 2% American Indian, 26% Asian, 19% African American, 10% Hispanic and 43% Caucasian. The number of students who qualified for free and reduced lunch was 262 or 47%.

Hypothesis

Low achieving sixth and seventh grade students will achieve more than one-year growth in mathematics achievement as a result of participation in an Expanded Learning Opportunity.

Null Hypothesis

Low achieving sixth and seventh grade students will not achieve more than one year of growth in mathematics achievement as a result of participation in an Expanded Learning Opportunity.

Results of the Study

In the fall, all sixth and seventh grade students at McClure Middle school were administered the MAP assessment. Following this assessment, 68 sixth and seventh

grade students were assigned to the math expanded learning opportunity. The mean MAP point for all students assigned was 213.46. The grade level equivalency for the mean score was 1.76 points above the grade level equivalency of a fifth grader at the beginning of the year student, based on MAP 2008 Status Norms.

Grade Level	Beginning of Year Mean	Mid Year Mean	End of Year Mean
Fifth Grade	211.7	216	219.2
Sixth Grade	218.3	221.4	223.8
Seventh Grade	224.1	226.4	236.3

Table 1: MAP Status Norms

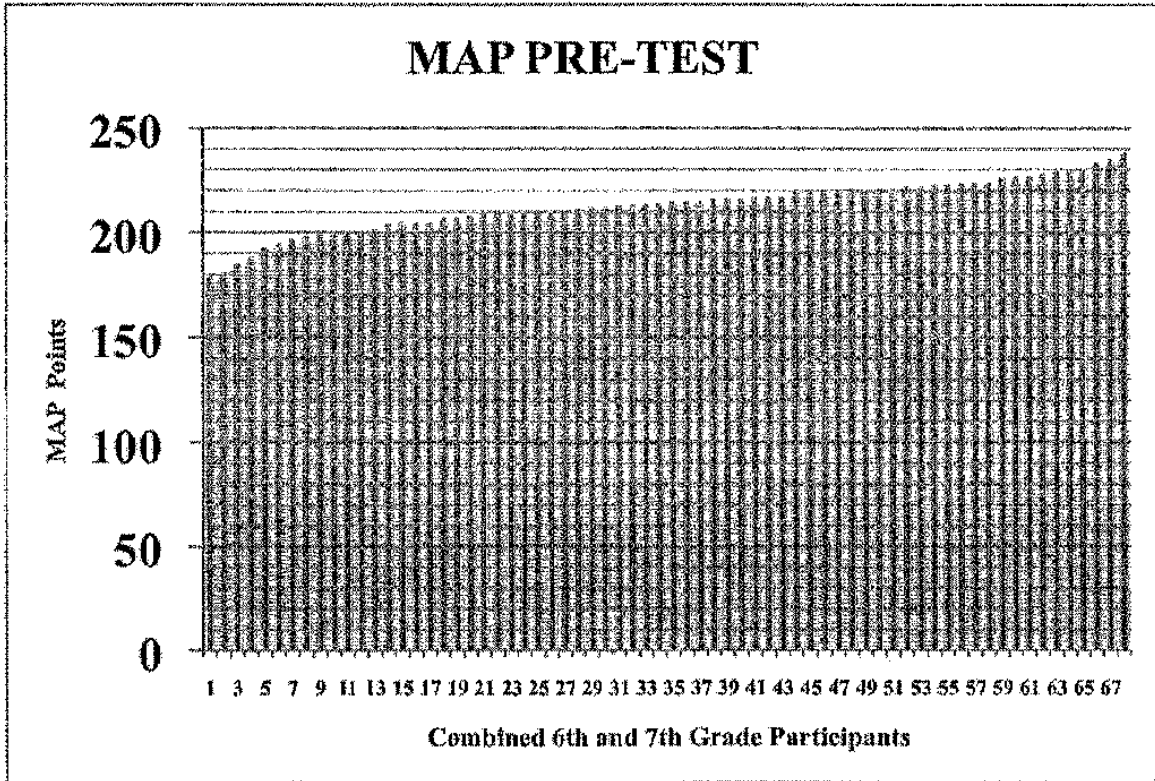


Figure 1: MAP Pre-Test Combined 6th and 7th Grade Participants

Of the total participants, 40 sixth grade students assigned to the math Expanded Learning Opportunity. The mean Pre-Test MAP points for sixth grade students assigned was 211.4. This was .3 points below the grade level equivalency of a fifth grader at the beginning of the year student, based on MAP 2008 Status Norms. This score was considered to being one year below grade level for math.

