Engagement and Perception's Influence on Achievement

Pathfinder Elementary

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11-25-12

Abstract:

Can increasing student perception and engagement though alternative teaching methods, such as introducing math in an everyday context improve student test scores. Literature on this subject suggests improving student engagement and introduction of math in everyday applications can improve student comprehension.   This study looks at a second grade classroom in rural Michigan. Nine different data sources were utilized including a pre and post study parent survey, a daily classroom observational chart, conference interviews, comparison of pre and post-test of lessons taught traditionally and using everyday math, a teacher journal of observations made during lessons, an evaluation of student report cards, and comparisons of state standardized test and district objective scores. The study found student improvement regardless of lesson delivery, and improved engagement with introduction of everyday math. As a result of this study, introduction of more everyday math in the second grade classroom can lead to better engagement.

Introduction:

When asked, students and parents rarely say math is easy, nor do they say it is their favorite subject in school. This leads to the question, "Does this negative perception result in poor achievement in math?" Teaching second grade in a small rural, predominantly white school district in Michigan, I see students who perform marginally on district and state standardized tests in math. In a classroom which gets good parent involvement many students and parents view math as difficult and not fun, rarely is math the student's or parent's favorite subject.

Understanding the underlying assumption that poor perception and self-efficacy in math, by both students and their parents negatively affects learning and understanding, the question can be raised "How can a teacher improve math's perception?" Two methods to improve math's perception is relating math to the everyday world, showing students and parents how math is everywhere. A second method is to introduce alternative teaching methods and technology in math instruction ultimately improving math's negative perception.

Area-of-focus Statement:

This research will focus on alternative instructional methods to lead to better engagement and perception of math by students and parents, resulting in better test scores in a second grade classroom.

Research Questions:

1. How does use of alternative teaching methods which utilize technology improve student and parent engagement?

2. How does a focusing the importance of math in the everyday world lead to better student and parent engagement.

3. What is the effect of improved perception and engagement on student comprehension and test scores?

Definition of variables:

Now an area-of-focus and research questions have been identified it is important to define the variables. According to Mills (2011), theses definitions should "accurately represent what the factors, contexts and variables *mean to you*" the researcher (pg. 61). This project focuses on many variables or factors.

Two important variables are perception and engagement. While these two variables have different definitions and meanings they often can be related or linked. Traditionally mathematics has been perceived as a "hard" or "difficult" subject, where only the really smart kids succeed. Munafo hoped to "figure out what I could do as their teacher to inspire**"** (2007). Inspiration is often directly related to perception and engagement. Perception is often fostered by the student's parent's perception of math's difficulty, if the parents think math is hard and not applicable in the real world they will reinforce their child's negativity. Closely related to the definition of perception is engagement. Simply state engagement is the student's interest in the subject. In other words, does math excite and peak the student's interest enough for them to invest their time and effort.

Another variable important variable in this action research study is what is meant by technology and alternative instructional methods. First, one must understand what meant by traditional teaching methods to understand their alternatives. Traditionally, methods to teach second grade mathematics involve classroom lecture, homework, memorization and drills surrounding set lesson plans handed down from teacher to teacher. Therefore, a non-traditional method would be something outside these standard instructional methods used for decades.

Technology would also play an important role in these non-traditional methods. Technology today is so much more than just a calculator; it is an mp3 player, digital camera or computer. This technology could then inspire, engage and excite the student to the everyday uses of math.

The final variables needing to be defined are what specifically how is comprehension or understanding measured and what specific areas the study will focus upon. This project will focus on comprehension of several areas of second grade mathematics. These areas include addition, elapsed time, and money. In the classroom to be studied student comprehension and learning is measured several different ways. Each student's competency in district wide math outcomes is evaluated by the teacher. Each student is evaluated as having mastered, not mastered or in progress for each specific math outcome. Another method to determine comprehension is the Michigan Education Assessment Program (MEAP). In this study, improvement in comprehension and test scores can now be defined as improvement in mastery levels of the district wide competencies and overall improved MEAP scores.

Review of Literature

Boaler, J. (1993). The role of contexts in the mathematics classroom: do they make mathematics more "real"? For the Learning of Mathematics, 13(2), 12-17.

This journal articles addresses a specific element of this research project, the connection between math and the real world. According, to Korzym, you need to make sure your action research is valid, accurate and real (2007). This validity is important in the types of data collection used but also relates to whether the fundamental concept to be explored is truly important. This source looks at math and its application in the real world but questions methods of application and analysis whether the traditional methods are truly effective. This

study hopes to apply math to the real world and this article suggests one has to be careful of the context one uses to apply math in the real world to be effective.

Brown, S.M., & Wallberg, H.J. (1993). Motivational effects on test scores of elementary

students. The Journal of Educational Research, 86(3), 133-136

Like Mills suggests, a text should allow a researcher to immerse themselves into the related literature helping them to clarify all issues they need to consider in order to solve the problem (pg. 45). This related study does not address parent student perception of math. It does not evaluate alternative teaching techniques, like our research project. What this study does, is evaluate how positive influences, in the case of this study, and positive inputs in test instructions, can lead improved test scores. The study compared two types of math instructions on a test, one with standard test instruction language, the other with positive suggestions or motivational type instructions. The study found students performed better when provided motivational instructions as opposed to the standard. This relates to the research project assumption of how a positive perception or increased motivation can result in better test scores.

