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**DO FORMATIVE ASSESSMENT STRATEGIES HELP LEARNERS WITH  
ACADEMIC DIFFICULTIES?**

by

Dana King

A Thesis

Submitted to the  
Department of Interdisciplinary and Inclusive Education  
College of Education

In partial fulfillment of the requirement  
For the degree of  
Master of Arts in Special Education

at  
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Thesis Chair: S. Jay Kuder, Ed.D.

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## Abstract

Dana King

DO FORMATIVE ASSESSMENT STRATEGIES HELP LEARNERS WITH  
ACADEMIC DIFFICULTIES?

2015-2016

Sydney Kuder, Ed.D.

Master of Arts in Special Education

The purpose of this study is to determine whether or not formative assessment strategies enhance the educational learning experience for lower level learners in a mathematics classroom setting. The selected students are supported by a Basic Skills teacher and perform below grade level. The FA group, Formative Assessment group, was given two variations of Formative Assessments to use each day. The IAL group, Instruction as Usual group, continued as is. The formative assessment strategies used were mini white boards and a mathematical graphic organizer allowing the students to determine the problem, question being asked, information provided, which operation to choose, and inverse operations in order to check the work presented. The students were evaluated by performing a Pre and Post Topic assessment. The results had shown that although both groups improved significantly from pre to post assessment, the FA group produced stronger scores.

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## Chapter 1

### Introduction

As educators, we are continuously assessing throughout the day to ensure that our students are actively learning and achieving mastery. With multiple types of learners and differentiated instruction occurring throughout each lesson, how do we know these students are working and the lessons are meaningful? Students with learning deficiencies have difficulty to varying degrees in relation to material taught in the classroom depending on the identified needs. These difficulties require the teacher to differentiate learning at many levels. For instance, a student identified with a specific learning needs may require key notes in order to keep up with the lecture rather than try to take notes and listen, The way students with learning needs are able to retain information has been an area of concern for years. These students may need an accommodation of teaching strategies such as mnemonic devices, study and drill, or flash cards.

The traditional model to assess was based upon curricular tests the end of a unit. Students were expected to master a concept, and take a summative assessment. This assessment score would determine student grades and classroom placement. Measurement experts agree that there are a variety of effects that could cause a negative assessment score ranging from emotional distress to everyday hardships.

In this study, I have examined the effectiveness of formative assessment in the classroom with basic skills students. I believe that there are multiple ways to assess a child in the classroom and we are limiting student growth by sticking to the summative assessment model. Formative assessments provide information needed instantly and

directly. Formative assessments show student thinking and understanding. Most importantly, formative assessments help students grow as individuals and produce a happier learning environment. For instance, by use of a mini white board, students are able to flash their answers, which gives an immediate response. Graphic organizers (graphic organizers are an instructional method to help students learn. Not a type of assessment).help establish and provide a definitive answer as to the level of understanding and guided groupings are created on daily assessments alone that help modify and adjust thinking and delivery. These daily assessments help build student confidence and willingness, especially those with learning needs.

According to W. James Popham, author of Transformative Assessment, “Formative assessment is a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes” (Popham, 2008). This type of assessment helps teachers modify and adjust while providing a thriving educational environment for students. This educational strategy provides teachers a look into the cognitive development and to show how students are thinking about the assignment as opposed to summative assessments, which provide a “final grade”; an assessment after the lesson or unit is taught.

The research question in this study is: Are students with learning needs mastering new math skills while formative assessments are ongoing in the daily classroom?

This study was conducted in a suburban fifth grade mathematics classroom. In this classroom, there are a total of seventeen students. Out of the seventeen students, nine



of them are classified as basic skills. The basic skills students were divided into two groups. The first group containing four students, becoming the control group, where instruction will go on as usual. The second group becoming the testing group, where they will be given two examples of formative assessment throughout the daily math lessons. Group one contains a total of four students. Of these four students, all are Caucasian and do not require reduced lunch. There are two female and two male students. These basic skills students are given simple modifications and accommodations during class such as underlined key words and reference charts.

The second group, the group that will have formative assessment interventions, consists of five students. Of the five students, three of them are Caucasian, two of them are African American, and one is on reduced lunch. There are three female and two male students. One student is classified other health impaired (ADHD). One student has a 504 that allows for preferred seating, manipulatives, and extra time on assessments.