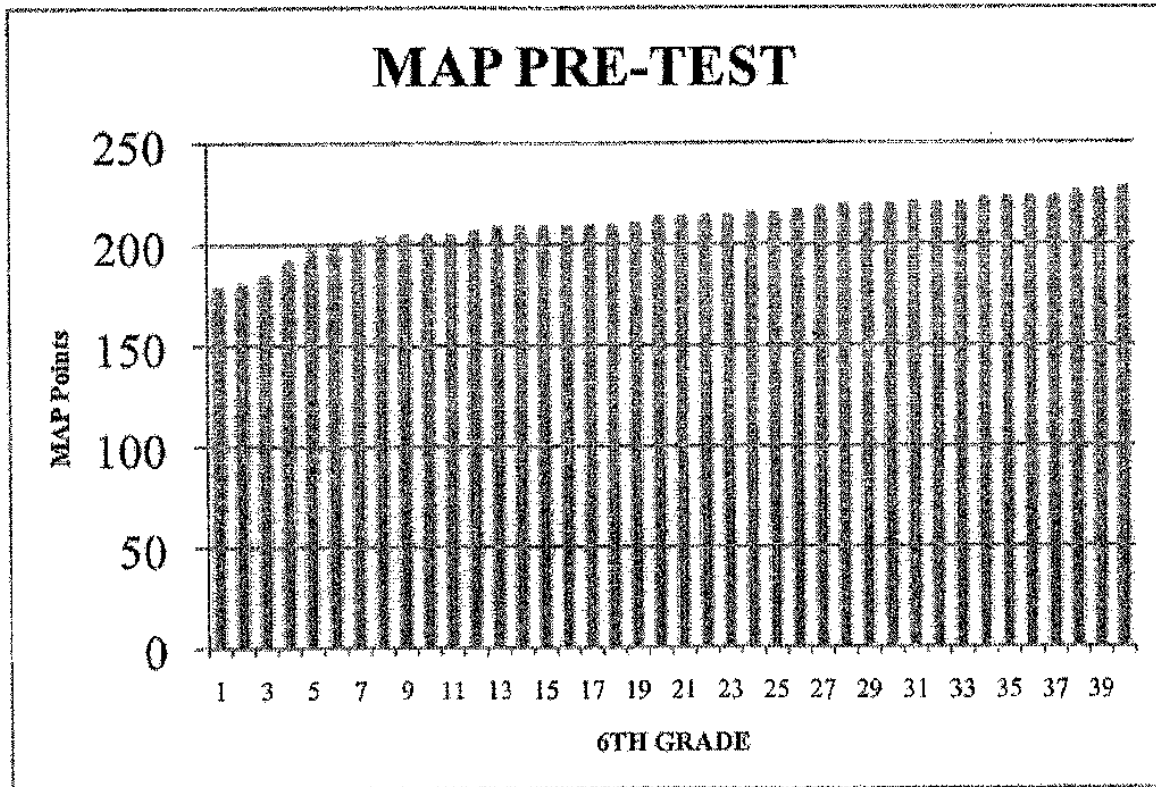


Figure 2: MAP Pre-Test Sixth Grade Participants

Of the total participants, 28 seventh grade students were assigned to the math Expanded Learning Opportunity. The mean Pre-Test MAP points for seventh grade students assigned was 215.3. This was .7 points below the grade level equivalency of a fifth grader at the middle of the year student based on MAP 2008 Status Norms. This score was considered to being a year and a half below grade level in math.