Fermanich, M. Leon. (2003). *School resources and student achievement: The effect of school-level resources on instructional practices and student outcomes in Minneapolis public schools.*

This research examined resources the teacher has in the classroom. The study focused on fifth grade math classes in an urban school district. In short, the study looked at the relationship of student achievement in relation to the resources the school provided the teacher. In other words, does the amount of resources affect student achievement?

This area of research has a direct impact on the action research related to mathematics in a rural second grade classroom. The study focused on resource allocation for professional development for math. Teachers who participated in school wide professional development experience improved student engagement. This suggests professional development provides instructors with fresh new ideas, which in turn excite them on the subject which translates into better student engagement.

Hargis, J, & Marotta, S. (2011). Using flip camcorders for active classroom metacognitive reflection. *Active Learning in Higher Education*, *12*(1), 35-44.

This journal article from Active Learning in Higher Education uses technology, specifically Flip digital camcorders to engage and excite students in a subject. This source provides a basis for taking one medium such as a video camera and making it useful and connected to mathematics. Similar to the other sources, this article provides promising practice with a unique perspective.

This example of student engagement incorporates technology, and more importantly fun. "Faculty identified innovative methods to integrate the camera into the classroom teaching, which resulted in more engagement and positive student outcomes" (Hargis & Marotta, 2011). The Flip camera uses studied in the article could then be combined with the parent involvement discussed in the previous source to help facilitate the engagement of both the parents and the student.

Kanter, PF, Darby, LB, & Toth, R. (1999). *Helping your child learn math*. Jessup, MD, U.S. Department of Education.

This U.S. Department of Education book provides ideas and suggestions for families to incorporate math in the home. While it was originally written in 1999 it has been reprinted many times and is still relevant today. This text addresses both aspects to be investigated in the action research project. First, the text addresses the negative perception given to math. "Although parents can be a positive force in helping children learn math, they also can undermine their children's math ability and attitudes by saying things such as: "Math is hard" (Roth, Darby & Toth, 1999, pg.1).

The text also provides promising practices for parents' suggesting ways to introduce math in the home and engage their child. Sections include math in the home, math in the grocery store, and math on the go as just a few examples. These practices can then be reinforced in the classroom. This text will also provide me inspiration and an example of how to apply math in the real world.

Kosciolek, S. Ann. (2003). *Instructional factors related to mathematics achievement: Evaluation of a mathematics intervention.*

This source has specific implications to the classroom to be studied. Again, it is a study involving technology; specifically computer based instructional management system called Accelerated Math. The classroom which is the focus of the action research also has used this exact program. However, in the past year, due to financial limitations this program has been eliminated. This study looks at the impact of Accelerated Math on student achievement and engagement. Once again, technology, engagement and achievement find a connection.

Michigan Department of Education, Office of School Improvement. (2006). *Mathematics grade*

  level content expectations (v.12.05). Lansing, MI: State of Michigan.

 Before one can begin on a journey they must first understand where they are headed. This

resource is the State of Michigan's grade level content. This document establishes what areas

of instruction are required in the classroom. This grade level content "provide(s) a set of clear

and rigorous expectations for all students and provide teachers with clearly defined statements

of what students should know and be able to do as the progress through school" (Mathematics

grade level content expectations, 2006).

Wilburn, J., Keat, J., & Napooli, M. (2011). *Cowboys count, monkeys measure, and princesses*

  problem solve: Building early math skills through storybooks. Baltimore, MD: Brookes

  Publishing Company.

 This book demonstrates how a teacher can use stories to engage students reference

mathematics. It provides examples of stories in which math is incorporated into everyday

life. This text functions as a guide for finding new ways to implement math in everyday and

includes stories designed to be used in the first through third grade.

Pajares, F, & Graham, L. (1999). Self-efficacy, motivation constructs, and mathematics

  performance of entering middle school students. Contemporary Educational Psychology,

  24(2), 124-139.

 This is a study involving middle school students and mathematics. The study looked at

self-efficacy or the student's belief in their own abilities as it relates to motivation.

"According to Bandura's (1986) social cognitive theory, self-efficacy beliefs-their judgments of confidence to perform academic tasks or succeed in academic activities-predict the subsequent capabilities to accomplish such tasks or succeed in academic activities" (p. 124). This study directly relates to this research project several ways. While it study uses middle school students, the premise is close to the questions asked in this research project as it relates to motivation, perception (self-efficacy) and performance. This study focused on the relationship between self-efficacy and performance, specifically how those with a positive math outlook scored higher; while this study focuses on does an increase or change in self-efficacy improve scores.

Weinstein, C, & Mignano, A. (2003). Elementary classroom management: lessons from research and practice. Boston: McGraw-Hill.

This educational text focuses on classroom management at the elementary level. While this research project is not about classroom management, this text does have some valuable insight. Specifically, this text has chapters with ideas and techniques about dealing with families. A action research project involves both student and family and develop solid methods to communicate and include families would be beneficial. This updated third edition provides insight into concerns such as student apathy and motivation. Also, at the elementary level classroom management and methods an instructor uses can play an important role in student perception of the subject being taught. Therefore, developing sound classroom methods which improve student engagement and motivation are equally important as the subject being taught. If the student does not like the teacher or their methods, it does not matter what they teach the student will have a negative outlook towards the subject.

Description of proposed intervention or innovation:

This action research project will provide motivation to parents and students to improve their overall perception of mathematics. The project will also implement alternative teaching methods utilizing technology to excite and engage the students about math. The three district and state objective involving addition, elapsed time and money will be taught using alternative teaching methods utilizing technology and everyday applications.

