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High School Mathematics Grading Practices and their Correlation to Standardized Test Scores

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**High School Mathematics Grading Practices and their Correlation
to Standardized Test Scores**

by

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Chapter 1: Introduction

Purpose of the Study

The purpose of this study was to see if there is more of a positive correlation between students' standards-based grading scores or traditional grading scores as it relates to standardized test scores in high school mathematics.

Why do teachers give students grades? What does a grade really mean? How do teachers know what a student has actually learned? Over the years, education has become a bit of a routine: Teachers teach the material, students do homework on the material to help them learn it, followed by an assessment. Students are then given a letter grade with little to no explanation as to why they received that grade or how their grade could be improved. These “traditional grading practices often lead to ‘grade fog,’ in which the level of content mastery is distorted by such non-standards-based criteria as practice, neatness, organization, attendance and behavior” (Deddeh, Main & Ratzlaff-Fulkerson, 2010, p. 54). Students need to know exactly what their grades represent and how they can improve their overall knowledge of a curriculum.

We all know that grades can be used to motivate students, sort students in different classes by ability, or qualify students to go to certain universities. With the nation's drive to improve test scores in math, students need to know and understand what their grade means. Some of the highest achieving students get lower overall classroom grades because they choose not to do all of the homework, even though they ace all of their tests. Likewise, lower achieving students receive higher overall classroom grades because they did their homework, were a good student in class, or completed extra credit (Pilcher, 1994). Students' efforts should be

recognized, but not as a separate part of a final grade when that grade means so much to graduation status and scholarship opportunities.

Over the last 8 years as a teacher in a high school, I have heard every line in the book when it comes to how students and their parents interpret grades. It is because of this confusion that, as curriculum leader, I decided to pursue standards-based learning and grading as the math department's teaching method of choice at North Branch Area High School (NBAHS). The purpose of this study was to see if standards-based grading impacts student achievement in high school math.

Significance of the Study

An alarming rate of more than 50% of incoming ninth-grade students at NBAHS have been categorized as not meeting standards on the Minnesota MAP test. My colleagues and I have been working diligently to try to figure out what we could do differently to have the greatest impact on student achievement. We have tried several different approaches over the last few years, including the development of several new courses designed to help at-risk students, the purchase of new computer programs to help students stay engaged while learning, and having teachers flip their classrooms. While we did see some improvement with those interventions, we were not completely satisfied with the results. We asked ourselves *how* and *why* such a high number of students were being left behind. How is it that students pass their math classes with above average grades, only to take a standardized math tests and receive a below average rating?

One reason this might be happening is that there is no set gradebook teachers are supposed to use. Teachers, for the most part, have the option of including what they want to in the overall grade. Some teachers include non-academic scores such as behavior, attitude,

timeliness, effort, neatness, extra credit, and homework along with the academic scores, and thus we have created grade fog. What does this grade mean and what is its importance to the student, family, or anyone else? Some teachers have this non-academic grade worth as much as 50% of a student's overall grade for the course (Fisher, Frey, & Pumpian, 2011). This effort part of a grade must be addressed; how does extra credit benefit the student? The letter grade is placed on such a pedestal these days; it is the marker of success. Because of the heavy emphasis on a letter grade, students and their parents are willing to do just about anything to ensure that an A is given. They ask for extra credit. Many times these extra credit assignments are busy-work type assignments rather than productive educational activities. The student will do an extra project or help out around the classroom in some manner to earn their A, and then what? The question remains: Did the student actually learn what they needed to learn through that extra credit assignment, or was the letter grade increased based on extra effort without true learning?

Goodwin (2011) looked at this phenomenon in his article titled "Grade Inflation: Killing with Kindness?" Goodwin stated that between 1991 and 2003, the math grade point average (GPA) of high school students taking the ACT exam rose from 2.8 to 3.04, which is relatively high based on a 4-point scale. As a result, the ACT math scores should have improved significantly as well. In fact, the ACT scores improved by only 0.51 (Goodwin, 2011), thus illustrating the phenomenon of grade inflation: earning a higher letter grade without an increase in actual learning or retention of knowledge. Goodwin gave another example when describing how students in high school received an A or A- in classes more frequently in 2006, 32.8% of the time, compared to 1992, when only 18.3% of students earned an A or A-. These results force us to ask: Are students getting smarter? The proportion of high school seniors performing at or

above the proficiency level on the National Assessment of Educational Progress (NAEP) reading exam dropped 5% from 1992 to 2007 and only 23% of seniors were at or above proficiency on the NAEP math exam (Zirkel, 2007). Or have the grades been inflated due to faulty algorithms that are based more on non-academic factors than true academic learning?