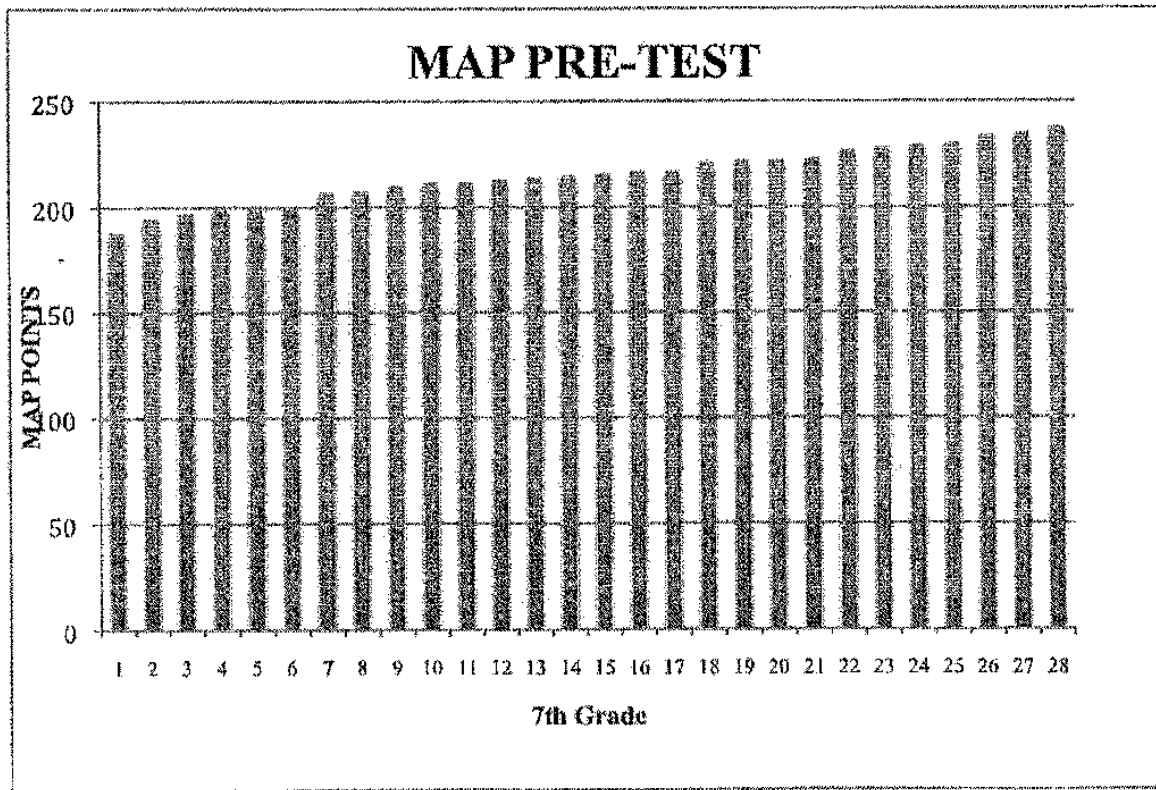


Figure 3: MAP Pre-Test Seventh Grade Participants

In the spring, 40 sixth and seventh grade students at McClure Middle school were administered the MAP assessment. Prior to this assessment, 68 sixth and seventh grade students were assigned to the math expanded learning opportunity. The mean points for all students on the MAP post-test were 221.25. The mean score was .15 points below the grade level equivalency of a sixth grader at the middle of the year, based on MAP 2008 Status Norms. Overall, the mean gain of all participants in the expanded learning opportunity was one and a half years growth.