Data Collection Plan:

Research Questions	1	2	3
1. How does use of alternative teaching methods which utilize technology improve student and parent engagement?	Pre/Post survey	Teacher Chart	Parent/student interview
2. How does a focusing the importance of math in the everyday world lead to better student and parent engagement?	Pre/Post-test standard	Pre/Post-test utilizing applications	observation journal

3. What is the effect of improved perception and engagement on student comprehension and test scores?	Report Cards	Standardized test scores	District evaluations

Research Question 1:

How does use of alternative teaching methods which utilize technology improve student and parent engagement?

Data Collection 1:

The first data collection tool used to evaluate if alternative teaching methods which utilize technology will improve parent and student engagement is a Pre/Post parent survey. This survey will be administered at the beginning of the project and upon its completion. A comparison how students and parents answer the pre and post survey will illustrate if the introduction of technology improved student and parent perception. As Mills suggests, this form or questionnaire will allow the researcher to collect large amounts of data in relatively short period of time (p. 83).

Data Collection 2:

The second data collection tool used to evaluate if alternative teaching methods which utilize technology will improve parent and student engagement is teacher observations chart. The teacher will keep a daily chart of observations during the unit instruction. The instructor will become an active participant observer. These observations will focus on student motivation, engagement, and overall class attitude during the instructional process. These observations can then be used to help determine if the students were engaged.

Data Collections 3:

The third data collection tool used to evaluate if alternative teaching methods which utilize technology will improve parent and student engagement is parent and student interview at the end of the unit and at conferences. This data collection tool can be specific to the question of the alternative teaching techniques and their ultimate effect on parent and student perception and motivation about math. These interview questions can be guided and then responses can be categorized and evaluated to see if perception did improve for specific students and parents. It may also allow for the researcher to discern if perhaps a parent's perception did not improve while the student's did.

Research Question 2:

How does a focusing the importance of math in the everyday world lead to better student and parent engagement?

Data Collection 1:

The first data collection tool used to determine how does focusing on the importance of math in the everyday world lead to better student and parent engagement is a pre and post-test using standard math assessments. The pre-test and post-tests will focus on strictly the district objectives using traditional math assessments. These tests will show how students perform with the traditional math assessments, which do not connect the math to the everyday world. The results of this data will hopefully show low scores and understanding.

Data Collections 2:

The second data collection tool used to determine how does focusing on the importance of math in the everyday world lead to better student and parent engagement is a pre and posttest focusing on connection of math in the real world. These tests will focus on the same concepts covered in above data collection methods however; the questions will relate the subject matter to the real world and test real world applications. While testing the same material and outcome, this "real world" test may show increased understanding.

Data Collections 3:

The third data collection tool used to determine how does focusing on the importance of math in the everyday world lead to better student and parent engagement will be a teacher observation journal. Understanding, the most cumbersome part of research project is writing the data analysis (Korzym, 2007) the researcher should not shy away from difficult or time consuming collections methods either. While a journal of observations of the students during the instructional and testing, which covers things such as student comments, mood, facial expressions may be a difficult and cumbersome task resulting in difficult analysis, it may prove to be the most beneficial.

Research Question 3:

What is the effect of improved perception and engagement on student comprehension and test scores?

Data Collection 1:

The first data collection tool used to determine the effect of improved perception and engagement on student comprehension and test scores will be the student's report cards. During the project several different assessments will be used in the lesson from homework, quizzes and classroom discussion to suggest just a few. Through evaluation of the student's report cards or more specifically their grades on specific lessons comprehension can be determined.

Data Collection 2:

The second data collection tool used to determine the effect of improved perception and engagement on student comprehension and test scores will be standardized test scores. Standardized test scores can provide empirical data both on scores of the current students and past students. It will allow a comparison between classes which utilized alternative teaching and technology and those that did not. It will also provide a mechanism to compare students from across the district and state on the core curriculum requirements.

Data Collection 3:

The third data collection tool used to determine the effect of improved perception and engagement on student comprehension and test scores will be the district outcomes. This data collection tool again will provide both current and historical data. While standardized test provide empirical data, the district outcomes are similar. The state outcomes and district outcomes are listed and the instructor determines which outcomes the student has mastered, is currently in progress and those they have not mastered. This data tool provides quantitative data which can then identify students who comprehend or mastered the material. These outcomes can be more specific then some of those identified through standardized test and report cards.

Data Analysis:

How does use of alternative teaching methods which utilize technology improve student and parent engagement? The first step to measuring improvement as it relates to engagement is

to compare engagement before and after an implementation of a new idea or technique. The first data source was utilized to gage both student and parent engagement, on all subjects not specifically math.

The pre survey measured three core concepts. First, it asked the parents' favorite subject. The parents were not given a choice and could fill in any subject they choose. Six different subjects were identified as favorite subjects of the parents. These subjects included language arts or English, math, social science, science, gym and art. No single subject dominated as a favorite subject of parents, however the subjects which received the most votes was math, with language arts, science and art all tying for second.

Parent Pre Survey:

Respondents were asked to pick word which best describes each subject.

Subject	Fun	Challenging	Exciting	Hard	Interesting	Boring
Language Arts	4	2		1		2
Math	1	1	2	1	3	1
Social Science	1		2		5	1
Science	3		4		1	1
Gym	6	2	1			

The pre survey given to the students produced much different results. Unlike the parent's survey, where parents were allowed to pick any subject, the student survey required the students to vote for their favorite subject from a list provided. Students could vote for gym, language arts, science, math or social studies. Similar to the parent survey all subjects received votes. Two subjects dominated in the student's choice of favorite subject, specifically gym and social science.