When considering what our interventions to this problem might include, one of my co-workers brought up Robert Marzano's work, "Formative Assessment and Standards-Based Grading." After much discussion and research, we chose to embrace standards-based learning and grading for all students enrolled in a math class at NBAHS. I am choosing to study this now to ensure that this teaching and grading style will provide my students with the best opportunities to learn and succeed.

Research Question

In high school mathematics do standards-based grading scores show more validity/correlation to standardized test scores than traditional grading scores?

Focus of the Paper

The purpose of this study was to examine the effectiveness of standards-based grading and math achievement on standardized tests and the effectiveness of traditional grading and math achievement on standardized tests. I have used the EBSCO host resources, using the academic search premier's databases to search for my information. In my search for articles, I used the following words or phrases: "standards-based grading," "grades," "math achievement," "Common Core," "No Child Left Behind (NCLB)," "grade inflation," "formative assessment," "summative assessment," "rubrics," "feedback," and "homework.. I also searched for the following authors: "Gusky," "Hattie," "Marzano," and "Wormelli." When choosing my

resources, I read through my articles and made sure they correlated with my topic. There were a lot of limitations that came up in my study. Standards-based grading is a newer method that currently has not been overly studied in research based journals. Most of the articles I have used in this paper are quite recent and very few of them were actually using their own action research or findings.

Rationale

The significance of this study was to find ways to improve student achievement in math. Educators who have or are thinking about switching to standards-based grading can benefit from the results of this research. If standards-based grading has more of an impact or correlation to standardized test results, more teachers should or would make the switch to give their students the best chance of success. If traditional grading has more of an impact or correlation to standardized test results, more teachers should continue doing what they are using or switch back to a traditional grade book to give their students the best chance for success. In the current age of standardized testing and its impact on schools, all teachers want to be able to accurately give students, parents, and administration the understanding of what grades mean and what will best predict student achievement on standardized tests.

Definition of Terms

Assessment: the collection of student generated data for the purpose of evaluating and scoring (Green & Emerson, 2007).

Common core: a national movement that details what students should know in English and Math at the end of each grade level.

Evaluating: the process of giving feedback to help students improve their level of understanding of course material (Green & Emerson, 2007).

Grade fog: a teacher inability to correctly distinguish an actual letter grade of student achievement based off of grades that incorporate effort, homework, participation, and attendance.

Grade inflation: a means in which grades go up, but the academic achievement does not.

Grading: the numerical (1-4) score or letter (A, B, C, D, or F) given to students to show level of understanding.

Highly qualified teacher: a teacher who has a bachelor's degree, a full state certification or licensure, and has proven that they know how to teach their subject.

Learning target: written in student friendly "I can" language a learning target is created by the classroom instructor based on the curriculum standards or state standards. Each learning target is a specific objective or goal that helps guide the learning process.

Rubric: a tool that teachers use to assess students work.

Standards-based grading (SBG): a method of grading in which students are assessed based on their mastery of a specific skill or standard. Students are individually graded on their ability and comprehension of each learning target and are able to retest on areas that are deficient.

Traditional grading: a method of grading students based on percentages of correct responses. Traditional grading is usually based on a combination of related and unrelated assessments of skills. The grade could consist of all or few of the following; homework,

behavior, participation, extra credit, quizzes, and tests. Depending on the teacher, students are able to re-test, a test curve is given, or test scores are final.

Standardized test: a standardized test is a test that requires all takers to answer a selection of questions from a common set of questions and is scored in a consistent way, which makes it possible to compare scores of all individuals.

