

**HOW DOES USING FORMATIVE ASSESSMENT  
EMPOWER STUDENTS IN THEIR LEARNING?**

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## Abstract

This study was designed to increase student empowerment through the use of formative assessment. The targeted population consisted of first and fifth grade students in the same school. Evidence for the existence of the problem included teacher observation, students' lack of knowledge and skills to complete classroom assignments, and low test scores.

Analysis of probable cause data revealed that students were unclear about what they needed to know. Systems beliefs about testing focus on sorting students rather than motivating them. Students were not taking responsibility for their learning. Students did not have adequate, descriptive feedback on their work and were not encouraged to reflect on their learning. Parents were not informed about their child's learning.

A review of professional literature resulted in our action plan. The study took place from August 2006 until December 2006. The subjects for the study were the students in the researchers' classrooms. The research focused on strategies utilized in the mathematics classrooms. The researchers began each mathematics unit by introducing a lotus diagram, which is a visual representation of key concepts to be taught in that unit. As the lesson was being taught, the researchers related the lesson to the goals on the lotus diagram. The researchers used teacher-made assessments to determine if students made unit goals. The researchers used class graphs and individual student graphs to track progress. The students used portfolios to organize graphs, lotuses, and assessments. Researchers provided a daily 15 minute intervention time to reteach goals in small groups to students that did not meet the goals on assessments. Researchers also sent home family letters on each unit that described major goals and vocabulary for each unit. Researchers interviewed students individually, as part of their mathematics instruction. Data collections employed included teacher made assessments, student interviews, and anonymous classroom graphs.

Post-intervention data indicated an increase in student involvement in their learning in the area of mathematic. Many students were more aware of grade level mathematic goals. They were able to talk about the mathematics goals and monitor their progress toward these goals. Students also displayed the ability to solicit help when needed in class.

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## CHAPTER 1

### PROBLEM STATEMENT AND CONTEXT

#### General Statement of the Problem

The students in the targeted first and fifth grade classes exhibited an inability to self-monitor their learning. This interfered with students' ability to know which skills and knowledge they had not mastered. Evidence for the existence of the problem included teacher observation, lack of knowledge and skills to complete student assignments, and low-test scores.

#### Local Context

The school is located in a western suburb of a large metropolitan city in the Midwest. The enrollment of the school was 476 students. Of the total enrollment, 36.3% were White, 13.7% Black, 30.7% Hispanic, and 18.9% Asian. Of all the students in the school 13.4% were limited English proficient. The school consisted of 21 general education classrooms. The breakdown of this is as follows: four sections each of kindergarten through second grade and three sections of third, fourth and fifth grades. The average class size in grade five was 24 students and grade one had an average class size of 21 students. The socioeconomic status of the school was lower-middle class. The economic status of the students in the district indicated that 25.4% students were from low-income families. Low-income families were defined as students that come from families receiving public aid, living in institutions for neglected or delinquent children, are supported in foster homes with public funds, or are eligible to receive free or reduced-price lunches. The students in the school had a 94.5% attendance rate and there was no chronic truancy

reported. The definition of chronic truancy was students who were absent from school without valid cause for 18 or more of the last 180 school days. There was a 27.6% mobility rate reported for the students. Mobility rate was based on the number of times a student enrolled in or left a school during the school year.

Two hundred twenty two students were reported as bilingual, those whose native language is not English, with 61 students classified as Limited English Proficient (LEP), individuals who do not speak English as their primary language and who have limited ability to speak, read, write, or understand English. The students speak 21 languages with Spanish being the most prominent language. Other languages commonly spoken at the school included Urdu, Gujarati, and Filipino.

The school's overall performance on the Illinois Standards Achievement Test (ISAT) was 76.6%, while the state average was 68.9%. In grade five, the performance rate on the reading was 72.3% compared to the state average of 59.8%. In mathematics, the school scored 78.5%, compared to the 73.1% performance on the state level.

The school employed a total of 33 certified staff members. These staff members included 19 teachers in kindergarten through fifth grade. The other fourteen teachers include a learning disabilities resource teacher, guided reading teachers, reading specialists, bilingual teachers and a speech pathologist.

The curriculum followed a traditional program, including core subjects (language arts, math, science, and social studies) taught by classroom teachers. In addition, the students received an average of 75 minutes of music instruction, and 75 minutes of physical education per week. The students also attended the library for 20 minutes per week. During this time, the primary grade students listened to a story read by the librarian and were given the opportunity to check out books to read at home. At the intermediate grade levels, students did not listen to a

story read by the librarian; they checked out a book and had time to read the book silently on their own.

Identified students with special needs are provided the opportunity to receive services which include speech, occupational therapy, reading resource, inclusion, and social work. Children who receive these services are identified at the school's Special Services Team (SST), which is a group of teachers and support personnel who meet to discuss children and their academic needs. The Special Services Team makes recommendations on interventions that the classroom teacher can use in his/her classroom. After these interventions have been implemented, the SST meets again and determines if there is a need for any special testing to be done. If special testing is done, it is reviewed at another meeting and appropriate placement in any of these services may be made based on the results.

Children with limited English receive support from an English as a Second Language (ESL) teacher or Early Language Learner (ELL) teacher. The school district uses the Language Assessment Scale (LAS) to determine eligibility for these programs. Students who score below 50% on this test will receive services. The criterion for establishing a bilingual classroom is 20 students in a single language. At the current time, the school has a bilingual program for Spanish speaking students only; while the ESL teacher services children who speak other languages.

Students in grades four and five can receive pull out services for gifted mathematics. Prerequisites for consideration in this program include: teacher recommendation, scores on the Developmental Reading Assessment (DRA), and mathematics ISAT scores from the previous year. Students that are considered for the gifted mathematics program take a placement exam and students who score above 87% on this exam qualify for the program.

The Early Childhood Education Program (EC) is also offered for preschool students who

are identified as at-risk for failure. Students are identified for possible placement in the self-contained EC program at our monthly preschool screening. Children are screened in the areas of speech and language, as well as, small and large motor skills. The preschool screening team also looks at risk factors that may contribute to developmental delays. If the team has significant concerns about a child, a full evaluation is done. Children who qualify based on this evaluation become part of the EC program. Other students go to other early childhood programs in our district.

One concern at the school is low parental involvement. This is seen through a lack of participation in evening activities held at the school. For Literacy Night, only 90 parents attended. At Family Mathematics Night, 65 parents attended. There are 476 students in attendance at the researchers' school.

Another concern at the building is low achievement on standardized testing for low-income students and Black and Hispanic students. This is seen in ISAT data reported to the school. Thirty percent of low-income students were not meeting state standards in reading ISAT tests, 25% of Black students and 36.8% of the Hispanic students also did not meet state standards on the reading ISAT tests.

#### District Context

The targeted school is one of five schools comprising the district. Of those schools, four are elementary and one is a middle school. The total enrollment for the district is 2,607 students. The instructional expenditure per student is \$5,015 per pupil. The operational expenditure is \$8217.00 per student. The total tax rate per \$100 is 3.47. The school district employs 159 teachers. The average years of teaching experience is 14.1 years. The demographic make up of the teaching staff is 96.9% White, .6% black, and 1.9% Hispanic. Male teachers comprise 11.9%

of the teachers in the district and female teachers comprise 88.1% of the work force. This compares with 23.5% of male teachers and 76.5% of female teachers for the state. Fifty five percent of the 159 teachers employed by the district hold a master's degree. The teachers' average salary is \$58,267, compared to the state's average of \$55,558.

The district administrative team consists of a superintendent, five building principals, two vice principals, one special education director, and one director of curriculum and instruction. The administrator's average salary in the district is \$125,022.

ISAT scores and making adequate yearly progress (AYP) continue to be concerns for this school district. One effort the district has made to raise student achievement is establishing district goal teams; these include a literacy goal team, a mathematics goal team, a technical support team, a data goal team, and assessment goal team. The purpose of these goal teams is to establish essential skills for each grade level and to assist teachers with the use of assessments that yield accurate information regarding student progress toward achievement. This information should serve as a basis for teachers to revise instruction to align with grade level goals. These goal teams also are designed to assist the district with developing the core values of continuous improvement and to assist teachers in the use of quality tools, which are an important part of continuous improvement.