The dependent variable for this study is the use of end –of- topic assessments, the unit’s summative assessments. Each day, *during the lesson*, is where the formative assessment study begins. The independent variable, the formative assessments, are showing teachers how students are learning new material. The first formative assessment tool used in this study is the use of mini white boards. Each student in Group 2, the intervention group, was given a mini white board. During whole group instruction and small group instruction, they were taught how to use the mini white boards. During the lessons, the students would write a “check” at the top if they felt confident; and a simple minus symbol if they were stuck.; this also allowed time to reflect on themselves and self-assess. Next, the students use the mini white boards to flash answers to example

problems, again, telling the teacher if the lesson needs to be revisited or if it was mastered, therefore, giving the green light to move forward. Group one, who is not given the use of a white board as an intervention, continued with the daily lessons as usual.

The second formative assessment intervention is the use of a graphic organizer. Students in Group 2 were given graphic organizers to break down the mathematical problems. In this graphic organizer, students are given space to explain their thinking using words, make connections, and share questions and comments. Students in Group 1 were not given this graphic organizer.

The formative assessment white board intervention and the graphic organizer intervention took place over a four-week period. This allowed time to teach two math topics with pre and post unit assessments. In theory, the student's who receive the formative assessment interventions throughout the four weeks will receive higher success on post-tests than students who did not receive formative assessment support.

The implications embedded with this study include learning objectives, giving valuable feedback, and time management. The students need to be aware of what the objective is and be given a clear purpose of the lesson which requires the teacher to clearly state what he/she is looking for. Another implication for this study is giving valuable feedback to the students depending on their work. Teachers must be considerate as to not make the child discouraged, but to clearly indicate what went wrong in the particular problem and help guide them through. A third implication for this study includes time management; by using mini white boards, for example, quick assessment

with a simple check mark can instantly show the teacher to proceed or continue guiding the lesson.

If my theory is correct, students will benefit from formative assessment in all subjects of study. Educators could modify and personalize formative assessments based on student needs, which could improve the overall educational experience.

## Chapter 2

### Literature Review

Historically speaking, formative assessment was not a tool utilized in the classroom. The idea of summative, end of the unit assessments, were the underlying assessment in order to determine the skills mastered. However, in the 1960's, questions arose due to achievement gaps between wealthy students versus poor students as well as the connection between diversity groups. President Lyndon B. Johnson's "War on Poverty" discussed the educational differences between privileged versus underprivileged children. The Economic Opportunity Act of 1964 and the Elementary and Secondary Education Act of 1965 were created in order to attempt to reduce the achievement gap (Guskey, 2005). Throughout the years, formative assessment was created. Formative assessment determines student understanding during the lesson as well as helping teachers decipher the parts of the lesson in which need to be revisited. According to W. James Popham, (2008) formative assessment is, "A planned process in which assessment-elicited evidence of students' status is used by teachers to adjust their ongoing instructional procedures or by students to adjust their current learning tactics" (Popham, 2008). Popham believes that formative assessment is a tool that could transform the classroom and the learning that occurs. Teachers and students are given the chance to reflect and correct or applaud their own learning; they become responsible for their own success.

Benjamin Bloom, an educational researcher, spent years observing classrooms. Teachers were teaching one topic in one way in an exact amount of time. Bloom recognized that this could potentially be the cause of the achievement gap. He suggested

that teachers must vary in their teaching techniques in order to reach students with different backgrounds, learning styles, and upbringings. Bloom acknowledged that teachers should use a differentiated method in order to reach students and also assess throughout in order to provide instant and direct feedback (Guskey, 2005). After trial and error and determining a success rate, Bloom created Mastery Learning. Mastery Learning refers to students being assessed formatively, which will provide the student with direct response in order to master the unit. “This “just-in-time” correction prevents minor learning difficulties from accumulating and becoming major learning problems. It also gives teachers a practical means to vary and differentiate their instruction in order to better meet students’ individual learning needs” (Guskey, 2005, p 4).