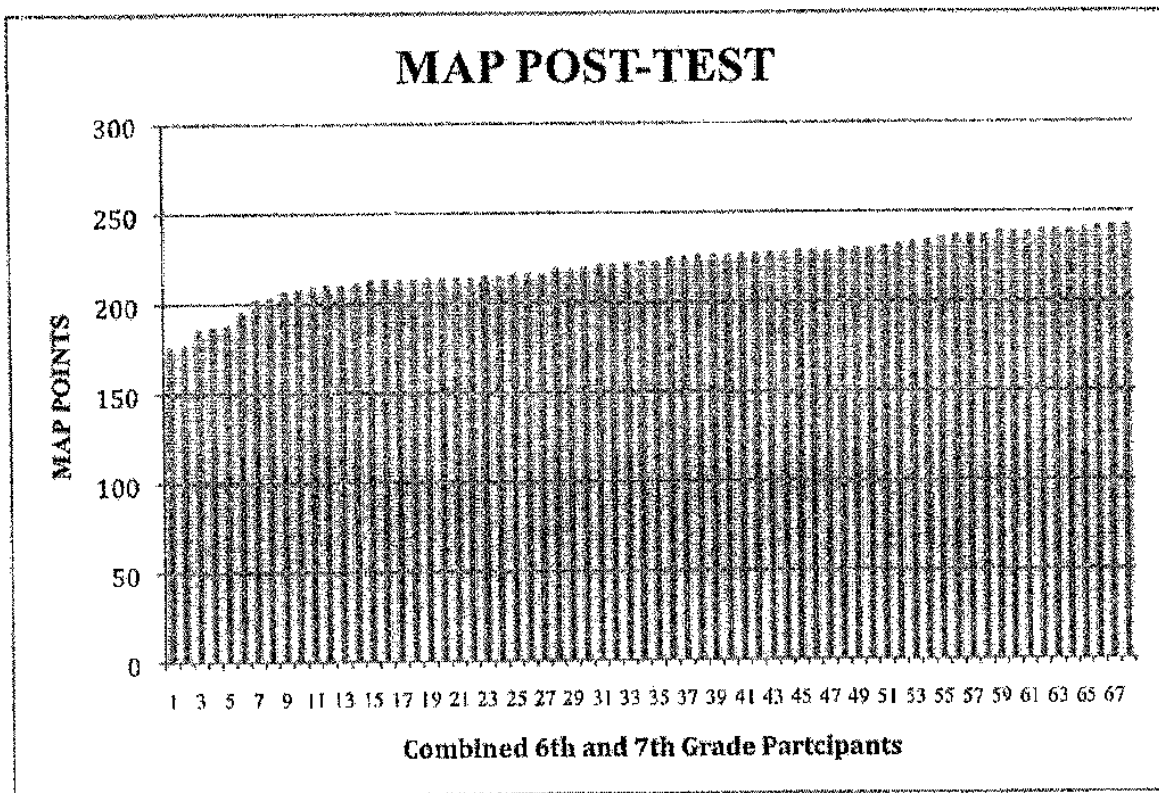


Figure 4: MAP Post-Test Scores Combined 6th and 7th Grade Participants

The mean Post-Test MAP points for sixth grade students assigned to the expanded learning opportunity in math was 219.2. This was .8 points above the grade level equivalency of a sixth grade at the beginning of the year student, based on MAP 2008 Status Norms. The sixth grade students made slightly more than one years growth in math after participating in the math expanded learning opportunity.