Chapter 2: Review of the Literature

Introduction

In this chapter, a collection of literature reviews will build a foundation for the study of standards-based grading vs. traditional grading as it relates to high stakes standardized test scores in mathematics. As high stakes testing paves the future of education, the quality of teaching and the correlation to teaching to the state standards are on the rise as well. With the current focus on standards, it only makes sense that a new wave of grading to those standards has come to the forefront of education. Teachers are now teaching to the standards and holding their students accountable in different ways than what you or I might be used to. This study aims to determine if standards-based grading provides more accurate information of students' knowledge than traditional grading systems as related to high stakes standardized tests.

Traditional Learning Strategies

The traditional grading system was created during the industrial revolution by William Farish and has been in use since approximately 1792. Due to its longevity, students and their parents understand what a letter grade or percentage mean on a transcript or report card. There are two variations to this traditional grading method; in the first, students acquire points for various activities, assignments, quizzes, tests, and behaviors. These points accumulate over time and the total number of points at the end of the grading period determines your letter grade (Marzano & Heflebower, 2011). In the second variation, teachers follow an algorithm which places activities, assignments, quizzes, tests, and behaviors into weighted categories, which are then calculated to determine a final letter grade (Green & Emerson, 2007). The problem with this is that:

some students may fail due to incomplete homework, some because of poor attendance, and others because of low test scores...one teacher admitted 'we really don't know why most of them are failing. In fact, a whole group of them may actually understand the content but they have compliance issues. We just don't know any other way to grade.' (Fisher et al., 2011, p. 46).

These grading methods can, in many cases, be created or adjusted by each individual teacher leading to inconsistent grading throughout a department. Inconsistencies cause confusion and grade fog for students and parents, increasing frustration and potentially affecting a student's self-esteem and confidence. Students begin to see themselves as academic failures, not because they are not able to learn the content, but because teachers are unable to clearly explain how or why a student received that particular grade. There are simply too many factors involved to clearly define where the problem lies.

Simply balancing the many factors involved in earning a grade would be hard enough on a student without the system setting them up to fail. Most traditional letter grading systems look something like this: A ranges from 90-100%, a B from 80-89%, a C from 70-79% a D from 60-69%, and an F from 0-59%. Under the traditional system, a student has a 60% chance of failing math and only a 40% chance of passing. Why does the traditional scale have so many degrees of failure? Let's look at a list of five hypothetical test scores for two different algebra students. The first student has the following scores {76, 76, 76, 76, and 76}. The second student has the following test scores {95, 95, 95, 95, 0}. When you look at the test scores of each student, you may think that one student should have a higher letter grade than the other. However, when we take the average of these scores, both students end up with an average score of 76%, a C in the gradebook. This example shows us the weight that the score of zero in the F

category carries (Wormeli, 2006). With the traditional grading system, one test could make or break a student's grade.

State Education Reform

Due to the flaws in the traditional education system, there have been many different versions of educational reform over the last decade: the development of State Standards, No Child Left Behind, Common Core, and the Blueprint of NCLB. States and schools were being held more accountable for their students' abilities on state tests. When students were earning A's and B's in core math classes but were not able to show proficiency on the state tests, it was a red flag to everyone involved. School districts were being held responsible for student improvement and teachers needed a better way of tracking what information the students had learned versus what they still needed to learn.

NCLB (2001)

The No Child Left Behind Act of 2001 was signed into law by President Bush in 2002. The law expanded the federal role in education and focused its attention on improving education for disadvantaged students. The goal of NCLB is to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind (U.S. Department of Education, 2001). For the purpose of this article, I focus on the accountability piece that requires schools to show their student achievement scores/measures. Starting with the 2002 school year, states had to show student achievement data broken down by individual school districts. By the summer of 2006, every teacher in a core content area had to be "highly qualified" in the subject they taught. By the 2013-14 school year, states were required to bring all students up to the proficiency level on state tests (Issues A-Z: No Child Left, 2011).