Students were asked to pick their favorite subject from a list on the board:

Gym	6
Language Arts	3
Science	3

Math	4
Social Studies	6

22 total

The second core concept measured by the pre survey use of math in the home. The parents overwhelming acknowledge the use of math in the home at a rate of eighty percent of the respondents stating they used math at home. In contrast the students overwhelming believed they did not use math at home with only thirty-two percent or a third of the students stating they used math at home.

The final concept measured by the survey was the parent's and student's perception of difficulty of homework.   Parents were asked to rate the difficulty of homework in each subject on a scale of one to five. The survey showed parents found math homework the hardest with an average of 3.4 on a scale of one to five. Similarly the students found math as least favorite, but surprisingly language arts also was identified by the students.

Parents Pre-Survey Perception of Homework Difficulty:

Respondents were asked to rate difficulty of homework on scale of 1-5.

Language Arts	Math	Social Science	Science
1	2	3	2
1	4	5	5
1	2	1	1
3	5	2	5
3	2	3	3
3	2	2	2

Students were asked their least favorite subject:

Class Pre Survey

Gym	1
Language Arts	6
Science	5
Math	6

Social Studies	3

22 total

The parents post survey explored two of the three core concept, specifically use of math at home and difficulty of homework by subject. This survey like the pre-survey was voluntary and distributed at conferences. The participation in the parent post survey was much less than pre-survey, but did provide some interesting conclusions. One hundred percent of the parents agreed they used math in the home for everyday things. With regards to homework's difficulty, parents found all subjects statistically equal with regards to difficulty, however the level of difficulty of homework across the board was rated as easier.

Parents Post Survey:

This survey received limited response and only focused on describing subject, use of math at home and perceived difficulty of homework.

Subject	Fun	Challenging	Exciting	Hard	Interesting	Boring
Language Arts	1	1		1	1	1
Math		1	2	1		1
Social Science		1	1		3	
Science	1		1		2	1
Gym	4		1			

The students post survey provided different results. As should be expected with the utilization of everyday math lessons in the classroom, the students now recognize they do use math in the home. The survey showed all students polled agreed they used math in the home. The post survey also showed a shift in what subjects the students identified as their favorite. Gym no longer dominated and all subjects except social studies gained in votes as a favorite subject. While social studies was identified as the favorite subject of the most of the students receiving twenty-seven percent of the vote as favorite subject in the pre survey and twenty-nine percent in the post survey.

Class Post Survey results Favorite Subject:

Gym	3
Language Arts	4
Science	4
Math	4
Social Studies	6

21 total

The second data source collected was a teacher conducted survey on three areas. Ten separate math lessons were monitored. Three areas were evaluated through a teacher observation chart. Areas monitored by the instructor were motivation, engagement and an overall impression of the class. The instructor graded the class on a scale of one to five in relation to motivation and engagement, the overall class attitude was given a positive, negative or neutral grade. Lessons were delivered in traditional first and then one using technology next. The final two lessons were both using technology.

An underlying assumption was that introduction of technology into the lesson would increase student engagement and learning. In analysis of this data, student engagement and motivation were increased by the introduction of technology in the lesson. However, this motivation and engagement diminished as the technology was used regularly. As the students used technology more and more in the classroom, their motivation and engagement decreased to level it was without utilizing technology. This suggests the change in motivation and engagement was more about the change or something new, then necessarily the use of technology. (Appendix C)

Teacher Observation Chart:

Dates	10-4	10-5*	10-11	10-12*	10-19	10-20*	10-25	10-26*	10-28*
Motivation	2	5	3	3	4	3	2	3	1

Engagement	2	5	2	5	3	1	2	2	1
Overall	n	+	+	+	+	-	n	+	-

Non Technology Average: 2.75

Technology Average: 2.8

*Denotes Technology used in lesson plan.

The final data source was guided interview questions during conferences. This data source provides little useable data. Several issues or problems were found in relation to use of this data source. First of all, determining exactly what guided questions to ask poised a monumental problem.   The primary purpose of the data source was to find out if perception actually changed as a result of use of alternative teaching methods. Even through guiding questions, it was difficult to gage if perceptions actually changed for parents. The other issue with regards to this data collection technique was involving the student. The data collection was to take place at conferences, yet few students actually came with the parents to the conferences. These two issues proved this data source as completely unusable.

After collecting data in regards to how using alternative teaching methods, specifically technology improve teacher and parent engagement, one important trend was found. While parent engagement was difficult to measure, student engagement and excitement was more easily monitored through the data sources. It is evident student excitement and engagement did increase when an alternative method of instruction (introduction of technology in this case) did increase. However, the data showed this increase was only temporary and not sustained as students became familiar with the use of technology in the classroom.

Keeping in mind student engagement improved, although it appeared temporary, the data suggested changing methods of instruction delivery can be beneficial for student engagement. The data collected in the parent and student survey also showed a correlation with the second research question which asked "How does focusing the importance of math in the everyday world lead to better student and parent engagement?" Both the students and parents were asked if they used math at home. After introducing everyday math concepts or math in everyday life, a large and substantial increase in recognition of use of math in the home was observed. Keeping this in mind, the next step was to find out if introducing math and everyday situations or math in the real world increased engagement, which would ultimately lead to better understanding and learning or the concepts.