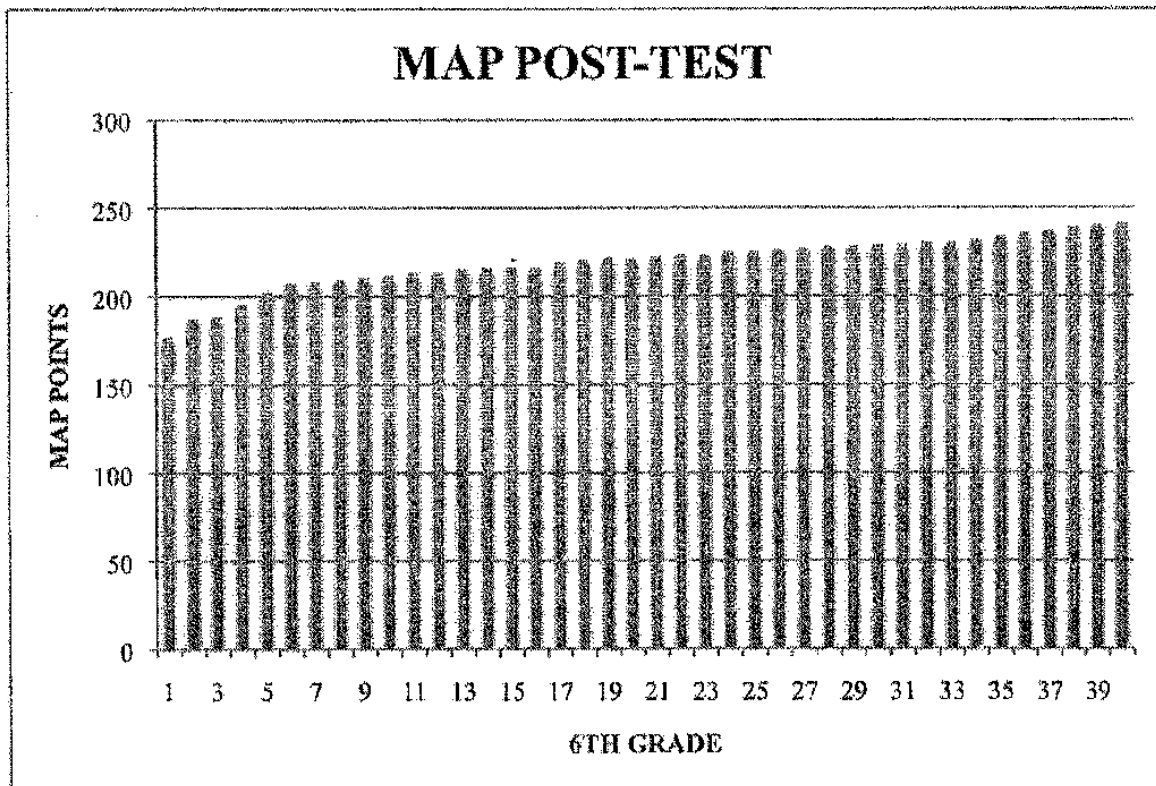


Figure 5: Map Post - Test Sixth Grade Participants

The mean Post-Test MAP points for seventh grade students assigned to the expanded learning opportunity in math was 223.3. This was .5 points below the grade level equivalency of a sixth grade student at the end of the year, based on MAP 2008 Status Norms. The seventh grade students made slightly less than one and a half year's growth years after participating in the math expanded learning opportunity.