There are multiple types of formative assessments that can be provided to students on a daily basis. Besides making daily observations, asking questions, and discussion techniques, a teacher could also provide graphic organizers, exit slips, or include peer connections. Students learn in different ways and by including multiple types of formative assessing strategies, teachers are providing a wider gap for students to achieve and be successful in the classroom. As the National Council of Teacher of English stated, “Formative assessment is a constantly occurring process, a verb, a series of events in action, not a single tool or a static noun. In order for formative assessment to have an impact on instruction and student learning, teachers must be involved every step of the way and have the flexibility to make decisions throughout the assessment process” (NCTE, 2013)

There are many factors included in formative assessment, which must be addressed by the teacher in order to be successful. For example, self assessment is an important tool

because students can dissect their own work and gauge their understanding. Black and Wiliam (1998) found that sometimes students are too hard on themselves and also cannot fully self assess unless there is full understanding. They must understand the learning goal as well as what they need to achieve (Black, Wiliam 1998). Black and Wiliam (1998) also found that questioning and discussion techniques must be handled carefully. When a question is asked, the same few students participate. This could be discouraging to other students who are unsure and also send the message that someone else will answer the question. Teachers can guide productive discussion by having students turn and talk, work in small groups, or asking students to use index cards or dry erase boards to write an answer down. These suggestions eliminate the dominant student so all students can think at their own pace and level while also providing meaningful discussion. “The dialogue between pupils and a teacher should be thoughtful, reflective, focused to evoke and explore understanding, and conducted so that all pupils have an opportunity to think and to express their ideas” (Black, Wiliam 1998).

In researching formative assessments for varied types of learners, these tools may be a critical component in the increase of student learning. In a position statement prepared by the National Council of Teachers of English (2013) cited the work of Cizek (2010) that described the following as essential elements of formative assessment:

1. Requires students to take responsibility for their own learning.
2. Communicates clear, specific learning goals.
3. Focuses on goals that represent valuable educational outcomes with applicability beyond the learning context.

4. Identifies the student's current knowledge/skills and the necessary steps for reaching the desired goals.
5. Requires development of plans for attaining the desired goals.
6. Encourages students to self-monitor progress toward the learning goals.
7. Provides examples of learning goals including, when relevant, the specific grading criteria or rubrics that will be used to evaluate the student's work.
8. Provides frequent assessment, including peer and student self-assessment and assessment embedded within learning activities.
9. Includes feedback that is non-evaluative, specific, timely, and related to the learning goals, and that provides opportunities for the student to revise and improve work products and deepen understandings.
10. Promotes metacognition and reflection by students on their work. (NCTE, 2013).

Formative assessments may happen at any time throughout the lesson. They may happen in the beginning to discover what prior knowledge the student has, they may happen during the lesson to ensure they are following the teacher with the new material up until this point, and also at the end to determine how successful the lesson is. This strategy allows the teachers to find a starting point, reteach, adjust strategies, or suggest reinforcement. However, formative assessment does not only include assessment.

Formative assessment is a process, with assessment being the first step. After the teacher provides an example of formative assessment, the teacher will be provided with an immediate response of student understanding. The teacher must then analyze the data given, and make the decision to reteach the topic, or to move forward with the lesson.

They must ask themselves, why was this lesson unsuccessful? What is Plan B? In

analyzing formative assessment data, teachers are able to comprise new groupings and also continue to differentiate by allowing certain students to move forward and providing struggling students with assistance. Once in a re-teaching setting, it is critical that the teacher attempts to teach the material in a different fashion, even if this includes a simple re-explanation while then providing another formative assessment. This second assessment will again determine the level of understanding for the students who may have not previously understood. Teachers should not continue teaching new material unless each student has mastered a particular skill. This will only create a trickle effect, which will cause the student to continuously struggle and be a step behind.

The difficulty in formative assessment lies within the fact that each student learns differently. It is impossible to predict how a child will respond to a particular lesson, which means that teachers must be prepared to use a variety of formative assessment strategies. According to surveys, studies, and research reviewed by Black and Wiliam (1998), as a whole, educators seem to become stuck or complacent regarding assessment. They believe that difficulties with assessment revolve around three issues.

“The first issue is *effective learning*.

-The tests used by teachers encourage rote and superficial learning even when teachers say they want to develop understanding; many teachers seem unaware of the inconsistency.

-The questions and other methods teachers’ use are not shared with other teachers in the same school, and they are not critically reviewed in relation to what they actually assess.



-For primary teachers particularly, there is a tendency to emphasize quantity and presentation of work and to neglect its quality in relation to learning.

The second issue is *negative impact*.

-The giving of marks and the grading function are overemphasized, while the giving of useful advice and the learning function are underemphasized.