When looking at the big picture and fundamental goals of the NCLB act, it sounds like a great idea. However, when it was actually implemented, there were flaws, limitations and setbacks that became apparent. If we look at the first initiative of NCLB, states had to demonstrate student achievement which was completed by analyzing student grades. With the high letter grades failing to match up to the low test results, educators were (are) being required to find new ways to impact student understanding. School districts want more proof that the way teachers are teaching is actually impacting achievement.

Common Core (2008)

Common Core state standards are aligned with the skills and knowledge needed to be successful at post-secondary schools. This means that students entering college will be able to do so without having to take remedial courses. By adopting the guidelines of the Common Core Standards, schools have made a commitment to their students. When a student earns his or her diploma, that diploma actually matters and students are able to choose more paths for their future because they are not held up due to their academic knowledge (Closing the Expectations Gap, 2013).

Recently, all 50 states and the District of Columbia have adopted state specific college and career ready (CCR) standards in English and math. Out of the 50 states, 45 of them and the District of Columbia have adopted the Common Core State Standards (CCSS) for English and Math. Minnesota has adopted the CCSS in language art but still maintains their own CCR state standards in mathematics. Alaska, Nebraska, Texas, and Virginia have adopted their own state standards that reflect the core values of CCR (Closing the Expectations Gap, 2013).

Based on our traditional grading system, can high school teachers look at their students' overall grades and say for a fact that students are ready for post-secondary schooling? I know when I looked at my gradebook a couple years ago I would not have been able to say yes. If we say that a student is not ready for post-secondary education, do we really know what his or her weaknesses are? This is the big picture question that a traditional gradebook cannot answer. In the traditional setting, assessments cover more than one learning target making it difficult to decipher what a student struggles on. Any one section of a single assessment could have really impacted a student in a positive or negative way. Throw in any homework, participation points, or extra credit and now we really do not know where students are lacking or where they are proficient (Pilcher, 1994).

NCLB Blueprint (2010)

In March of 2010, President Barack Obama presented to Congress "A Blueprint for Reform," the goal of which was to reform NCLB through four main areas. Changes included: (1) creating an emphasis on teacher and principal effectiveness; (2) actively including parents and families in their children's education; (3) implementing college-ready and career-ready standards and developing improved assessments aligned with those standards; and (4) providing funding, support and intervention for the lowest-performing schools (Horan, 2010). If we focus our attention on the third main point of implementing college and career ready standards, it directly relates to common core. So the problem with the traditional gradebook in relation to Common Core is now the same problem when we look at the NCLB Blueprint.

Minnesota State Math Standards

Minnesota is one of the few states that have chosen not to take part in the math common core standards. Governor Tim Pawlenty and Governor Mark Dayton did not accept the common core standards because they feel that the current Minnesota State Standards were more rigorous and were already college-and-career-ready standards. As a math teacher in Minnesota, I can clearly see that our math standards are laid out for us and we are able to use these standards to guide us in our curriculum and lesson planning. More importantly, we are able to break them down farther to make them more learner friendly for our students. This is the basis for the Standards-Based Grading system.

What is SBG?

“Standards-based grading is a grading practice that measures students’ proficiency on well-defined learning objectives” (Scriffiny, 2008, p. 70).

Why Implement Standards-Based Grading

“If your current grading system doesn’t guide students towards excellence, it’s time for something different” (Scriffiny, 2008, p. 70). In Scriffiny’s article, he gave seven reasons of why to implement standards-based grading which are listed and summarized below.

1. *Grades should have meaning.* Every time we assess a student or put a grade on a piece of student’s work, we have to be able to back up what that grade means, and how it differs from the other grades.
2. *Teachers need to challenge the status quo.* A lot of teachers feel that students will not complete homework unless it is graded. So they grade all of the homework, combine it with extra credit and assessments and all of a sudden we have a grade that does not