How does a focusing on the importance of math in the everyday world lead to better student and engagement? In order to determine if introducing everyday situations in math instruction improved student engagement three data sources were used and careful analysis of these data sources can help answer this question. The first two data sources make an assumption that improved engagement leads to improved test scores or comprehension. The first two data sources are very similar. In both data sources a pre and post-test are given to the students. Several factors must be mentioned when considering data from these two sources. The lesson delivered in the traditional method and the everyday method was on two different math standards. Since this data was collected on one class and not over several years the subject could not be the same for both lessons. Keeping this in mind this data source does not account for the potential that the lesson used in the standard delivery data source was possible an easier or harder subject or concept then that delivered in the utilizing everyday math. The test scores for standard math lesson were collected in a table (Appendix D).

Traditional Instruction Pre and Post Test Results:

Student	PreTest	Post Test	Improvement
1	10	10	0*
2	0	9	9
3	0	8	8
4	0	10	10
5	0	1	1
6	9	10	1
7	1	8	7
8	0	4	4
9	0	10	10
10	0	9	9
11	0	9	9
12	0	10	10
13	5	10	5
14	3	9	6
15	1	10	9
16	0	4	4
17	0	7	7
18	0	10	10
19	0	10	10
20	8	10	10
21	0	1	1
22	8	10	2
Average	**2.0**	**8.5**	**6.8**

*perfect score on both was not included in statistics

This data source showed and average pretest score of two and an average post test score of eight. As a class, there was an average improvement in number right of 6.8. Only three of the twenty-two students did not progress to a satisfactory proficiency in the task. Similarly four of the twenty-two students scored at a satisfactory proficiency after the pretest. All four of these students either improved or scored the same score on the post test.   This data source establishes a baseline for comparison of use score improvement. This data source suggested the lesson delivery was successful and the students progressed to a satisfactory level of proficiency.

The second data source was test scores on a pre and post-test for a math lesson which utilized everyday math, more specifically a lesson which showed how the math is used in everyday applications (See appendix D). Surprisingly this data source provides similar results as the lesson delivered in the first data source. Of the twenty-one students who took the pretest for tested at a proficient level. As was the case with the first data source, three of the twenty-one students tested failed to meet minimal proficiency at the task. It should be noted the same students who did not perform at a satisfactory level in the first data source were the same as with the second data source. Overall the class improved an average of 6.7 more questions right after the everyday math instruction.

Everyday Math Instruction Pre and Post Test:

Student	PreTest	Post Test	Increase
1	10	10	0*
2	2	8	6
3	0	8	8
4	2	10	8
5	0	5	5
6	1	10	9
7	5	10	5
8	0	3	3
9	0	10	10
10	0	5	5
11	2	9	7
12	0	10	10
13	0	9	9
14	7	10	3
15	0	9	9
16	0	8	8
17	0	10	10
18	0	0	0
19	0	10	10
20	10	10	0*
21	0	5	5
22	7	10	3
Average	**2**	**8.1**	**6.7**

*perfect score on both was not included in statistics

It is important to note, the question these data sources are attempting to explain in not about student score improvement but student engagement and the underlying assumption is that if a student is engaged they will show better comprehension and test scores. Both these data sources do not take into account the difficulty level of the standard tested or other factors which could affect student test scores. Both of these data sources illustrate that students improved regardless of the method the lesson was delivered. The key to answer this research question lies in the third data source, the teacher journal of the student engagement during the execution math lessons. Student engagement was observed during the presentation of the two above described math lessons, as well as two other math lessons. In total, the journal looked at the instructor's perceptions and observations during the administration of the different lessons utilizing both standard math instruction and everyday math instruction.

Not surprising the teacher journal, the third data source, showed the students overall were more engaged with the everyday math instruction. The instructor observed better eye contact and better engagement between the teacher and students. Unlike the traditional instruction the everyday math lesson included a short story to start showing how the math is important in everyday uses. When the traditional math instruction started the students were asked to take out their math books and several "sighs" were heard from the classroom.   The students showed little excitement about the math lesson when the tradition instruction was used. One observation was students paid attention longer with the everyday math instruction. While in both examples the instruction time was similar, the instructor observed the students staying engaged longer with the everyday instruction.

In evaluating these three data sources it is important to understand the question is centered on student engagement. The first two data sources demonstrate the students were engaged in both methods of lesson delivery. If students were not engaged they would not be able to score at a proficient level on the post test. Therefore, it can be concluded, based on the first two data sources, that students were engaged with the instruction regardless of the type of lesson. The third data source is the key to determining if the students were more engaged in one or the other delivery method. While analysis of the teacher journal compiled during lesson delivery is purely subjective, the results do indicate students were more engaged and more excited when their math lesson was presented in an everyday context.

Upon analysis of the data collected to answer the question about student engagement, the question then arises can this improved engagement lead to better comprehension and learning in the students. The final question to ask is "What is the effect of improved perception and engagement on student comprehension and test scores? Three data sources were utilized to answer this question.

First, this data source consisted of an evaluation of the student report card or grade book. Throughout the year the student was given multiple assessments from homework to test and quizzes. This data source was difficult to evaluate its value. Throughout the year, lessons which utilized everyday math and their assessments were highlighted. The problem encountered with this data source is how the report card is actually used. In our district students are not given a letter grade in the lower levels. Their report card only evaluates whether or not the student is proficient, in progress or needs improvement as an evaluation method. Analysis of the student report cards with regards to everyday math and traditional math resulted in similar results. No significant difference was observed between outcomes on the report card which utilized

everyday math and those which utilized traditional math. It should be noted, the majority of

math instruction, almost seventy-five percent was instructed using the everyday math method.