-Approaches are used in which pupils are compared with one another, the prime purpose of which seems to them to be competition rather than personal improvement; in consequence, assessment feedback teaches low-achieving pupils that they lack "ability," causing them to come to believe that they are not able to learn.

The third issue is the *managerial role* of assessments.

-Teachers' feedback to pupils seems to serve social and managerial functions, often at the expense of the learning function.

-Teachers are often able to predict pupils' results on external tests because their own tests imitate them, but at the same time teachers know too little about their pupils' learning needs.

-The collection of marks to fill in records is given higher priority than the analysis of pupils' work to discern learning needs; furthermore, some teachers pay no attention to the assessment records of their pupils' previous teachers". (Black, William 1998).

Educators are now expected to shift from old ways and old standards while implementing new educational practices. Tests are no longer the only factor used to determine the

success of each individual student and formative assessment is being used as a tool in the classroom to provide efficient and effective learning.

According to Robyn Madison-Harris and Ada Muoneke(2012), the purpose of formative assessment is more than instant feedback but it also is the driving force of learning. Formative assessment is a process, which includes setting goals, observing student learning, identifying strengths and weaknesses and also providing differentiation for individual student needs. Formative assessment provides feedback on current curriculum and data for a particular school or district. Schools are supporting formative assessment for multiple reasons, such as focus on student needs, closing the achievement gap, forcing teachers to stay current, providing a variety of assessments for the students, and ultimately, keeping learning student centered. Formative assessment is showing academic gains as well as confidence for students in the classroom. Madison-Harris and Muoneke (2012), state that formative assessment is comprised of four components:

- . “Identifying the gap involves understanding the difference between what students know and what they need to know. Once a teacher identifies this gap, the necessary instructional support can be provided to help the student progress toward the learning goal.
- . Feedback flows between the teacher and students. Feedback provides critical information that the teacher needs to determine the current status of a student’s learning and informs the next steps in the learning process. Clear and detailed feedback is provided to the student for improving learning. Feedback should be designed to close the instructional gap.
- . Students must be actively involved in their own learning and the assessments in which

they are engaged. This happens best through collaboration between the teacher and students to develop a shared knowledge about their current learning status and what they need to do to progress. Doing so builds skills within students that are needed for self-monitoring their learning and determining when they need assistance.

- . Learning progressions break down a larger learning goal into smaller parts. This is necessary for helping teachers locate students' current learning status in relation to a continuous set of skills needed to master ultimate learning standards. Once the points at which students are on the learning progression continuum have been identified, the teacher can work with the students to set short-term goals that will help them progress to the ultimate position along the continuum” (Madison-Harris, Muoneke 2012).

Formative Assessment is a strategy that should be implemented in every classroom with every student. However, students with learning disabilities benefit the most. Formative assessment allows these learners to take control of their learning. By self-assessing and completing a specific example of assessment, the students can see instantly whether they need guidance. As previously noted, the stronger students may tend to dominate class discussions or small group conversations which in turn allows the lower level learners to blend in. Formative assessment provides each individual student the opportunity to speak up without necessarily speaking up. Formative assessment is also proven to increase scores on summative assessments due to the adjustments made throughout the lesson before the end of the unit.

The following steps are suggested by Madison-Harris and Muoneke in order to

provide a meaningful learning experience in the classroom. These steps should be repeated on a daily basis to ensure quality learning:

- Goals should be set daily and should be clear.
- A clear target must be explained.
- Instructions must be direct and detailed.
- Throughout the lesson, progress must be monitored.
- Feedback should be exchanged often.
- Lesson modification (Madison-Harris, Muoneke 2012).

Formative assessment is used to determine learning outcomes and encourage educational success. Each child is an individual and they learn in different ways. By differentiating and providing daily formative assessments, teachers are able to monitor and modify based on individual needs. Assessments are critical in the classroom and should be used daily where they help the teacher reach individual student needs. According to CERI, Assessment for Learning Formative Assessment, “Formative assessment – while not a “silver bullet” that can solve all educational challenges – offers a powerful means for meeting goals for high-performance, high-equity of student outcomes, and for providing students with knowledge and skills for lifelong learning.” (CERI, 2008). There are multiple “elements” which support the use of formative assessment in the classroom. The first element refers to creating a classroom culture that promotes participation and conversation. With these two factors in place, an overall feeling of comfort is created which provides students with the self- esteem and desire to ask questions, want to become a stronger student, and also become a risk taker. The second element noted by CERI proclaims that setting clear goals makes the process of