- mean as much. Teachers need to show students the importance of practice; it is for learning, not for points.
3. *Teachers can control grading practices.* Teachers have always complained about factors they cannot control, such class size or salaries to name a few. With standards-based grading, teachers are in complete control of how we assess and grade our students.
 4. *Standards-based grading reduces meaningless homework.* Remember going through homework assignments and mainly checking if they were completed? Not anymore. With standards-based grading, teachers get the most out of every piece of paper that is turned in. Formative assessments are the key to understanding and because the useless paperwork is nonexistent, you will have time to give direct feedback to your students, which is more meaningful to both parties.
 5. *It helps teachers adjust instruction.* A standards-based gradebook gives the teacher loads of information on how students are doing on each individual learning target. It is easy to look at your gradebook and see which skills you need to spend more time on.
 6. *It teaches what quality looks like.* Everything these days is performance-based. If we base our grades on standards, our students will grasp the idea of what is quality effort and become more motivated in their own learning.
 7. *It is the launch pad for other reforms.* Usually, when a district starts using standards-based grading, they quickly discover that they need to take another look at their standards and reexamine their curriculum.

Standards-based grading is not like a light switch. It takes time for students and parents to grasp the new ideas. Parents, students, and most teachers only know one way of grading, because it was the way they were taught and the way they understand; that's the way it's always been. Standards-based grading could change the status quo, and teachers need to decide if it is the best option for their students.

Myths about SBG

1. Schools are “dumbing things down,” making it easier for students to earn an “A.”

The answer to this is actually quite the opposite. Students will find it more challenging and rewarding to earn an A in class. All grades represent what a student actually knows and understands; there are no non-academic scores that go into the grade. If a student understands all the material at a mastery level, they will receive an A. If they are below that level, they have the option to retake assessments to improve their grade. Based on the research done by Pollio and Hochbein (2015), “descriptive statistics found that more students who achieved an A or a B in their class scored proficient or above on state accountability testing when they experienced standards-based grading as opposed to traditional grading” (p. 21). This study examined student performance from 11 high schools in Louisville, Kentucky. The student demographics of the district included 51% white, 37% black, and 12% other, with nearly 62% of students qualified for free/reduce lunch. The research included two cohorts of 1,163 (2011) and 1,256 (2010) 11th grade students who completed an Algebra 2 course and the Kentucky Core Content Test (KCCT) in mathematics. The results of the research showed that when students experienced traditional grading

practices their actual grades were not valid predictors of the learning of their math content level. In these classrooms, 40% of the students earned A's or B's in Algebra 2, but only 26% of these students had a proficient or distinguished score on their KCCT assessment. In other words, success in a traditional grading classroom defined by grades does not translate into success on student achievement exams. On the other hand, when we look at the results from students that experienced standards-based grading practices it might serve as a more valid predictor of student achievement on standardized tests. In these classrooms, 45% of the students received an A or a B in class and 55% of them scored proficient or distinguished on their KCCT assessment. So, based on this result, when teachers use standards-based grading not only do more students receive A's or B's, but the rate of students passing the state assessments nearly double as compared to students earning A's or B's in traditional grading classrooms. This is still not the best evidence and we would hope for more students reaching the proficient or distinguished achievement marks, but it seems to be a step in the right direction. Another important finding in this research was that the "analysis of variance found that students who achieve higher grades in their mathematics class also achieved high scores on the KCCT assessment when they experienced standards-based grading" (Pollio & Hochbein, 2015, p. 23). So, schools are not dumbing down the curriculum or grading scale with using standards-based grading. Instead, schools and teachers are enhancing the students' chances to be successful on standardized assessments.

2. Students with learning disabilities will be harmed by standards-based grading.

It is a known fact that students with learning disabilities struggle with math and are usually a grade level below other students in their class that do not have learning disabilities. So it is a worry that students with learning disabilities would be harmed by standards-based grading. Based on the research done by Bouck and Kulkarni (2009), “students with learning disabilities were not harmed from being taught in a standards-based mathematics curriculum; however, they were also not receiving an advantage over a traditional curriculum approach” (p. 242). This article researched four separate school districts in a midwestern state that all had similar demographic and community features. Two of the schools used the same standards-based learning curriculum and the other two districts used the same traditional curriculum. The participants in the research were 13 sixth-grade students and 15 seventh-grade students with learning disabilities. The results of the research showed that there was no statistical evidence that one curriculum was better or worse for students with learning disabilities. Digging a little deeper into their research results, the seventh-grade data alone shows that students who are in a standards-based environment can answer 35.2% of questions correctly, compared to 27% in a traditional setting, a difference of 8.2%. Another interesting part of the data was with open ended questions which are significantly harder than multiple choice questions because students have to really know what they are doing as well as have the language/communication skills to express it. Students with learning disabilities usually struggle with open ended assessment questions because of the vocabulary in