Use of more everyday math was a change from previous year's instruction and leads to the value

of the next two data sources.

The second data used to answer the third research question was a direct comparison of

Michigan Education Assessment Program or MEAP test results for the district (appendix F). It is

significant to note the district, as a whole, moved from inclusion of more everyday math grade

wide in our school. In school year 2010 the district experienced significantly low math scores on

the MEAP test. As a result, use of the everyday math concept was implemented. While some

instructors had implemented some everyday math in previous years this was the first year

everyday math became a focus for all instructors. The 2010 MEAP math results showed a

significant increase from approximately 34% proficiency rate to an increase of 53% proficiency.

This suggested the change in instructional method, specifically the use of every day math

resulted in increased proficiency on standardized test.

Historical MEAP (Michigan Educational Assessment Program)

3rd Grade Math-Pathfinder Elementary School Percentage of students who are proficient.

2008-64.7

2009-52.5

2010-34.4

2011-53.3

The final data source used to evaluate the 2010 second graders with the previous year's

students was use of district outcomes, specifically a comparison of previous year's performance

in regards to district outcomes with this year's class. Collection of this data proved to be the

most difficult. After the poor performance on standardized testing in 2009, our district

implemented many different measure and procedures in an effort to improve student learning and

scores on standardized test. As a result, the district change the measure used to determine if a

student was meeting the districts' outcomes. Previous years outcomes were recorded in a

curriculum management system or CMS. The instructor would go into the system and evaluate

each outcome with one of three scores, mastered, not mastered and in progress.

In 2010 the district implemented a testing system where students were given standardized

test. The Northwest Evaluation Association, Measures of Academic Progress or MAPS is no

used to evaluate district outcomes. This system tested students in September, January and at the

end of the year. The test score when applied to a table showed what level the student was

performing, in relations to a grade level. Because of the change in how district outcomes were

evaluated, this data source could not be used to compare previous years. It would be like

comparing apples and oranges.

District Outcomes MAP test 2011/12

Student	Sept 11 MAPS	Jan MAPS	Percent increase
1	190	191	.5
2	182	183	.5
3	166	175	5.4
4	195	203	4.1
5	165	169	2.4
6	185	193	4.3
7	176	180	2.2
8	160	163	1.8
9	154	185	16.8
10	163	164	.6
11	171	177	3.5
12	173	173	0
13	160	181	13.1
14	187	190	1.6
15	177	195	10.1

16	185	194	4.8
17	183	187	2.2
18	193	219	13.5
19	163	176	8
20	190	203	6.8
Average	**175**	**185.1**	**5.1**

That is not to say this data source was not of any value. The data source did show

improvement across the board for all students except one, which remained unchanged. While it

is difficult to use this data to compare year to year, this data does demonstrate overall

improvement of the class with regards to the district's outcomes. This, compiled with the idea of

the implementation of more everyday math, has significance to this research.

Overall, data collected in this project focused on three main ideas, first what is the

perception of math, second, can changing how math is taught lead to better engagement and

perception, and finally, does this change, if it occurred indeed lead to better comprehension and

learning demonstrated through higher test scores. The data does show that most perceive math

as a difficult subject. The data does demonstrate implementation of everyday math results in a

better perception of math as a whole. However, the data does suggest that use of traditional

instruction with poor perception and engagement also improved student test scores.

The data also demonstrates use of alternative teaching methods such as everyday math,

did lead to a significant increase in test scores. This along with the fact that students had better

engagement when being taught using everyday math does suggest, improved perception through

use of alternative teaching can lead to better test scores.

Action Plan:

The purpose of this action research project is to determine if alternative instructional methods can lead to better engagement and perception of math by students and parents, resulting in better test scores in a second grade classroom. Introduction of an alternative teaching method such as everyday math, or applying math lessons to everyday life does improve student engagement. Students overall perception and parents perception of math and everyday life did improve. In the class which was evaluated also demonstrated an improvement in standardized test scores in relation to math. The question which still remains unanswered is did the improved engagement and perception of math result in the improvement. The data suggests it may have been a factor, but does not prove the improved engagement or the alternative teaching methods was the actual cause of the improved test scores.

Whether improved engagement was the cause of the improvement of the test scores and student learning or not, I discovered better student engagement created a better learning environment. Students are always more excited and engaged in subjects they like or believe are fun. Finding ways to implement everyday math lessons, took a subject which many students still did not view as fun or their favorite and at least make it tolerable for them. While this technique did not change every student's favorite subject to math, it did lead to improved student engagement.

As a result of the improved student engagement, I found myself more engaged and striving to be better. I found myself striving to find more ways to relate math to the second grader's everyday life. So whether or not better student engagement lead to better test scores, I found better student engagement did lead to me being a better teacher.

As a result of this project, I am continuing to use everyday math in my instruction. In the past year approximately seventy-five percent of our math outcomes were taught utilizing

everyday math. My goal is to increase the use of everyday into almost every lesson. No one likes change and this was evident with the implementation of the use of everyday math in the classroom in our district. Several of my colleagues would complain about having to alter or change how they taught math. I plan to collaborate with my fellow teachers in grade level meetings. By sharing my research and its conclusion with my fellow second grade teachers, they can see the value in change and not just change for change sake, and how everyday math is working.