learning obtainable. After goals are set, the teacher should clearly track progress in order to show the student their improvement or lack there of, in which another goal would be created. Element three states that differentiation is critical; no two individuals are the same. Although research cannot prove this as a fact, formative assessment is believed to help on an individual level due to cultures, status, backgrounds, and prior knowledge. These are just a few examples in which the classroom climate may be affected and how formative assessment may help increase learning outcomes in the classroom. Element four refers to the varied approach of assessing. Traditionally, summative testing may cause anxiety and stress due to the pressure placed upon these assessments. By assessing formally, students are having an opportunity to fully express themselves and communicate while using alternate forms of assessment. Element five confirms that feedback is one of the main components of formative assessment. Based on the specific feedback given, teachers may adjust their delivery or plans in order to continue teaching. Last but not least, the sixth element refers to students being active learners. By claiming responsibility and learning *how to learn*, students will become successful if the proper measures are in place (CERI, 2008). These elements occurring in the classroom will help all levels of learners if they are guided the proper way. The ultimate goal of an educator is to teach and there are protocols in which the teacher must take. According to CERI, “Several studies show that formative assessment methods have an even stronger impact for underachieving students.” (CERI, 2008).

In the following study, students with severe learning disabilities as well as mild learning disabilities were split into three groups; the first control group did not use curriculum-based measurement, the second group did use curriculum-based

measurement, and the third group used curriculum-based measurement as well as self-monitoring strategies. Throughout the formative assessment process, self-monitoring is highly recommended for students with learning needs. Self-monitoring requires responsibility as well as accountability for individual learning. Self-monitoring has been used as a tool in the classroom for teacher and student; allowing both to observe, self-reflect, and make necessary changes if needed. The self-monitoring does not pertain to just the specific lesson taught; self-monitoring refers to delivery of the lesson, understanding of the lesson, classroom management, and behaviors as well. In this particular study, the experiment was intended to determine if formative assessment strategies significantly enhance learning in mathematics computation for students with learning needs (Allinder, Bolling, Oats, Gagnon, 2000).

Thirty-one teachers had participated in this study, being divided into two groups; the first group was instructed to continue without curriculum-based measurement and the second group was provided detailed training and did implement curriculum-based measurement. Two students were chosen at random in each group who were relatively similar in disability level, grade level, and math level. To begin calculating data, students completed an assessment test in which they had ten minutes to complete fifty problems followed by slope measurement, which was calculated biweekly. Teachers were expected to complete documentation, which included specific lesson plans, times, materials used, groupings, skills taught, and any changes and/or problems that occurred due to level of student understanding. After the initial data was collected, eight teachers created the third group; curriculum-based measurement as well as self-monitoring (Allinder, Bolling, Oats, Gagnon, 2000).

The results prove that formative assessment is a significant strategy to be used in the classrooms. During this study, the students began by completing an assessment of fifty questions in ten minutes. The pre test results are similar for all students in each of the three groups; however, there is a significant difference in the post-test from the students in group three compared to groups one and two. This study proves that teachers who used CBM and self-monitoring adapted daily lessons and implemented self-monitoring strategies. “It appears that the self-monitoring process prompted teachers to use information to refine instructional components, whereas the teachers who did not self-monitor appear to have relied more on changes in test-taking behaviors” (Allinder, Bolling, Oats, Gagnon, 2000).

By incorporating formative assessment into classrooms, students with learning needs are being given the opportunity to learn in a different format, self-monitor, self-assess, and most importantly take responsibility for their learning. According to the No Child Left Behind Act, every student is entitled to a meaningful education. If applying a multitude of learning strategies will enhance learning in the classroom as well as improve the teaching from teachers, formative assessment has been proven effective.

## Chapter 3

### Methodology

#### Setting and Participants

This study included eight fifth grade students. These students attend a rural school setting in southern New Jersey. The school district includes three schools. with a total of 914 students; 462 males and 452 females. Of these 914 students, 97.2% being Caucasian, 1.8% is African American, and 1% is Hispanic. English is the primary language spoken with a miniscule percentage of English Language Learners.