### The Surrounding Community

The total community population is 31,765. The demographics are 75.1% White, 12.3% Black, 12.5% Hispanic, and 3.6% Asian. There are approximately 10,791 households in the community. The median household income is \$56,285. The median home value is \$139,400.

The total percentage of employable citizens in the community is 75.3%. From that group, 71.9% of the labor force is employed and 3.3% are unemployed. The occupational characteristics

of the employed citizens in the community are 31% management/professional, 32% sales, 10% service, 19% production/transportation and 7% in construction/maintenance.

The general income per household in the community consists of 13% of the population making under \$25,000, 30% making \$25,000-\$49,999, 44% making \$50,000-\$99,999, 10% making \$100,000-\$149,999, 2% making \$150,000-\$199,999 and 1% earning \$200,000 or more. Of all the families in the community, 4.7% fall at or below the poverty rate.

There are many cultural advantages of living in the community. The community is close to a large metropolitan city, and is an established community with many ranch homes, split levels, apartments, condos, shopping centers, churches, industrial business parks, modern service facilities, beautiful parks, and three elementary school systems.

The community's sports center is the center of many of the local activities. The sports center offers a fitness and aquatic center for people of all ages to enjoy. For school aged children, the sports center offers classes in dance, soccer, basketball, gymnastics and martial arts. School aged children can also spend their days off of school at an all day activity program offered for working parents at the center. Teens hang out at "Club Friday Night", which is a Friday night activity club offered there, as well.

Many preschool programs are available at the center. Three-year-old and four-year-old preschool is offered, as well as a Pre-K program for children who are too young to start kindergarten. This program is not part of the school district.

The sports center has partnered with the Senior Citizen Council to provide a variety of services to senior citizens in the community. This partnership provides home delivered meals to senior citizens. A home maintenance program also allows senior citizens to get needed repairs

done to their homes. In addition, this joint venture also provides senior citizens with many field trips and opportunities to socialize.

#### National Context of the Problem

In 1983, President Ronald Reagan's administration released "A Nation at Risk", a report on the findings of the state of education in the United States. This report stated, "The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people." (National Commission on Excellence in Education, 1983, p. 1) This report made a lasting contribution by focusing national conversations on issues of education. For the next twenty years, the educational performance of students continued to fall short. This national conversation sparked many new ideas about how to improve education.

In 2002, President Bush and his administration has made its contribution to education by building an accountability system for schools in the United States and tying them to a set of national standards in the No Child Left Behind (NCLB) law in 2002. The overall purpose of the law was to ensure that every child in America was able to meet the high learning standards of the state where he or she lived. (ISBE, 2005) Each of the fifty states tied their respective learning standards to the national standards.

Components of this law include annual testing of students at grades 3-8 at the elementary and middle school grade levels and at grade 11 at the high school level. States must provide verification of their assessment system and report annually on student achievement. A state definition and timeline of whether schools are making "adequate yearly progress" (AYP) is also required to show progress toward the goal of 100 percent of students meeting state standards by the 2013-2014 school year.

Standardized tests are being used across the country to assess student achievement. In Illinois, the Illinois State Achievement Tests (ISAT) and PSAE (Prairie State Achievement Exam (PSAE) tests are used to assess student achievement levels and to determine which schools are meeting Illinois state standards. However, standardized testing only provides educators with a partial picture of their students' skills and achievement.

Standardized assessment, on the other hand, is an unusual event in the life of the child. It asks the child to provide a singular desired response, provides a summary of the child's failures on certain tasks and provides little diagnostic information. Instead, it provides ranking information on how a child compares to his peers. It is a one-time shot of a student's ability, assessing artificial tasks, which may not be meaningful to the child. In addition, standardized testing data, provides parents with essentially meaningless and often frightening numerical data, reinforcing the idea that the curriculum rather than the child is the center of the educational process (Grubb & Courtney, 1996, p. 10).

Children need to be engaged in their learning. Testing results often do not provide children with the information they need to further their success in school. Therefore, it is necessary to involve students in the assessment process. In an interview with Dennis Sparks, Rick Stiggins states:

When students are involved in the assessment process, though, they can come to see themselves as competent learners. We need to involve students by making the targets clear to them and having them help design assessments that reflect those targets. Then we involve them again in the process of keeping track over time of their learning so they can watch themselves improving. That's where motivation comes from. (Sparks, 1999)

A great deal of research has been done in the area of assessment. Research indicates that making assessment an integral part of classroom practice serves to improve student learning. Black and Wiliam (1998) reviewed about 250 research studies and concluded that the learning of students, including low achievers, is generally enhanced in classrooms where teachers include formative assessment to make judgments about teaching and student learning. When teachers use assessment techniques such as observations, conversations, and interactive journals, open-ended questions, and portfolios, the students are likely to learn through the process of articulating their ideas and answering the teacher's questions. Feedback from these types of assessments can be used to help students with goal setting. This allows the students to take responsibility for their learning and become more independent learners.

To ensure this learning takes place, assessments must become a routine part of the classroom activities, rather than an interruption. Teachers must ensure that all students have an opportunity to demonstrate clearly what they know and can do. When done well, assessments can be used to build a picture of individual student's progress toward the goals of instruction. Therefore, assessment needs to be a major factor in teacher preparation and professional development.

### Reflection

Our research question is: How does using formative assessment empower students in their learning? We will be using student and parent surveys, written observations of the classroom, videotapes of student conferences, and data folders to document our problem.

Our district is focusing on the Baldrige Model for continuous improvement. Student self-assessment is a large part of this model. Students need to be able to chart their progress and reflect on their progress in order to grow and learn. The teacher's role is to facilitate the reflection

process for his/her students to provide them with the tools they need to become self-directed learners.

Teachers will be bringing the Illinois State standards for mathematics to the students in easy to understand language. The teachers will use a LOTUS to share these standards with the students. Students will be tracking their progress on mathematics standards through the use of data folders. The teachers will be conferencing with individual students about their progress. Students will also keep a math portfolio of their work. Students who are not meeting these standards will receive additional instruction to help them meet these standards. In addition, we will also be keeping class data charts for these standards. We will use data charts to discuss classroom progress. We will also use Plan-Do-Study-Act to help students assess their learning.

As educators, we are always concerned with helping children learn and grow. We hope to see students who are able to self-assess their learning and take ownership in their schoolwork. We will assess our intervention with teacher observations, parent surveys, and recorded conversations with the students and student surveys before, during, and after our intervention.

The collaborative research process is very exciting. There are two teachers from the same school working on this research project. Continuous improvement and student self-assessment are important topics in our district. All of the teachers are encouraged to begin using several of the tools described in this proposal. By working together, we will be able to support each other in our building as we go through the research process. We also have an extremely supportive principal who is very eager for us to conduct our action research. She will be an invaluable resource to the two of us as we further develop our research project.

## CHAPTER 2

### PROBLEM DOCUMENTATION

#### Problem Evidence

In order to document students' inability to self-monitor their learning, the researchers used student surveys, parent surveys, teacher observations and ISAT testing data. The researchers decided to focus their study on the content area of mathematics

Parent surveys and student surveys were used to determine attitudes toward mathematics and assess parent and student knowledge of state standards. The surveys were also used to determine whether or not students and parents are able to use assessment to enhance student's learning.

Student surveys (See Appendix A and B) were conducted in a first grade and a fifth grade classroom. These were administered by the classroom teachers during the second week of school and were done anonymously by the students. Twenty first-grade students and nineteen fifth grade students responded to the survey.

Parent surveys (See Appendix C) were sent home to first and fifth grade parents on the third week of school. These were also conducted anonymously. Ninety percent of the first grade parents and seventy four percent of the fifth grade parents responded to the survey. The results of these surveys are summarized in the tables below.

Table 1.