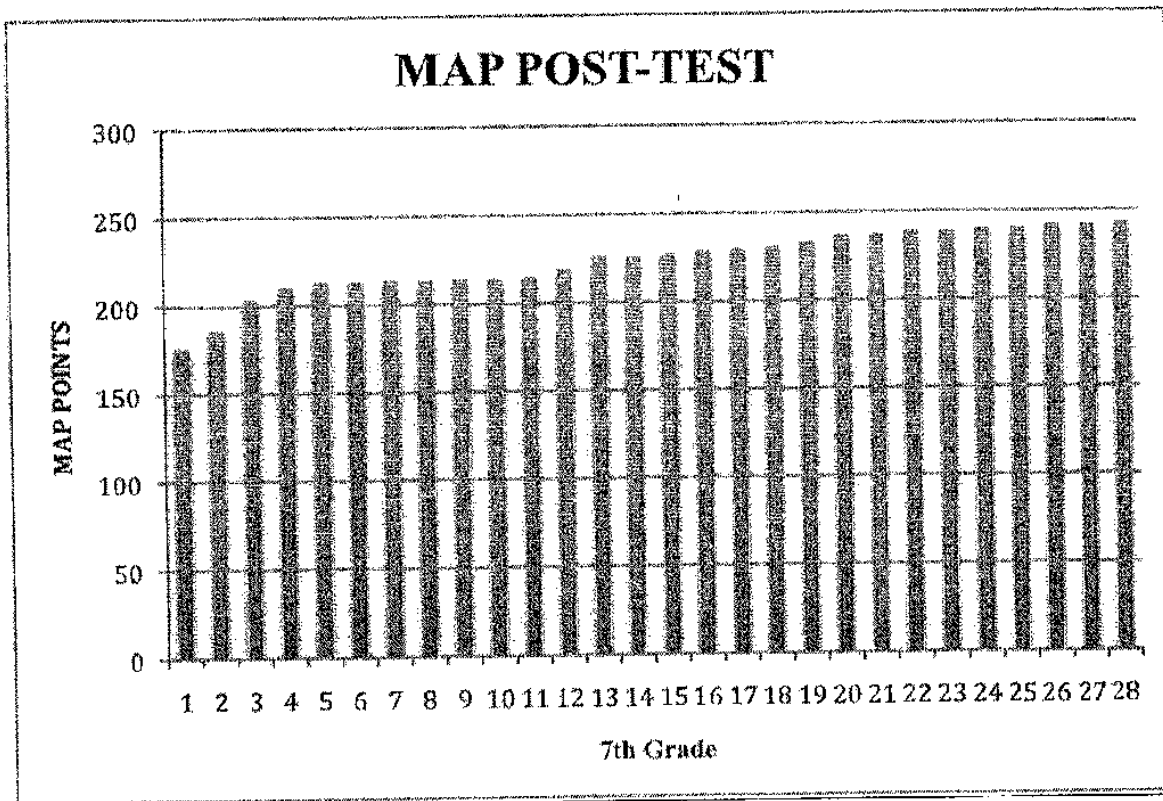


Figure 6: Map Post - Test Seventh Grade Participants

Findings

Based upon the analyzed data, the following findings were listed:

1. All sixth and seventh grade students who participated in the math expanded learning opportunity made more than a years growth based on MAP Pre-Test and Post-Test data.
2. Sixth grade students made slightly more than one years growth.
3. Seventh grade students made slightly less than one and a half years growth.
4. Student achievement in math was accelerated by participation in the expanded learning opportunity.

Summary

This chapter was designed to analyze the data and identify the findings. From the analyzed data, the research question was answered. Chapter 5 will summarize the study, draw conclusion and make recommendations.

Chapter 5

Summary, Conclusions, and Recommendations

Introduction

Chapter 5 is organized around the following topics: (a) summary, (b) conclusions, and (c) recommendations.

Summary

The purpose of this study was to determine whether or not sixth and seventh grade student participation in the math expanded learning opportunity would accelerate achievement at McClure Middle School. Chapter one explained why the administration and teacher leaders at McClure Middle School collaboratively created an ELO program to raise student achievement in mathematics. This chapter also described the impact low achievement in math has on our society. The review of literature in chapter two was focused on how educational policy and reform efforts are shaped by TIMSS. It also contrasted curriculum components and standards of high achieving Asian countries and the United States. Further the chapter offered a comparison of teacher preparation and pedagogy between the United States and other countries. The differences of instruction time and ELOs were also discussed. Chapter three documented the methodology and treatment of data in the study. Chapter four was focused on an analysis of the data.

Conclusions

Based upon the findings, several conclusions were drawn:

1. Students can exceed more than one year's growth in mathematics when given expanded learning opportunities.

2. McClure Middle School is closing the mathematics achievement gap for students who are significantly below grade level in math.
3. The math intervention model at McClure Middle School is worthy of replication in Seattle Public Schools.
4. The instructional model of McClure Middle School's math department represents best practices in math education found in higher achieving Asian countries.

Recommendations

Based upon the conclusions, the following are recommended:

1. Students who are significantly below grade level in mathematics should continue to have expanded learning opportunities.
2. McClure Middle School should continue to progress monitor the growth of participants at the seventh and eighth grade levels during the 2010 – 2011 school year as a cohort.
3. McClure Middle School should further document their design of their math intervention model for possible replication at other middle schools in Seattle Public Schools.
4. McClure Middle School should continue and expand the use of the I Can LearnTM software.
5. During the 2010 – 2011 school year McClure Middle School should document the achievement of eighth grade students who have participated in the intervention model following the TIMSS assessment given in the spring.