The students chosen in this study have been categorized as needing basic skills instruction by the school due to continuous learning difficulties. These students have been apart of the tier process in order to determine if their needs could be helped. The ultimate goal in education is to guide students to reach their highest potential. The tier process is a model used to help students be self-sufficient and independent. Tier One refers to the teacher. The teacher is responsible for attempting all possibilities to help each child thrive by providing differentiation strategies in the classroom. If Tier One is not enough support, Tier Two will be implemented. Tier Two is a response to intervention and is designed to target and remediate academic skills needed. Tier Three is the final intervention phase. In this phase, professionals observe students, and plans are put into place. Students in Tier Three are provided intense interventions including modifications and teacher support.

This study consists of two groups. One group will continue with math instruction as usual which the second group will receive formative assessment strategies throughout the learning of the unit.



*Group One Participants*—Group one instruction will go on as usual. These students will not be given Formative Assessment strategies throughout the unit. Group One consists of four students; two female and two male. Students are Caucasian and ten years old. Three of the students in Group One receive basic skills modifications for mathematics and language arts. One student receives basic skills modifications for mathematics only. These four students struggle during math instruction due to lack of comprehension regarding directions and word problems, and they also struggle with the mastery of math facts.

*Group Two Participants* – Group two instruction will include the use of two Formative Assessment strategies throughout the unit. Group Two consists of four students; two female and two male. One male and one female are African American students. Both of these students are eleven years old. The other two group members are Caucasian, ten year olds. Three of the students in Group One receive basic skills modifications for mathematics and language arts. One student receives basic skills modifications for mathematics only. These four students struggle during math instruction due to lack of comprehension regarding directions and word problems, and they also struggle with the mastery of math facts.

### **Procedure**

All eight students began this study by taking a topic pretest. They were given the end of unit assessment prior to learning the new material. This provides a measure of data to determine skills learned as well as provide data to fully determine if Formative Assessment strategies are beneficial for lower level learners. These scores were placed

into a graph to show if the students will improve their assessment scores after the material has been taught as well as differentiation between Group one and Group two while using Formative Assessment strategies. After the unit has been taught, the students will take a Topic 8 post-test. The Topic 8 pre and post-test will be examined to determine if these Formative Assessment strategies are beneficial in helping students with learning needs.

All students in the class rotate in four separate centers; two small groups are teacher led, one is technology infused, and the final center is continuous math facts reinforcement. Each center lasts a total of ten minutes and two teachers see each student in a small group setting every day.

Students in the intervention group will be receive two formative assessment strategies will be used

1. Mini white boards
2. Graphic organizer

Students in this group were given mini white boards during their center time. An explanation was given on how to use the white boards; i.e. they could solve example problems on the boards, write a check at the top corner to explain understanding or draw a minus sign to show misunderstanding, as well as jot down any questions they may have during practice time. The use of mini white boards will continue during whole group and small group instruction through the duration of the study.

Students in the intervention group were also given a graphic organizer. This specific graphic organizer breaks down word problems for students who struggle with reading comprehension. The organizer is broken down into multiple steps:

1. Problem – what is the mathematical word problem?
2. Question – what is the question that needs to be solved?
3. Know –what information has been given?
4. Equation – what equation must be formed in order to solve the problem?
5. Picture – can you draw a picture or graph to help solve the problem?
6. Answer – solve using the equation given.
7. Prove It – inverse operations to check the answer.

The students in Group Two entered the classroom each morning with a mini white board on their desk as well as multiple graphic organizers. They also were able to help themselves to extras in a special bin.

### **Objective**

The objective of this study is to determine if Formative Assessment will help struggling learners in a mathematics setting. By comparing two different groups, will the results show that Formative Assessment helps increase understanding of the unit taught?

## Chapter 4

### Results

In this study, formative assessment strategies were implemented with the goal of improving the mathematics performance of fifth grade students with math difficulties . One group of four students received formative assessments throughout the math unit (FA group) while the second group of four students received instruction as usual (IAL group). The interventions implemented were the use of graphic organizers and mini white boards daily throughout groups lessons and independent lessons. The research question in this study to be answered was

-Are students with learning needs mastering new math skills while formative assessments are ongoing in the daily classroom?

This study began by completing a baseline assessment. The students took a pretest prior to topic instruction, followed by a post-test. Based on the Envision Math Series, Topic 8 is Order of Operations. The students are required to follow PEMDAS (Parenthesis, Exponents, Multiplication, Division, Addition, Subtraction) in order to solve equations as well as solve multiple step word problems. Topic 9 based on the Envision Math Series is the addition and subtraction of fractions, finding equivalent fractions, simplifying fractions, finding the least common denominator for two fractions, and solving multiple step word problems.