*Student Pre Survey Results*

<b>Question</b>	<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No Response</b>
I like mathematics.	1 <sup>st</sup> Grade	20	13	3	2	2
	5 <sup>th</sup> Grade	18	12	2	4	0
I know the mathematics goals for my grade level.	1 <sup>st</sup> Grade	20	9	5	5	1
	5 <sup>th</sup> Grade	18	7	1	10	0
My parents should know the mathematics expectations for my grade level.	1 <sup>st</sup> Grade	20	14	4	0	2
	5 <sup>th</sup> Grade	18	18	0	0	0
I can talk about mathematics goals.	1 <sup>st</sup> Grade	20	9	8	3	0
	5 <sup>th</sup> Grade	18	10	3	5	0
I can monitor my progress towards mathematics goals.	1 <sup>st</sup> Grade	20	11	1	7	1
	5 <sup>th</sup> Grade	18	12	1	5	0
I know when I need extra help and how to get it.	1 <sup>st</sup> Grade	20	14	1	4	1
	5 <sup>th</sup> Grade	18	13	1	4	0
When I take a test, it helps me want to learn more.	1 <sup>st</sup> Grade	20	11	7	2	0
	5 <sup>th</sup> Grade	18	12	0	6	0

A majority of the first and fifth grade students surveyed agreed that they liked mathematics. When students were polled about their knowledge of grade level mathematics standards, the results were more varied. At least half of the first and fifth graders reported that

they did not know the mathematics goals or were unsure of the mathematics goals for their grade level.

However, the same students felt that their parents should know the mathematics goals for their grade level. Seventy percent of first graders and one hundred percent of the fifth graders felt that their parents should be responsible for knowing these mathematics goals. This reflects that the students wish to have their parents involved in their progress.

When students were asked if they could talk about their mathematics goals, about half of the students felt they were able to do this. However, this is inconsistent with the response that fewer than half of the students reported that they knew the mathematics goals for their grade level.

Another question in the student survey dealt with students' ability to monitor their progress toward mathematics goals. This was explained to the students as the ability to look at their class work and assessments and determine areas of strengths and areas in need of improvement. Fifty five percent of the first graders and sixty six percent of the fifth graders felt that they could use this data to monitor their progress. The first grade and fifth grade students did not demonstrate this during classroom discussions. In classroom discussions, the students were not able to articulate the differences between strong and weak work. The fifth grade students were unable to monitor their progress. This self-reflection is an ongoing process, which had just been introduced at the time of the survey.

The next item on the survey dealt with students' ability to seek help when they have difficulties. About seventy five percent of the first and fifth graders reported that they know when they need extra help in mathematics and how to get this help. However, class discussions with students indicate that the students had not been encouraged to reflect and ask questions

about their work. Students report that they typically get the test from their teacher, look at their grade and file it in their folder. This would contrast with the seventy five percent of students reporting that they know when they need extra help and how to get this help.

The final question on this survey dealt with student attitudes about how important testing is for their learning. The results on this question were varied. At least half of the students in first and fifth grade felt that taking tests motivates them to learn more. The rest of the students disagreed or were unsure about the effects of testing on their motivation to learn.

The survey that the parents received had questions that were very similar to those given to the students. The results of these surveys are summarized in the table that follows.

Table 2.

*Parent Pre Survey Results*

Question	Grade Level	Number of Parents Responding	Agree	Disagree	Unsure	No Response
My child enjoys mathematics.	1 <sup>st</sup> Grade	17	11	6	0	0
	5 <sup>th</sup> Grade	15	10	2	3	0
I know the mathematics goals for my child's grade level.	1 <sup>st</sup> Grade	17	6	10	1	0
	5 <sup>th</sup> Grade	15	9	1	4	1
It is important for parents to be aware of grade level expectations in mathematics.	1 <sup>st</sup> Grade	17	17	0	0	0
	5 <sup>th</sup> Grade	15	13	0	2	0
After teachers make students aware of mathematics goals for each unit, my child should be able to talk about these mathematics goals.	1 <sup>st</sup> Grade	17	13	4	0	0
	5 <sup>th</sup> Grade	15	8	0	7	0
After teachers make students aware of mathematics goals for each unit, my child should be able to monitor progress toward meeting these goals.	1 <sup>st</sup> Grade	17	7	9	1	0
	5 <sup>th</sup> Grade	15	10	0	5	0
After teachers make students aware of mathematics goals for each unit, my child should be able to identify what extra help they need.	1 <sup>st</sup> Grade	17	9	7	1	0
	5 <sup>th</sup> Grade	15	13	0	2	0
Testing can be used to motivate students.	1 <sup>st</sup> Grade	17	12	4	1	0
	5 <sup>th</sup> Grade	15	11	1	3	0

When parents were polled about their child's interest in mathematics, more than half of the first grade parents and two-thirds of the fifth grade parents stated that their child enjoys mathematics.

First grade parents felt that they were not aware of the mathematics goals for their child's classroom, with only one third of the parents reporting that they know the appropriate mathematics goals for their child. The number was higher for fifth grade parents. Sixty percent of fifth grade parents reported that know the mathematics goals for their child.

Although many of the parents in first and fifth grade do not feel that they know the mathematics goals for their child's classroom, a large percentage of them feel that it is important for them to know these goals. This is reflected in the positive response to this question by one hundred percent of first grade parents and about eighty percent of fifth grade parents.

The next question in the survey dealt with the students' ability to articulate these mathematics goals. First grade parents did not feel as strongly as fifth grade parents did about this statement. Less than half of the first grade parents felt that this was necessary, while over half of fifth grade parents agreed with this statement. Comments on the first grade parent survey indicated that parents did not feel that children were capable of doing this in the primary grade. One example of this is, "Is this too much to ask of students this young?"

Few first grade parents felt it was appropriate for first graders to monitor their own progress. This is in contrast to fifth grade parents who answered the survey. Two thirds of fifth grade parents felt that it was appropriate for students to monitor their own progress toward meeting mathematics goals.

The next question dealt with students using assessment information to identify areas in which extra help is needed. A majority of first grade parents feel that first graders should be able

to identify when they need extra help in class. However, the number of parents who believe this is higher than the number of parents who feel that their child should be able to monitor their progress. Is it necessary for a child to be able to monitor their progress to determine which areas they need extra help. In fifth grade none of the parents disagreed with the need for their child to be able to identify strong and weak areas. Parents felt that their children need to be responsible for determining when they needed additional assistance in class.

The final question dealt with using testing for motivation. Roughly seventy percent of first and fifth grade parents feel that testing is motivating to students.

Through the comments written in on the parent surveys, it was apparent that parents want to be a part of the assessment process. Parent comments included:

- I want the teacher to “advise the goals, make the goals achievable and provide measures to monitor their progress”
- “I would just need information on each goal/milestone and possible some worksheets/examples of the tools used at school”
- I would like “mathematics homework a few times per week so we know what’s being worked on in class and how our child is doing”

#### Probable Causes

There are several possible reasons why students are not able to self-monitor their learning. Students often lack a connectedness to their classrooms. Often these students do not understand the standards of their grade level. Parents are not often involved in their child’s education.

Students often do not feel connected to the information taught in their classrooms. One factor that contributes to this is that instructors have a tendency to encourage one-way

communication patterns that lead to a lack of involvement and participation. This gives the listener little or no opportunity to respond immediately and directly. A teacher must make assumptions about their students' listening skills, prior training, and understanding of material being communicated. This one-way communication often results in material being presented that is too difficult or simple for students. Assumptions are made by the teacher without the students' feedback, which excludes them from the learning process.

Students exhibit a number of learning styles in their approach to the classroom. Three that are related to a lack of involvement are: avoidant, competitive, and dependent. The avoidant learning style usually shows a response of a student who is uninterested in learning the course content and does not participate with teachers or peers in the classroom. The competitive learning style leads to a student feeling that he must perform better than the rest of the class, making the rest of the students unlikely to join this student in participation because it creates a win-lose situation. The third learning style is dependent. Students with this learning style show little intellectual curiosity and learn only what is required of them. These students will be unlikely to initiate or have much to say in class discussions.

A third factor that contributes to lack of student connectedness in the classroom is that students are not encouraged to work cooperatively with each other. In order to learn, to create, to explore the world around them, and to grow intellectually, students need active learning experiences. Teamwork helps the students to learn to tackle increasingly difficult problems, which is something they will need for the real world.