This research project asked the question how does improved perception and engagement of math by parents and student lead to better comprehension demonstrated through test scores and demonstrated there is some connection between student and parent engagement and performance. The answer to this question is perhaps not the most important thing learned from this project. Whether or not my data and research can prove engagement leads to success, I did find one undisputable fact as a result of this project. Simply stated, when my student engagement improved, my engagement improved. I strove to be a better teacher, I became more excited to present new ideas and when my students became more engaged, I became a better teacher.

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Appendix A:

Data Collection Plan:

Research Questions	1	2	3
1. How does use of alternative teaching methods which utilize technology improve student and parent engagement?	Pre/Post survey	Teacher Chart	Parent/student interview
2. How does a focusing the importance of math in the everyday world lead to better student and parent engagement?	Pre/Post-test standard	Pre/Post-test utilizing applications	observation journal
3. What is the effect of improved perception and engagement on student comprehension and test scores?	Report Cards	Standardized test scores	District evaluations

Research Question 1:

How does use of alternative teaching methods which utilize technology improve student and parent engagement?

Data Collection 1:

The first data collection tool used to evaluate if alternative teaching methods which utilize technology will improve parent and student engagement is a Pre/Post parent survey. This survey will be administered at the beginning of the project and upon its completion. A comparison how students and parents answer the pre and post survey will illustrate if the introduction of technology improved student and parent perception. As Mills suggests, this form or questionnaire will allow the researcher to collect large amounts of data in relatively short period of time (p. 83).

Data Collection 2:

The second data collection tool used to evaluate if alternative teaching methods which utilize technology will improve parent and student engagement is teacher observations chart. The teacher will keep a daily chart of observations during the unit instruction. The instructor

will become an active participant observer. These observations will focus on student motivation, engagement, and overall class attitude during the instructional process. These observations can then be used to help determine if the students were engaged.

Data Collections 3:

The third data collection tool used to evaluate if alternative teaching methods which utilize technology will improve parent and student engagement is parent and student interview at the end of the unit and at conferences. This data collection tool can be specific to the question of the alternative teaching techniques and their ultimate effect on parent and student perception and motivation about math. These interview questions can be guided and then responses can be categorized and evaluated to see if perception did improve for specific students and parents. It may also allow for the researcher to discern if perhaps a parent's perception did not improve while the student's did.

Research Question 2:

How does a focusing the importance of math in the everyday world lead to better student and parent engagement?

Data Collection 1:

The first data collection tool used to determine how does focusing on the importance of math in the everyday world lead to better student and parent engagement is a pre and post-test using standard math assessments. The pre-test and post-tests will focus on strictly the district objectives using traditional math assessments. These tests will show how students perform with the traditional math assessments, which do not connect the math to the everyday world. The results of this data will hopefully show low scores and understanding.

Data Collections 2:

The second data collection tool used to determine how does focusing on the importance of math in the everyday world lead to better student and parent engagement is a pre and posttest focusing on connection of math in the real world. These tests will focus on the same concepts covered in above data collection methods however; the questions will relate the subject matter to the real world and test real world applications. While testing the same material and outcome, this "real world" test may show increased understanding.

Data Collections 3:

The third data collection tool used to determine how does focusing on the importance of math in the everyday world lead to better student and parent engagement will be a teacher observation journal. Understanding, the most cumbersome part of research project is writing the data analysis (Korzym, 2007) the researcher should not shy away from difficult or time consuming collections methods either. While a journal of observations of the students during the

instructional and testing, which covers things such as student comments, mood, facial

expressions may be a difficult and cumbersome task resulting in difficult analysis, it may prove

to be the most beneficial.

Research Question 3:

What is the effect of improved perception and engagement on student comprehension and

test scores?

Data Collection 1:

The first data collection tool used to determine the effect of improved perception and

engagement on student comprehension and test scores will be the student's report cards. During

the project several different assessments will be used in the lesson from homework, quizzes and

classroom discussion to suggest just a few. Through evaluation of the student's report cards or

more specifically their grades on specific lessons comprehension can be determined.

Data Collection 2:

The second data collection tool used to determine the effect of improved perception and

engagement on student comprehension and test scores will be standardized test scores.

Standardized test scores can provide empirical data both on scores of the current students and

past students. It will allow a comparison between classes which utilized alternative teaching and

technology and those that did not. It will also provide a mechanism to compare students from across the district and state on the core curriculum requirements.

Data Collection 3:

The third data collection tool used to determine the effect of improved perception and engagement on student comprehension and test scores will be the district outcomes. This data collection tool again will provide both current and historical data. While standardized test provide empirical data, the district outcomes are similar. The state outcomes and district outcomes are listed and the instructor determines which outcomes the student has mastered, is currently in progress and those they have not mastered. This data tool provides quantitative data which can then identify students who comprehend or mastered the material. These outcomes can be more specific then some of those identified through standardized test and report cards.