After the pre-test was given, the four-week study began. The mini white boards were explained in detail to Group 2. The mini white boards would be located on their desks when they arrive and available for use everyday. As a group, they discussed symbols to communicate with the teacher during the lesson; ie a happy face symbolized understanding

and a frown face symbolized help was needed. During “I Do, We Do, You Do”, the students in group two were able to complete practice problems as well as center work on their white boards.

A graphic organizer was also given as a form of formative assessment to use each day. This graphic organizer helped breakdown word problems by forcing the students to separate the problem. The following questions were utilized in this specific organizer:

Problem - what is the word problem being asked?

Question - what are we trying to figure out?

Know - what do we already know?

Solve - how can we solve? (a mini checklist where the student may select, a picture, graph, equation)

Equation - what is the mathematical equation used to solve?

Answer – what is the final answer?

Check - prove it - (inverse operations)

## Group Results

The results for topic 8 are shown in table 1. The “instruction as usual” (IAL) group had a mean score of 17% on the pretest. The formative assessment (FA) group had a mean score of 20%. Following the intervention, the FA group had a mean score of 71%, an improvement of 54%, while the IAL group had a mean score of 80%, a 60% improvement. While both groups improved significantly from pre-test scores, the FA group had an improvement of 60%, which was higher than the IAL group. Students in the IAL group had a range of scores 60%-86%. Of the four students in the FA group, three of those received 80% or higher on the post assessment. One student received a 55%, which did show growth from the original pre test, however, this student struggled with the concepts taught. A t-test performed on the differences between the pre and post-test scores found no statistically significant differences between the groups.

Table 1

### *Results for Topic 8*

|            | IAL Group | FA Group |
|------------|-----------|----------|
| Pretest    | 17%       | 20%      |
| Posttest   | 71%       | 80%      |
| Difference | 54%       | 60%      |

The “instruction as usual” group had a mean score of 26% on the pre-test for Topic 9 where the formative assessment group had a mean score of 25%. (see table 2). Following the intervention, the IAL group had a mean score of 65%, an improvement of 39%, while the FA group had a mean score of 77%, an improvement of 52%. The difference between the formative assessment group and the “instruction as usual” group shows a 25% increase on the post assessment. The FA group scores range from 71%-88% where as the IAL group scores range from 53%-81%. A t-test performed on the differences between the pre and post-test scores found no statistically significant differences between the groups.

Table 2

*Results for Topic 9*

|            | IAL Group | FA Group |
|------------|-----------|----------|
| Pretest    | 26%       | 25%      |
| Posttest   | 65%       | 77%      |
| Difference | 39%       | 52%      |

## Chapter 5

### Discussion

This study examined the effectiveness of formative assessment for improving the mathematics performance of students with learning needs in a 5<sup>th</sup> grade classroom. All eight students in this study are identified as students needing basic skills instruction in mathematics and/or language arts who perform below grade level. This study was completed over a four week span in a mathematics setting.

Students were placed into two groups for this study. Group one continued math instruction as usual (IAL). Group two (FA) was provided two formative assessment techniques to use everyday. After a pre and post topic test for two separate mathematical topics, both groups improved their scores from pre to post. On Topic 8, Order of Operations, the IAL group had a pre test mean score of 17%, a mean post-test score of 71%, which provided a difference of 54%. The FA group for Topic 8 had a mean pre test score of 20%, a post-test score of 81%, which provided a difference of 60%. Although both groups improved on their post-test scores, the FA group performed stronger. Similar results were found for topic 9, adding and subtracting fractions.. The pre-test for the IAL group had a mean test score of 26%, a post-test score of 65%, providing a difference of 39%, whereas the FA group had a mean test score of 25%, a post-test score of 77%, which provided a difference of 52%. Again, the FA group showed a stronger outcome. Although the formative assessment strategies provided proved to be successful for most of the students, not every student improved following implementation of this method. One student in the FA group received a 14% on her pre test followed by a 55% on her post-test. This is not considered mastery and shows she needs further instruction.