Another factor that may hinder a student's inability to self-assess is that many students are unaware of the standards. The schools that most adults grew up in were designed to sort students and rank them from the highest achievers to the lowest achievers by the end of high

school. The result of this ranking was detrimental to those students in the bottom third of the distribution. These students often dropped out of school or failed to develop the reading, writing, and mathematics problem solving skills necessary for our increasingly technical culture. (Stiggins, 2005a)

The mission of our schools has changed. Society has decided that all schools must help all students meet academic achievement standards. According to Stiggins, “The problem is that the assessment, evaluating, and grading practices of our youth—that is those specifically designed to permit only a few to succeed—now must be revised to permit all students to succeed, at least at some level”. (Stiggins, 2005b, p. 9)

In order for all students to be permitted to succeed, students must believe that they are in control of their success and that if they work hard, they can achieve success. Students need to see and understand the standards that they need to reach in order to see themselves making progress toward these goals.

However, students often do not understand these standards. Often their teachers are not clear on what learning targets they should be shooting for. Teachers often have not been given the opportunity for mastering these learning targets, themselves. Teachers who are not clear on their goals for student learning are not able to articulate these standards to their students. Just as a traveler needs a clear route to reach their destination, the same is true for students. Teachers must provide students with a clear route toward their goals in the classroom.

A final aspect in student’s inability to self-assess may be the lack of parental involvement in assessment. Many teachers feel that parental support is crucial to student success in the classroom. Fredericks and Rasinski (1990, p. 347) state three principles for encouraging parents to take a more active role in assessment:

1. Involving parents in the assessment process must be an integral part of the teacher's program, not just an add-on to the curriculum
2. Parent assessment procedures must be conducted comprehensively. Parents must also understand that assessment can lead to sound curriculum decisions
3. Parents' involvement in assessment should be approached systematically. Parents cannot be expected to assess and monitor their child's development without sufficient time or training.

Teachers must understand that involving parents in the assessment process will not happen automatically. The teachers need to nurture a partnership with the parents to make assessment meaningful for the students.

CHAPTER 3  
THE SOLUTION STRATEGY  
Literature Review

A review of the literature has indicated that current assessment practices do not always lead to the permanent transfer of learning they were designed for. Children have been subjected to a wide variety of testing over the past six decades, with evidence of improvement for the first twenty years. However, there is little evidence of improvement in achievement since the 1960s. There is no compelling evidence that high-stakes testing policies result in transfer to genuine learning. There is an even greater negative effect on America's poor and minority students due to the bias in the type of tests created. (Stiggins and Chappuis, 2005) Traditionally, assessment has been used to give grades or to show accountability of schools, but recently it has also begun to be used as part of instruction to support learning.

The demands on education have changed along with our society in the past several decades. Traditionally, schools focused on rote learning. The learning that took place in schools was passive and students were encouraged to regurgitate facts presented by their teacher. Our society continues to evolve toward greater social and cultural diversity in large metropolitan areas. Lifelong learning skills become essential in this changing society. The areas of reading comprehension, writing effectively and problem solving are critical for lifelong learning.

With these changes, the mission of our schools has been forced to change to ensure that no child fails or is left behind. Schools are made to be accountable to assure that lifelong

learning takes place. It is necessary for schools to rethink their assessment practices to assure that all students succeed.

As a result of No Child Left Behind (NCLB), schools are required to assure the learning of their students. Students must be able to master basic standards and learn how to take responsibility for their learning. However, many students have difficulty with this task because they are unsure about what they need to know. Many students see school as a series of unrelated activities and are unable to see the purpose for their learning activities. According to Black and Wiliam, (2002):

the main problem is that pupils can assess themselves only when they have a sufficiently clear picture of the targets that their learning is meant to attain. Surprisingly, and sadly, many pupils do not have such a picture, and they appear to have become used to receiving classroom teaching as an arbitrary sequence of exercises with no overarching rationale. (p. 142)

The first thing that teachers need to do is to determine what needs to be taught. Teachers need to ask themselves the following questions:

- What are my students supposed to learn?
- What have they learned already? What do they still need to learn?
- Which children should I recommend for special services?
- Have my students met or are they progressing on important achievement standards?
- Did they meet state achievement expectations?

Teachers need to be aware of the standards at their grade level, as well as those that precede or follow their grade level in order to answer these questions. Teachers also need to know what the students need to do to meet these standards. It is only then that the teacher can

begin to articulate these standards to their students. These standards or learning targets should be the foundation on which their teaching should be based. Students need to have these learning targets described to them in student-friendly language before any learning takes place. The classroom targets become a part of daily instruction that is then turned into precise and accurate assessments. Everyone understands the definition of success from the beginning. The teacher must be very careful to have clearly designed lessons that correlate directly to the learning targets. According to Stephen Chappuis (2004), “A fuzzy target is hard to hit: if the curriculum corner of the room is messy; by default, the assessment corner will be equally sloppy.” (p. 21)

Over the years, societal beliefs about testing have shaped our assessment environment. The prevalent belief about testing is that testing should serve two purposes: to inform decisions and to motivate students. (Stiggins, 2002) Over the decades, we have come to believe that by checking on achievement and by reporting the results to the public, we will be able to apply the pressure needed to accelerate school improvement. This has resulted in a switch of power to politicians and policy makers whose actions can affect the broadest range of classrooms and students.

The belief that high-stakes testing is motivating to students has also been widespread in our society. Throughout the years teachers have believed that if we maximize anxiety, students will perform better. Therefore, it was believed that the best way to improve student achievement was to pressure students to get high test scores and good grades to motivate them to work harder and produce more learning.

According to Stiggins (2004), “For assessment to become truly useful, politicians, school leaders, and society in general must come to understand the gross insufficiency of these tests as a basis for assessment for school improvement,” (Stiggins, p. 23)

Traditionally, assessments of learning were used to reward behavior that teachers felt led to learning. These behaviors include turning in homework, preparing for class discussions, trying hard, and participating in class discussions. Students who did not display these behaviors were punished with poor grades. Our traditional ways of using assessments to motivate students to want to keep trying-the rewards and punishments of grades-often don't work as well as teachers would like.

Recent research has shown that all people have an innate desire to learn; we are all born with intrinsic motivation. (Stiggins, 2004) Learning is required for survival. The brain is built to seek information, integrate it with other information, interpret it, and bring it out to apply it to appropriate situations.

When students are in a supportive learning environment, they continue to build upon this intrinsic motivation. A learning supportive environment offers students the following:

- a sense of control and choice
- frequent feedback on their performance
- challenging, but not threatening, tasks
- an opportunity to self-assess accurately
- learning tasks related to everyday life

There are two types of assessments that teachers routinely use. Summative assessment is an assessment that is used for recording the overall achievement of a pupil in a systematic way. It occurs at the end of a scheme of work or phase of education, and a norm-referenced assessment is often used for this final summing up of performance. Formative assessment, on the other hand is a form of assessment intended to give students feedback on their learning

progress and to give the teacher an indication of what students have mastered and areas of difficulty. Formative assessment should not be used to assign marks or grades in the classroom.

Using formative assessment practices shifts the focus from sorting students to providing a classroom environment where students will expect to succeed. Formative assessment allows the teacher to create a culture of confidence. The teacher involves the students in assessing, tracking, and setting goals for their learning. The students and teacher communicate so that the students understand what success looks like and students can see where they are now, and learn how to close the gap between the two. Studies by Black and Wiliam (1998) show a positive effect on student achievement when formative assessment is used. Student gains are especially noted in students who are low achievers.

It is very important for teachers to focus on what students can do. This compares this to the natural inclination displayed by parents and grandparents of toddlers. According to McTighe (1997):

They (adults) regularly support novice performance by encouraging small steps,(“c’mon, you can do it!) celebrating incremental achievements,(“Listen everyone, she said, ‘dada’!”) and documenting growth (witness the refrigerator displays ranging from scribbles of color to identifiable pictures) These celebrations encourage children to keep trying and to strive for greater competence. They focus on what youngsters *can* do and how they have *improved* as a means of spurring further continued growth. (p.10)

Learning is traditionally dominated and controlled by adults and students are seldom in control of making decisions about their learning. Philosophies of education encourage teachers to help students become responsible citizens capable of thinking on their own. Although this is

being discussed, it often has not been practiced. Educational practices have a tendency to foster dependency, where students want to be told what to do and how to think.

Assessment is derived from *assidere* to sit with or beside. Assessment should be something we do *with* and *for* a student. It is important to include students in the assessment process. Ultimately, students make the decisions about whether the learning is worth the effort and if they are capable of meeting learning targets. Student involvement means that students learn to use assessment information to manage their own learning so that they understand how they learn best, know where they are in relating to the learning targets and take the next steps in their learning. According to Sutton (2000):

We may need to teach less in order for the students to learn more. Teach less more carefully, and discuss it with our students. We need to clarify the purpose and expected outcomes of the tasks we design for students, and give them specific, clear and constructive feedback, and the chance to use that feedback to improve their own work. (p. 206).