Appendix B:

STUDENT/PARENT SURVEY/QUESTIONNAIRE:

1. What is or was your favorite subject in school?

2. Which of the following words best describes Language Arts?

    A. Fun
    B. Challenging
    C. Exciting
    D. Hard
    E. Interesting
    F. Boring

3. Which of the following words best describes Math?

    A. Fun
    B. Challenging
    C. Exciting
    D. Hard
    E. Interesting
    F. Boring

4. Which of the following words best describes Social Studies?

    A. Fun
    B. Challenging
    C. Exciting
    D. Hard
    E. Interesting
    F. Boring

5. Which of the following words best describes Science?

   A. Fun
   B. Challenging
   C. Exciting
   D. Hard
   E. Interesting
   F. Boring

6. Which of the following words best describes Gym?

   A. Fun
   B. Challenging
   C. Exciting
   D. Hard
   E. Interesting
   F. Boring

7. Do you use math at home? If yes explain.

8. How would you rate Language Arts homework on a scale of 1 to 10?

   Easy   Hard

   1   2   3   4   5

9. How would you rate math homework on a scale of 1 to 10?

   Easy   Hard

   1   2   3   4   5

10. How would you rate Social Studies homework on a scale of 1 to 10?

    Easy   Hard

    1   2   3   4   5

11. How would you rate Science homework on a scale of 1 to 10?

    Easy   Hard

    1   2   3   4   5

Parent Pre Survey:

Respondents were asked to pick word which best describes each subject.

Subject	Fun	Challenging	Exciting	Hard	Interesting	Boring
Language Arts	4	2		1		2
Math	1	1	2	1	3	1
Social Science	1		2		5	1
Science	3		4		1	1
Gym	6	2	1			

Respondents were asked what is their favorite subject:

Language Arts	Math	Social Studies	Science	Gym	Art
2	3	1	2	0	1

Respondents were asked if they used math at home and how:

Yes: 7 No: 2

Respondents were asked to rate difficulty of homework on scale of 1-5.

Language Arts	Math	Social Science	Science
1	2	3	2
1	4	5	5
1	2	1	1
3	5	2	5
3	2	3	3
3	2	2	2
4	2	1	1
3	7*	3	4
5	5	5	5
Average	**Average**	**Average**	**Average**
3	3.4	2.7	3.1

*One respondent went over the five.

Parents Post Survey:

This survey received limited response and only focused on describing subject, use of math at home and perceived difficulty of homework.

Subject	Fun	Challenging	Exciting	Hard	Interesting	Boring
Language Arts	1	1		1	1	1
Math		1	2	1		1
Social Science		1	1		3	
Science	1		1		2	1
Gym	4		1			

Respondents were asked if they used math at home and how:

100% responded yes they do.

Respondents were asked to rate difficulty of homework on scale of 1-5.

Language Arts	Math	Social Science	Science
2	1	1	1
1	2	1	1
3	4	2	3
2	1	3	2
2	1	2	1
Average	**Average**	**Average**	**Average**
2	1.8	1.8	1.6

Class Pre Survey

Students were asked to pick their favorite subject from a list on the board:

Gym	6
Language Arts	3
Science	3
Math	4
Social Studies	6

22 total

Class Post Survey results:

Gym	3
Language Arts	4
Science	4
Math	4
Social Studies	6

21 total

Students were asked their least favorite subject:

Class Pre Survey

Gym	1
Language Arts	6
Science	5
Math	6
Social Studies	3

22 total

Class Post Survey results:

Gym	1
Language Arts	5
Science	6

Math	5
Social Studies	4

21 total

Appendix C:

Data source two summary

Dates	10-4	10-5*	10-11	10-12*	10-19	10-20*	10-25	10-26*	10-28*
Motivation	2	5	3	3	4	3	2	3	1
Engagement	2	5	2	5	3	1	2	2	1
Overall	n	+	+	+	+	-	n	+	-

Non Technology Average: 2.75

Technology Average: 2.8

*Denotes Technology used in lesson plan.

Appendix D:

Traditional Instruction Pre and Post Test Results:

Student	PreTest	Post Test	Improvement
1	10	10	0*
2	0	9	9
3	0	8	8
4	0	10	10
5	0	1	1
6	9	10	1
7	1	8	7
8	0	4	4
9	0	10	10
10	0	9	9
11	0	9	9
12	0	10	10
13	5	10	5
14	3	9	6
15	1	10	9
16	0	4	4
17	0	7	7
18	0	10	10
19	0	10	10
20	8	10	10
21	0	1	1
22	8	10	2
Average	**2.0**	**8.5**	**6.8**

*perfect score on both was not included in statistics

Appendix E:

Everyday Math Instruction Pre and Post Test:

Student	PreTest	Post Test	Increase
1	10	10	0*
2	2	8	6
3	0	8	8
4	2	10	8
5	0	5	5
6	1	10	9
7	5	10	5
8	0	3	3
9	0	10	10
10	0	5	5
11	2	9	7
12	0	10	10
13	0	9	9
14	7	10	3
15	0	9	9
16	0	8	8
17	0	10	10
18	0	0	0
19	0	10	10
20	10	10	0*
21	0	5	5
22	7	10	3
Average	**2**	**8.1**	**6.7**

*perfect score on both was not included in statistics

Appendix F:

Historical MEAP (Michigan Educational Assessment Program)

3rd Grade Math-Pathfinder Elementary School Percentage of students who are proficient.

2008-64.7

2009-52.5

2010-34.4

2011-53.3

Appendix G:

District Outcomes MAP test 2011/12

Student	Sept 11 MAPS	Jan MAPS	Percent increase
1	190	191	.5
2	182	183	.5
3	166	175	5.4
4	195	203	4.1
5	165	169	2.4
6	185	193	4.3
7	176	180	2.2
8	160	163	1.8
9	154	185	16.8
10	163	164	.6
11	171	177	3.5
12	173	173	0
13	160	181	13.1
14	187	190	1.6
15	177	195	10.1
16	185	194	4.8
17	183	187	2.2
18	193	219	13.5
19	163	176	8
20	190	203	6.8
Average	**175**	**185.1**	**5.1**