Formative Assessment originated from the idea that all students were learning new topics in one way. To close the achievement gap, using differentiated methods of assessment daily have shown to be effective when showing instant feedback. All four children in the formative assessment group had shown growth from pre-test to post-test in this study. The dry erase boards supplied an instant engagement in the mathematics topic being taught. These boards were a motivator during whole group and small group settings. If the white boards had not been available, the absence may have deterred the willingness and drive of the students. The graphic organizer allowed the students to break down the problems and discover what is the question being asked. Without the graphic organizer, the participants may have struggled due to reading difficulties. This organizer provided a starting point while taking the students step-by-step to the end result.

In comparison to previous research, the present study found that Formative Assessment is a tool that may be used in classrooms to enhance the learning environment. Students are in control of their learning while self-assessing and self-monitoring their work. Teachers also are able to instantly make a decision on how to continue furthering instruction. Formative Assessment provides instant feedback with the intent to close the achievement gap with the goal of reaching mastery.

James Popham (2008) expressed that formative assessment allows students to take control of their own learning. By allowing the children to use mini white boards throughout the math lessons, they were able to state their understanding through previously planned symbols. The students were able to take responsibility for their educational growth while communicating to the teachers. Based on the research, the students in the FA group achieved higher scores on the post assessments than the students

in the IAL group. The assessment strategies were proven to be successful within the means of this study. Robyn Madison-Harris and Ada Muoneke (2012), claim these assessment strategies are the driving force of learning. These strategies force the teachers to remain current and up to date, focus on individual student needs, as well as provides comfort and confidence in the classroom.

According to a previous study, students with learning needs performed significantly stronger than those students who did not receive formative assessment strategies. Self-monitoring and self-assessment were the base of the results. In reference to this study, the students who were taught to self-monitor and self-assess were more successful than those who were not provided with the strategies to do so.

### **Limitations**

There were eight students total participating in this study, with four of them using formative assessment strategies. If the size of the study were larger, a data driven assessment could be formed showing total growth, for example, one full classroom in comparison to another.

Educators are unaware of what is happening at home for their students. Some factors that may effect a child's day include not sleeping well, not eating a healthy breakfast, or experiencing stressful encounters at home. This could affect daily lessons as well as end of the unit assessments. By including more students in this study, there will be stronger evidence to support either side.

## **Practical Implications**

The students in the FA group using the dry erase boards had a higher motivation to practice problems as well as participate during group lessons and in a small group setting. These students completed practice problems quicker than they have in comparison to pencil and paper, asked for the following questions, and would race to hold up their boards to show an answer. On day one, they were responsible for creating symbols to express their understanding in the corner of the board- a smiley face when feeling confident with new material taught or a sad face expressing help is needed. This created a feeling of ownership and taking control of their learning. The students were able to discreetly show their level of understanding and also would point to their symbol eager to show their results, regardless of the symbol drawn. Using the dry erase boards allowed the students to monitor their work as well as self-check their work step by step.

The graphic organizer was intended to help break down mathematical word problems as well as target important information. Students who are reading below grade level often struggle to determine what a word problem is asking, which operation to use, and how to begin solving. This specific organizer forced the children to go step by step as well as explain their thinking.

Teachers should be trained on how to use formative assessment in their classrooms. With closing the achievement gap as the end goal, teachers are able to improve the quality of instruction. However, with the number of students in the classrooms, is it possible to have individualized formative assessments for each type of learner? Is it possible to monitor each student, each day and make changes or adjustments

when necessary? Testing is no longer the only factor in determining grades and formative assessment is helping to measure understanding instantly. Formative assessment has the potential to be a great resource in our schools but has not yet been proven to be entirely effective.

### **Future Studies**

Future studies on formative assessment should provide the class as a whole with these formative assessment strategies in comparison to another class not using formative assessment strategies. With eight basic skills students, four of them received the extra help and the results proved positive. To expand this study, the focus groups should include a variety of backgrounds and demographics, as well as leveled learners.

### **Conclusion**

This study addressed the following question: Are students with learning needs mastering new math skills while formative assessments are ongoing in the daily classroom?

The data has shown that yes, students with learning needs are successful mastering new math skills while formative assessments are ongoing. Three students out of four in the FA group achieved mastery, while one did not. However, both groups showed growth. In this particular classroom setting, there are four daily centers to help reinforce new skills taught after the lesson. Out of the four centers, two of those centers are teacher led. Since both groups showed growth, I have to question whether or not these specific Formative Assessment strategies were successful, or if the growth is in response to teacher intervention.

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