Students need to be taught the skills they need to be in control of their own academic success: self-assessment and goal setting, reflection, keeping track of and sharing their learning. When students take responsibility for their learning, they are aware of what they need to learn. They relate this to what they already know and what they still need to work on. Students should be able to track their progress by reviewing feedback given to them by their teacher. Students will use this feedback to set new goals for themselves based on what they need to do next.

What often happens in a classroom is that students receive their work with a letter grade or percentage on the top. Students look at their grades and go on with the rest of their day. They

are not provided with specific feedback from their teacher that focuses on their strengths and weaknesses.

Prior to doing classroom assignments, students need to be provided with models of strong and weak work. Using various examples will help students address many problems that they may encounter in their own work. By engaging students in discussions on strong and weak work, teachers help students to develop an understanding of the quality that is expected in their work. According to Wiggins (1993), if teachers expect students to do excellent work, they need to know what excellent work looks like.

By providing students with criteria and models of excellence, teachers are often rewarded with higher quality products and performances. In addition, they are helping students become more self-directed. Students able to distinguish between poor- and high-quality performance are more likely to be able to evaluate and improve their own work, guided by a clear conception of excellence. (McTighe, 1997, p.8)

Teachers need to concentrate on offering regular descriptive feedback, instead of letter grades, on work that is for practice. This feedback should help students understand what they are doing right and what they need to work on next, with respect to their learning targets. A good way to think of this is “stars and stairs”. Students think about what they accomplished, their stars, and connect it to what steps they need to take next, their stairs. All students, regardless of ability, need to know that they did something right. It is the teacher’s job to find it and label it, before launching into what students need to improve. (Stiggins, 2004)

The use of feedback is important to both teachers and students. “Teachers use feedback to make programmatic decisions with respect to readiness, diagnosis and remediation. Students use it to monitor the strengths and weaknesses of their performances, so that aspects associated

with success or high quality can be recognized and reinforced and unsatisfactory aspects modified or improved.” (Sadler, 1989, p. 120)

Benjamin Bloom is a leader in the area of teaching for mastery. In mastery teaching, the teacher follows the following steps:

1. Determine objectives representing the purposes of the course or unit
2. The unit materials are divided into smaller learning units, each with their own objectives and assessments
3. Instructional strategies and evaluation methods are identified
4. Diagnostic tests precede each unit
5. Testing is used to provide supplementary instruction to help students overcome problems

The main point of mastery learning is the idea that time to learn must be adjusted to fit the student's aptitude. No students may proceed to new material until basic prerequisite material is mastered.

Bloom suggests that at the end of an instructional unit, about every two weeks, the teacher give a formative test, that is not used for grading to find out what has been learned and not been learned. The teacher should use the results of this test to determine corrective instruction for the common errors and re-teach, perhaps in a different way/style and test again on the same items using altered questions. Grading for mastery is not on the curve. Rather it means that every student can get an "A" if they master the material.

In 1984, Bloom provided a summary of research on the impact of mastery learning models comparing standard whole-class instruction with experimental classrooms using mastery learning and one-on-one tutoring of students. The analysis showed differences ranging from one

to two standard deviations in student achievement favoring the experimental conditions.  
(Stiggins and Chappuis, 2005)

The ultimate user of assessment information needs to be the student. Students need to have a clear understanding of what they have done wrong and how to make it right. In order for this to be effective, according to Black and Wiliam (1998) “feedback to any pupil should be about the particular qualities of his or her work, with advice on what he or she can do to improve, and should avoid comparisons with other pupils.” (p. 142)

Self-assessment is an essential component of formative assessment. Students should be engaged in tracking, reflecting on and communicating their own progress. Activities that require students to reflect on what they are learning and to share their progress help them develop insights into themselves as learners.

There should be three elements given to students to allow them to self-reflect. These include: the desired goal of instruction, evidence of the present position of the student’s knowledge, and understanding given to the student about the best way to close the gap between the two. When a student has these three components, they will be able to understand the main purpose of their learning and know what they need to do to succeed.

Student involvement in assessment doesn’t mean that students control decisions regarding what will or won’t be tested. It doesn’t mean that they assign their own grades. Instead, student involvement means that students learn to use assessment information to manage their own learning so that they understand how they learn best, know exactly where they are in relation to the defined learning targets, and plan and take the next steps in their learning.

(Stiggins and Chappuis, 2005, p. 13)

Portfolios are often being used by teachers to encourage students to reflect on their learning. “The portfolio helps the classroom environment become a seamless web of instruction and assessment.” (Burke, 2005, p. 58) Teachers are using portfolios in their classrooms for the following reasons:

- to demonstrate students’ skills and understanding
- a tool for discussion with peers, teachers, and parents
- to provide students with opportunities to reflect on their work metacognitively
- to give a chance to examine current goals and set new ones
- to show documentation of students’ development and growth in abilities, attitudes, and expressions

These benefits from the use of a portfolio, allow the teacher to evaluate and develop the curriculum and to evaluate his/her own goals and measures for individual students. It provides teachers with empowerment and support for making changes. Students are then motivated to learn because it gives them self-actualization experiences that they need to achieve by reflecting on their work.

The most important idea about the portfolio is to allow student reflection. Items in a portfolio should show both strengths and weaknesses in order for student to evaluate their work to determine where they are and what future goals they need to set.

Parents and families play a critical role in the education of children. Effective teachers actively engage families in their children’s schooling, make family members aware of their important contributions and encourage them in working closely with the schools. According to Joyce Epstein, director of the Center on School, Family, and Community Partnerships and the National Network of Partnership Schools at Johns Hopkins University, “creating effective

family/school/student partnerships may well be the single most important factor contributing to student success.” (Barr & Parrett, 2003, p. 166)

Teachers need to incorporate parents into the assessment process. Teachers need to provide parents with learning targets in family-friendly language prior to learning. Parents need to see what the next step is for their child’s learning. When teachers provide frequent assessments, parents can see what their child knows and what they need to continue to work on.

Parents also need to know if their child is progressing satisfactorily by meeting classroom-learning expectations. Classrooms that are involving children in self-assessments provide parents with this information.

Teachers need to help parents understand that learning is more than a series of grades on a report card. Parents need to see evidence of their child’s achievement. Evidence may include portfolios that include work at various developmental levels of mastery. Students can use these work samples to tell their parents about their academic growth.

In summary, formative assessment involves children in their learning. Students manage their own learning, rather than teachers making the sole instructional decisions. Students are the ones who read assessment results that teachers give them and they decide whether learning is within reach for them or not.

It is our hope that as researchers we will be able to empower our students to take charge of their learning through the use of the components of formative assessment.

### Project Objective

As a result of making students aware of mathematics goals for their grade level and their progress towards their mathematics goals, the targeted first and fifth graders will improve in their

ability to self monitor their learning, as measured by teacher made tests, parent surveys, student surveys, student interviews, and class radar charts.

#### Process Statement

In order to accomplish the project objective, the following processes are necessary.

1. Introduce mathematics standards in student friendly language.
2. Provide lessons to meet these standards.
3. Administer teacher-made assessments to check progress toward standards.
4. Use student graphs to chart progress and facilitate discussions.
5. Have students keep portfolios of progress in mathematics.
6. Provide daily intervention time to re-teach skills to students who have not met standards.