References

- Abedi, J., Courtney, M., Leon, S., Kao J., Azzam, T.,(2006). English Language Learners and Math Achievement: A Study of Opportunity to Learn and Language Accomodation.. *The UCLA Board of Regents*.. Retrieved on August 20, 2010 from www.cse.ucla.edu/products/reports/R702.pdf
- Braams, B., Braden, L., Finn, C., Klein, D., & Parker, Initials. (2005, January 5). *The state of math standards 2005*. Retrieved on August 15, 2010 from http://www.edexcellence.net/detail/news.cfm?news_id=338
- Bossé, M. J. and Bahr, D.L. (2008) The State of Balance Between Procedural Knowledge and Conceptual Understanding In Mathematics Teacher Education. *International Journal for Mathematics Teaching and Learning*, 25th Nov 2008, Centre for Innovation in the Teaching of Mathematics. Retrieved on August 16, 2010 from www.cimt.plymouth.ac.uk/journal
- Carmichael, S., Martino, G., Porter-Magee, K., Wilson, W. (2010) The State of State Standards and the Common Core in 2010. Thomas B. Fordham Institute. Retrieved on August 19, 2010 from www.edexcellence.net/commoncore/
- Darling-Hammond, L., Holtzman, D., Gatlin, S., & Vasquez Heilig, J. (2005). Does Teacher Preparation Matter? Evidence about Teacher Certification, Teach for America, and Teacher Effectiveness.. *Education Policy Analysis Archives*, 13, 42. Retrieved on August 19, 2010 from <http://epaa.asu.edu/ojs/article/view/147>

- Fuchs, L. S., Compton, D. L., Fuchs, D., Paulsen, K., Bryant, J. D., & Hamlett, C. L. (2005). Responsiveness to intervention: Preventing and identifying mathematics disability. *Teaching Exceptional Children*, March/April, 60-63
- Ginsburg, A., Leinwand, S., & , Initials. (2009, April). *Measuring up: how the highest performing state (massachusetts) compares to the highest performing country (hong kong) in grade 3 mathematics*. Retrieved August 21, 2010 from <http://hub.mspnet.org/index.cfm/18028>
- Jackson, A., & Davis, G. (2000). *Turning Points 2000: Educating adolescents in the 21st century*. New York: Teachers College Press.
- Kieffer, M.J., Lesaux, N.K., Rivera, M., & Francis, D.J. (2009). Accommodations for English language learners on large-scale assessments: A meta-analysis on effectiveness and validity. *Review of Educational Research*, 79, 1168-1201.
- Lewis, C. (2002). Does lesson study have a future in the united states?. *Nagoya Journal of Education and Human Development*, January 2002, No. 1, pp.1-23
- Organization for Economic Co-Operation and Development OECD 2004 *Learning for Tomorrow's World – First Results from PISA 2003*. Retrieved August 16, 2010 from www.oecd.org/.../0,3343,en_2649_33721_34405978_1_1_1_1,00.html
- Richland, L. (2007). Teaching gap exists between u.s., asian educators. Manuscript submitted for publication, Department of Education, University of California, Irvine, California. Retrieved on August 26, 2010 from http://www.gse.uci.edu/spotlight/2007_may.php

Quaid, L. (2009, September 27). Obama says kids need longer school days, shorter summers. Retrieved on August 12, 2010 from <http://washingtonexaminer.com/news/nation/>


Schmidt, W., McKnight, C. C., Houang, R. T., Wang, H. C., Wiley, D. E., Cogan, L. S. & Wolfe, R. G. (2001). *Why schools matter: A cross-national comparison of curriculum and learning*. Indianapolis IN: Jossey-Bass.

Trends in International Mathematics and Science Study 2008. Boston College, Lynch School of Education

Yoon, K.S., Duncan, T., Lee, S.W., Scarloss, B., & Shapley, K.L. (2007). *Reviewing the Evidence on how Teacher Professional Development Affects Student Achievement*. (Issues & Answers Report, REL 2007-No. 033). Washington, DC: US Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.

Appendix A
Permission to Conduct Research

I, Keisha Scarlett, give Shirley Mae Andersen permission to conduct her research project for the Masters in Education Degree at Heritage College during the 2009 – 2010 academic school year at McClure Middle School.



Keisha Scarlett, McClure Middle School Vice-Principal