#### Action Research Action Plan

##### Week 1

- Formulate a classroom mission statement
- Do quality work activity that uses Oreos to discover what quality work looks like (See Appendix D)
- Introduce Lotus diagram—explain what it is and how it is used (See Appendix E)

##### Week 2

- Distribute Parent Pre Survey
- Do student Pre Surveys in class
- Set up class graphs with goals on top. Review with students how to read graphs.
- Set up student portfolios—Decorate cover page, use section dividers for goal sheet, lotuses and assessments

##### Week 3

- Explain the mathematics program and action research project to parents at Curriculum Night

## Week 5

- Explain the mathematics goals and answer questions for parents at Family Mathematics Night

For each mathematics unit, we will follow the following process:

- Introduce lotus diagram and explain unit goals in kid friendly language
- As the lesson is being taught, relate lesson to the goals on the lotus diagram
- Use teacher-made assessments to determine if students have met unit goals
- Use class graphs and personal graphs to track progress toward mathematics goals
- Use PDSA (Plan-Do-Study-Act) to discuss and reflect on learning (See Appendix F)
- Use student portfolios to organize graphs, lotuses and assessments
- Provide daily 15 minute intervention time to re-teach goals to small groups of students who haven't met goals on assessments
- Send home family letters for each mathematics unit describing major goals and vocabulary for each unit
- Use Radar diagram after each unit assessment to judge student comfort level on student self-assessment (See Appendix G)

## Weeks 3, 6, 9, 12, 15

- Individual student interviews to discuss portfolios. Questions to consider for interviews include:
  1. What are your strengths in mathematics for this unit?
  2. What are your weaknesses in mathematics for this unit?
  3. How can you get help for your weaknesses?

## Week 13:

- Students will share their mathematics portfolios with their parents at Parent/Teacher Conferences.

## Week 16:

- Give Post Survey to parents

## Week 17:

- Give Post Survey to students

### Collection Tools

Table 3.

#### *Collection Tools for Action Research*

<b>Name of Measure</b>	<b>Type</b>	<b>Construct Measured</b>
Teacher made assessments	test	skills
Student interviews	interview	attitude toward their progress
Radar diagram	survey	thinking
Teacher observation	observation	skills, thinking, attitude
Student portfolio	observation	skills
Parent survey	survey	knowledge
Student survey	survey	knowledge

### Methods of Assessment

In order to assess the effects of the intervention, the researchers will be utilizing parent and student pre and post surveys. These surveys will determine attitudes about mathematics and check for understanding of essential mathematics skills. Parents and students will also be surveyed about the student's ability to monitor his or her progress in mathematics.

In addition, to these surveys, the researchers will incorporate student data folders as a tool for students to monitor their progress and set goals. The researchers will post data, anonymously, from teacher made assessments for the entire class in order to track the progress of the class as a whole.

## CHAPTER 4

### PROJECT RESULTS

#### Description of the Intervention

As a result of making students aware of mathematics goals for their grade level and their progress towards their mathematics goals, the targeted first and fifth graders will improve in their ability to self monitor their learning, as measured by teacher made tests, parent surveys, student surveys and radar diagrams.

The researchers began the first week of research by introducing the students to lotus diagrams, which are a visual representation of key concepts to be taught in that unit. The researchers explained to the students that the lotus diagram contained the essential skills that students need to master for each unit in mathematics.

The researchers distributed the parent and student pre surveys in week two. These surveys dealt with student and parent attitudes about mathematics. It also dealt with their knowledge of mathematics goals, determining progress toward mathematics goals, and student ability to obtain help on mastering these goals.

In week two, the researchers set up graphs to track class progress on the mathematics goals. The students also set up their mathematics portfolios, which included individual goal sheets, lotuses, and assessments. The researchers explained to the students how to chart data using these graphs.

During week three, the researchers presented the action research project to parents at Curriculum Night. The researchers gave the parents a list of essential grade level

mathematics goals for the upcoming year. The researchers answered parent questions about the mathematics program and grade level expectations.

The researchers used the following process for each unit of study. The researchers introduced the essential goals for each unit through the use of a lotus diagram. As each lesson was being taught, the researchers related the lesson to the goals on the lotus diagram. The researchers used teacher-made assessments to determine if students made unit goals. The researchers used class graphs and individual student graphs to track progress. These graphs were analyzed as part of the Plan-Do-Study-Act (PDSA) model. The PDSA is a discussion tool teachers can use with their students in the continuous improvement process.

The students used portfolios to organize graphs, lotuses, and assessments. The student portfolios had a list of student goals for each unit. Students were given assessments on each of these goals. When students met these goals in the first grade classroom, the researcher highlighted the goals on the assessments. The students highlighted the individual copies of the goals in their portfolios. In the fifth grade classroom, the students tracked their progress using individual bar graphs with the percentages from their assessments. Both classrooms used classroom charts to track class progress on the mathematics goals. These charts were used to help students understand where we are as a class in relation to the essential mathematics goals. They were also a discussion device used to guide and make decisions about future learning.

Researchers provided a daily 15-minute intervention time to reteach goals in small groups to students that did not meet the goals on assessments. This was an ongoing process that went through several revisions.

In the fifth grade classroom, the reteach time began as switching classes. The students were ability grouped based on the results of short cycle assessments. This was difficult to manage due to varied classroom schedules and a lack of time for teacher preparation and grouping. Next, the fifth grade researcher began working with ability groups in her own classroom. This method was more effective because preparation time with other teachers was no longer a factor. In addition, the researcher also employed the use of peer buddies. The students who had mastered the essential goals were paired up with struggling students. This method was met with great enthusiasm because students were actively involved in the learning process.

In the first grade classroom, the reteaching process also went through several revisions. First of all, the teacher tried to pull small groups of struggling students back to the table for small group instructions. This was very difficult because the other first grade students did not have the skills to work independently and several behavior problems occurred. Next, the four first grade teachers worked together to provide a common reteaching time for students. There were several scheduling issues, and the teachers were only able to provide this reteaching time once a week. This was tried for about six weeks, but since the instruction was not done on a consistent basis, it did not result in student achievement. Last of all, the researcher paired with one other first grade teacher. They developed a new model for reteaching. The teachers assessed their students on one goal each week. Students that did not meet the goal worked with one of the first grade teachers the following week for a twenty-minute period each day. Students that did meet the goal worked with the other first grade teacher on enrichment activities. This is the method that has proven to be the most successful based on the fact

that a majority of the students who are receiving the reteaching have mastered the goals the second time around.

Researchers also sent home family letters on each unit that described major goals and vocabulary for each unit. In the first grade classroom, the researcher sent home a list of goals that their child had mastered. Additional worksheets were attached for goals that the students had not yet mastered. In the fifth grade classroom, the students brought home mathematics goal assessments to be signed by their parents. This information was also shared with parents at Parent/Teacher conferences.

The researchers decided not to use the radar diagrams with their students. They felt that students were able to engage in meaningful discussions without having to bring in another discussion tool.

The researchers planned to meet with students individually to discuss their mathematics portfolio. However, due to time constraints, they were able to meet with students at the end of each trimester, instead of every three weeks. In the first grade classroom, the researcher held many whole class discussions in which the students reviewed which goals they had mastered and which areas they needed more work on. In the fifth grade classroom, the researcher used a goal reflection sheet to encourage students to think about their strengths, weaknesses, and how to get help for their weak areas.

Students in first and fifth grade shared their portfolios with their parents at Parent/Teacher conferences. This was used to facilitate discussions between the student, teacher and parents.

## Presentation and Analysis of the Results

Table 4.

*Student Pre and Post Survey Question 1*

<b>Question 1: I like mathematics.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	20	13	3	2	2
1 <sup>st</sup> Grade Post Survey	20	14	4	2	0
5 <sup>th</sup> Grade Pre Survey	18	12	2	4	0
5 <sup>th</sup> Grade Post Survey	19	12	3	4	0

This question dealt with student attitudes toward mathematics. The researchers felt that it was important to understand these attitudes prior to doing their research. A majority of the first and fifth graders had positive feelings toward mathematics. These positive feelings continued throughout the research time. The pre and post surveys indicated that student attitudes toward mathematics remained relatively unchanged throughout the action research.

Table 5

*Student Pre and Post Survey Question 2*

<b>Question 2: I know the mathematics goals for my grade level.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	20	9	5	5	1
1 <sup>st</sup> Grade Post Survey	20	19	0	1	0
5 <sup>th</sup> Grade Pre Survey	18	7	1	10	0
5 <sup>th</sup> Grade Post Survey	19	17	0	2	0

The next question dealt with student knowledge of the mathematics goals for their grade level. Prior to the action research, less than half of the first and fifth graders were aware of the appropriate mathematics goals

One of the major focuses of the action research was explaining mathematics goals in student friendly language. It was apparent to the researchers that this was an area of success in the action research. Almost all of the first and fifth graders reported that they knew the mathematics goals for their grade level. This was a huge increase from the beginning of the year.

Table 6

*Student Pre and Post Survey Question 3*

<b>Question 3: My parents should know the mathematics expectations for my grade level.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	20	14	4	0	2
1 <sup>st</sup> Grade Post Survey	20	18	0	2	0
5 <sup>th</sup> Grade Pre Survey	18	18	0	0	0
5 <sup>th</sup> Grade Post Survey	19	17	0	2	0

Question three dealt with whether students felt that their parents need to be aware of grade level expectations. The first and fifth grade students both felt that their parents need to be aware of the mathematics goals for their grade level. This was consistent throughout the research. Students felt that their parents needed to be aware of the learning expectations for their grade level.

Table 7.

*Student Pre and Post Survey Question 4*

<b>Question 4: I can talk about mathematics goals.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	20	9	8	3	0
1 <sup>st</sup> Grade Post Survey	20	15	1	4	0
5 <sup>th</sup> Grade Pre Survey	18	10	3	5	0
5 <sup>th</sup> Grade Post Survey	19	16	1	2	0

Table 8.

*Student Pre and Post Survey Question 5*

<b>Question 5: I can monitor my progress towards mathematics goals.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	20	11	1	7	1
1 <sup>st</sup> Grade Post Survey	20	19	0	1	0
5 <sup>th</sup> Grade Pre Survey	18	12	1	5	0
5 <sup>th</sup> Grade Post Survey	19	15	0	4	0

These questions dealt with student articulation and monitoring of their progress. Prior to doing the action research, about one half of the students felt that they were able to discuss mathematics goals for their grade level. However, this number increased after the students began using the lotus diagrams for a discussion of key mathematics concepts for each unit.

Monitoring progress toward mathematics goals increased as a result of the action research. Prior to the research, half of the first graders and two-thirds of the fifth graders felt that they could monitor their progress on their mathematics goals. Students were taught how to reflect on their progress, using the data in their portfolios. Following the research, almost all of the first graders and about three-fourths of the fifth graders agreed that they could monitor their progress in mathematics.

Table 9.

*Student Pre and Post Survey Question 6*

<b>Question 6: I know when I need extra help and how to get it.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	20	14	1	4	1
1 <sup>st</sup> Grade Post Survey	20	19	0	1	0
5 <sup>th</sup> Grade Pre Survey	18	13	1	4	0
5 <sup>th</sup> Grade Post Survey	19	16	1	2	0

This question dealt with students' abilities to recognize when they need extra help and how to get this help. About seventy five percent of first and fifth graders felt that they knew when they needed extra help and how to get this help prior to the action research. This was an important discussion that frequently took place throughout the action research. Students were encouraged to look at their assessments to determine areas where they needed additional assistance. After the research period, virtually of the students reported that they knew where they needed additional help and knew how to obtain that help.

Table 10.

*Student Pre and Post Survey Question 7*

<b>Question 7: When I take a test, it helps me want to learn more.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	20	11	7	2	0
1 <sup>st</sup> Grade Post Survey	20	19	0	1	0
5 <sup>th</sup> Grade Pre Survey	18	12	0	6	0
5 <sup>th</sup> Grade Post Survey	19	14	0	5	0

This question dealt with test taking attitudes. About one half of first graders and two thirds of fifth graders felt that taking tests motivated them to learn more. This increased at the end of the research for the first graders and remained about the same for the fifth graders. When the researchers formulated this question, they were interested in measuring student motivation. However, classroom conversations in the fifth grade indicated that students felt that taking tests helped them to gauge their progress and made them eager to take more tests. This was not indicated by student response of the survey question.

Table 11.

*Parent Pre and Post Survey Question 1*

<b>Question 1: My child enjoys mathematics.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	17	11	6	0	0
1 <sup>st</sup> Grade Post Survey	15	14	0	1	0
5 <sup>th</sup> Grade Pre Survey	15	10	2	3	0
5 <sup>th</sup> Grade Post Survey	14	9	1	3	0

The parent surveys had questions that mirrored those in the student surveys.

The first question dealt with the parents' perceptions of their child's interest in mathematics. A majority of parents felt that children enjoy mathematics. This increased for the first grader after the research period and remained constant for the fifth graders.

Table 12.

*Parent Pre and Post Survey Question 2*

<b>Question 2: I know the mathematics goals for my child's grade level.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	17	6	10	1	0
1 <sup>st</sup> Grade Post Survey	15	15	0	0	0
5 <sup>th</sup> Grade Pre Survey	15	9	1	4	1
5 <sup>th</sup> Grade Post Survey	14	13	1	0	0

Table 13.

*Parent Pre and Post Survey Question 3*

<b>Question 3: It is important for parents to be aware of grade level expectations in mathematics.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	17	17	0	0	0
1 <sup>st</sup> Grade Post Survey	15	15	0	0	0
5 <sup>th</sup> Grade Pre Survey	15	13	0	2	0
5 <sup>th</sup> Grade Post Survey	14	13	0	1	0

These questions dealt with parent awareness of grade level expectations in mathematics. Less than half of the first grade parents and about three fifths of the fifth grade parents felt that they knew the appropriate grade level expectations for their child prior to the action research. However, virtually all of these same parents felt that it was necessary for parents to be aware of these expectations.

During the research period, these goals were sent home to parents at the beginning of each mathematics unit. After the research was conducted, all of the first grade parents and more than ninety percent of the fifth grade parents indicated that they knew the mathematics goals for their child's grade level.

Table 14.

*Parent Pre and Post Survey Question 4*

<b>Question 4: After teachers make students aware of mathematics goals for each unit, my child should be able to talk about these mathematics goals.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	17	13	4	0	0
1 <sup>st</sup> Grade Post Survey	15	9	0	6	0
5 <sup>th</sup> Grade Pre Survey	15	8	0	7	0
5 <sup>th</sup> Grade Post Survey	14	12	0	2	0

Table 15.

*Parent Pre and Post Survey Question 5*

<b>Question 5: After teachers make students aware of mathematics goals for each unit, my child should be able to monitor progress toward meeting these goals.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	17	7	9	1	0
1 <sup>st</sup> Grade Post Survey	15	8	0	7	0
5 <sup>th</sup> Grade Pre Survey	15	10	0	5	0
5 <sup>th</sup> Grade Post Survey	14	10	0	3	1

These questions dealt with student awareness and monitoring of their progress in mathematics. About two thirds of first grade parents and half of fifth grade parents felt that their child should be able to talk about mathematics goals prior to the action research. About half of first grade parents and two thirds of fifth grade parents felt that their children should be able to monitor their progress. This number increased for fifth grade parents after the action research, but decreased for first grade parents. In the pre and post surveys, there were a lot of parents that were unsure on this question. Comments written in by parents on the survey indicated that they were concerned that it is too difficult for school aged children to monitor their progress and discuss mathematics goals.

Table 16.

*Parent Pre and Post Survey Question 6*

<b>Question 6: After teachers make students aware of mathematics goals for each unit, my child should be able to identify what extra help they need.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	17	9	7	1	0
1 <sup>st</sup> Grade Post Survey	15	9	1	5	0
5 <sup>th</sup> Grade Pre Survey	15	13	0	2	0
5 <sup>th</sup> Grade Post Survey	14	13	0	1	0

This question dealt with student ability to determine areas in which they need extra help. About half of first grade parents agreed that their child should be able to do this and almost half disagreed with this statement before the action research. After the research was conducted, many of these parents moved from disagree to unsure. Comments written in by first grade parents indicated that they felt this was too difficult for their child to accomplish. Fifth grade parents remained pretty constant with about eighty to ninety percent of parents agreeing with the statement.

Table 17.

*Parent Pre and Post Survey Question 7*

<b>Question 7: Testing can be used to motivate students.</b>					
<b>Grade Level</b>	<b>Number of Students Responding</b>	<b>Agree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>No response</b>
1 <sup>st</sup> Grade Pre Survey	17	12	4	1	0
1 <sup>st</sup> Grade Post Survey	15	13	0	2	0
5 <sup>th</sup> Grade Pre Survey	15	11	1	3	0
5 <sup>th</sup> Grade Post Survey	14	7	2	5	0

This question dealt with the concept of testing as a source of motivation. A majority of parents felt that testing is motivating for students prior to the research. Fifth grade parents changed their minds after the research. One half of fifth grade parents felt that testing is motivating for students. Comments on the fifth grade surveys indicated that parents were concerned that too much testing can become a source of stress for their child.

## Conclusions and Recommendations

### Conclusions

Throughout the research, the researchers had three main goals for their students. First, the researchers wanted to help students become aware of the essential mathematics goals for their grade level. Secondly, the researchers wanted students to be able to track their progress on their mathematics goals. Lastly, the researchers wanted the students to be able to use the information from their portfolios to make decisions that would lead to improvement.

Through the data on the student surveys and informal classroom discussion, the researchers observed an increase in student awareness of their mathematics goals. Students were able to discuss the lotus diagrams and were prepared for assessments on these goals.

Student portfolios were used to track student progress. Students as young as first grade were able to go through their portfolios and indicate to the teacher which skills they had mastered and which skills they needed additional work on. Class graphs, which were used to track the progress of the class as a whole, provided motivation for student achievement. Students worked together to help one another meet these essential goals because they wanted the entire class to be successful. The information gained from the portfolios and class discussions was then used to help students understand their strengths and weakness and develop a plan to address their weaknesses.

The parent surveys indicated that they felt that discussing mathematics goals and monitoring progress were areas that were too difficult for school aged children. However, the research was contradictory to parent thoughts on what children could do.

The first and fifth grade students were able to use their portfolios to measure their individual growth. Discussions between individual students and the researchers indicated that students were very perceptive of the areas in which they needed additional work.

### Recommendations

As a result of this action research study, the researchers would like to make several recommendations. First of all, the researchers would recommend extending the research period from three months to an entire school year. It was necessary for the researchers to model the reflection process many times for the students in order for them to do this independently. Therefore, it took the students about two months to get acquainted with the assessment process. By extending the research to one school year, the students would have the opportunity to revisit this process many times, thereby maximizing their ability to self-reflect.

The researchers also felt it was necessary to allow more time for individual conferences with students. Although this was done on an informal basis, time constraints prevented the researchers from doing this as often as they would have liked. Some ways this could be done would be engaging the assistance of support personnel or substitute teachers during the time teachers are conferencing with students.

Increasing parent involvement was an area the researchers wish to improve upon. As indicated in the parent surveys, parents were not aware of their child's capabilities in the area of assessment. It is necessary for the teacher to involve the parents in the assessment process. One way to do this would be to involve parents in more opportunities for sharing portfolios with their children. This would allow parents to see the way their child uses assessment information to help with future learning.

As with any initiative, teachers experienced in a leadership role, realize the importance of common systematic procedures. Teachers who have gone through the assessment process with their students need to encourage the other teachers at their grade level to join the process. Teacher leaders should provide an example to encourage all teachers in the school to become a part of the assessment process. Students, who have had experience with assessment each year, become more comfortable with the process and have greater insight into their learning.

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APPENDIX A

FIRST GRADE STUDENT SURVEY

## Student Survey

Please circle your answer for the statements below.

1. I like mathematics.



2. I know the mathematics goals for my grade level.



3. My parents should know the mathematics expectations for my grade level.



4. I can talk about mathematics goals



5. I can monitor my progress towards mathematics goals



6. I know when I need extra help and how to get it



7. When I take a test, it helps me want to learn more.



APPENDIX B

FIFTH GRADE STUDENT SURVEY

Please circle your answer for the statements below.

1. I like mathematics.

**Agree**

**Unsure**

**Disagree**

2. I know the mathematics goals for my grade level.

**Agree**

**Unsure**

**Disagree**

3. My parents should know the mathematics expectations for my grade level.

**Agree**

**Unsure**

**Disagree**

4. I can talk about mathematics goals

**Agree**

**Unsure**

**Disagree**

5. I can monitor my progress towards mathematics goals

**Agree**

**Unsure**

**Disagree**

6. I know when I need extra help and how to get it

**Agree**

**Unsure**

**Disagree**

7. When I take a test, it helps me want to learn more.

**Agree**

**Unsure**

**Disagree**

APPENDIX C

FIRST AND FIFTH GRADE PARENT SURVEYS

## Parent Survey

Please circle your answer for the statements below.

1. My child enjoys mathematics.

**Agree**            **Unsure**            **Disagree**

2. I know the mathematics goals for my child's grade level.

**Agree**            **Unsure**            **Disagree**

3. It is important for parents to be aware of grade level expectations in mathematics.

**Agree**            **Unsure**            **Disagree**

4. After teachers make students aware of mathematics goals for each unit, my child should be able to talk about these mathematics goals.

**Agree**            **Unsure**            **Disagree**

5. After teachers make students aware of mathematics goals for each unit, my child should be able to monitor progress toward meeting these goals.

**Agree**            **Unsure**            **Disagree**

6. After teachers make students aware of mathematics goals for each unit, my child should be able to identify what extra help they need.

**Agree**            **Unsure**            **Disagree**

7. Testing can be used to motivate students.

**Agree**            **Unsure**            **Disagree**

Please use the line below to mark how confident you are in your ability to help your child meet his/her mathematics goals.

1-----2-----3-----4-----5  
Not at          Barely          Somewhat          Confident          Extremely  
all confident      confident          confident                   confident

What assistance would you like from me to increase your comfort with mathematics goals for our grade level?

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APPENDIX D

QUALITY WORK ACTIVITY

The purpose of the Oreo cookie demonstration is to define quality as defined by customer needs, expectations and requirements.

1. Have student break apart the Oreo and eat the cream.
2. Have them put it back together.  
Ask: *“Would you buy a package of Oreos without the cream? Why?”*  
Allow time for comments.  
You are looking for: *“Not all the pieces are here.”*
3. Compare this with incomplete work.
4. Have the students wrap the Oreo in a paper towel.
5. Have the students crush the Oreo in the paper towel two times.  
Ask: *“Would you buy a package of Oreos that are crushed? Why?”*  
Allow comments.  
Lead with: *“Then what’s wrong with the package of crushed Oreos?”*  
You are looking for: *“The pieces are here, but they are not what the finished product should be.”*
6. Compare this to work that is often hurried through, incomplete, and/or not best effort.
7. Now take a new Oreo. Ask: *“What makes this Oreo different from the other Oreos?”* Allow comments. You are looking for: *“It’s all there. It looks good. It is complete. It isn’t damaged.”*
1. Compare the GOOD Oreo to completed work.
10. Introduce Quality Standards. Ask: *“How do you know this is a complete Oreo?”*  
Allow comments. Write the comments down on the board.
11. Ask: *“Why is it important to know what we are looking for before we make our projects?”* Allow comments. You are looking for: *“So we know what we are supposed to make.”*
12. Close with:  
*“What was the purpose of this activity?” “What are 3 things you learned from this activity?”*

APPENDIX E

SAMPLE LOTUS DIAGRAM

The Lotus diagram is completed and shared with the students at the beginning of each math chapter. It contains the essential skills for each chapter. It also includes activities that will address each of these essential skills.

**Review Goal 1: I can write numbers from 1-6.**

- Slate practice (Lesson 1.4)
- Math journal pages 1, 2, 5

**Review Goal 2: I can compare two numbers**

- Put number cards 0-15 in order
- Top-It

**Review Goal 3: I can count up to 20 objects**

- Slate practice (Lesson 1.4)
- Penny dice game (Lesson 1.3)
- Counting Walk—count objects on a class walk

**Establishing  
Routines**

**Unit 1**

**Review Goal 4: I can use tally marks to represent numbers**

- Pet Graphs (Lesson 1.7)
- Listening Tally (Lesson 1.7)
- Dice Roll and Tally (Lesson 1.8)
- Rock Paper Scissors Tally
- Graph favorite pizza (Lesson 1.12)

**Review Goal 5: I can count by ones using a number line.**

- Number line squeeze (Lesson 1.2)
- Use number line to determine number of students absent (Calendar)
- Count orally by 1s (Lesson 1.2)
- Number rhymes  
1,2 Buckle my Shoe
- Counting books
- Penny dice game (Lesson 1.3)

APPENDIX F

PLAN-DO-STUDY-ACT

A PDSA Diagram (Plan-Do-Study-Act) is used for a cycle to encourage continuous improvement. It uses the scientific method in relation to classroom improvement and problem solving. The students use the various steps around the PDSA diagram to plan for improvement in the classroom.