- the word problems and having to decide what information is important and where to start. Out of the 16 open ended assessments, students using a standards-based curriculum received higher scores 14 times. On one of the open response assessments, the standards-based students scored 25.2% better, and on nine occasions, standards-based students scored at least 10% better than traditional based students. That is a significant advantage that would point to a standards-based curriculum coming out on top. It is important to note that the 25% was only one time, but more than 50% of the time the standards-based students scored at least 10% higher. That 10% could be the difference between students passing or failing math.
3. Low level/struggling students will get passed on to the next class without actual learning and high level students will not get the attention they need. Based on the research done by Pollio and Hochbein (2015), “models suggest that standards-based grading weakened the negative association between social economic status and student achievement” (p. 21). In their research, evidence showed that there was a strong correlation between grades and standardized test scores of minorities or disadvantage students when they were in a class that was utilizing standards-based grading. This evidence suggests that teachers using a traditional grading practice for minorities, disadvantage, and lower level learners tend to grade students less on academic achievement and more on other non-educational factors. On the other end of the spectrum, based on the research done by Phelan, Choi, Vendlinski, Baker, and Herman (2011), “students with higher than average scores tend to benefit more from using formative assessments than students with below average scores” (p. 336). This

study included 85 teachers and 4,091 students and also showed that students in standards-based classrooms improved significantly over students that were in the control group when it came to properties of arithmetic, especially the distributive property.

4. Students will not do their homework.

The current motivation behind students doing homework is the points they earn by completing it. The ultimate goal should be obtaining knowledge and experience, but the current attitude is that students are doing homework to make teachers happy and to earn points. Would it not be better to teach students to learn for themselves, for their own growth and their own drive and desire to succeed, as opposed to doing it for points or to make someone else happy?

Standards-Based Learning Strategies

Ready to give SBG a try? Let us break down each essential piece of standards-based grading used to guide students' understanding of a topic or lesson. We will examine the importance of a learning target, a rubric, grades, homework, feedback, and formative assessments.

Learning Targets

With all the distractions of everyday life, the first thing that a student has to know before they are able to learn is what are the supposed to be learning. A learning target is designed to let students know what they need to be able to do at the end of the lesson. It guides students thinking and mindset to eliminate distractors and focus on what needs to be learned and how to demonstrate the learning. Teachers need be mindful about the intention of every lesson and

every activity, regardless of how engaging it is or differentiated the instruction may be. “Unless all students see, recognize, and understand the learning target from the very beginning of the lesson, one factor will remain constant... students will focus on doing what the teacher says, rather than focusing on learning” (Moss, Brookhart, & Long, 2011, p. 66). By giving students a clear, guided learning target, students do not have to spend precious instructional time in class trying to figure out what is expected from them; instead they can focus on the most important thing in school and that is learning.

Writing out a learning target does take a little time, but if you follow Marzano’s five recommendations it will come to you naturally.

1. *Create an internally consistent system.* As a district or school you need to make sure you are using the same language so as not to confuse your students. Learning targets, learning goals, learning objectives, instructional objectives, they all mean the same thing so pick the one you like best.
2. *Start with your state standard and focus on a single unit objective.* Usually our state standards are so broad and need to be broken down.
3. *Break the objective down into a learning progression.* Think through the learning process for the single objective, what should students be able to do?
4. *Use learning progression to establish daily targets.* Approximate how many days each learning target will take.
5. *Translate daily learning targets into student friendly language.* To ensure that students understand, use an “I can” format, which makes the statements easier to

comprehend (Marzano, 2013, pp. 82-83). By following these guidelines, you will create a clear learning target for your students to follow.

Syllabus and Rubrics

With SBG, students are given a syllabus and a rubric that lays out the foundation of what is expected for mastery within a unit. It outlines all learning that will take place over the course of the unit. The syllabus itself is broken down into individual learning targets that each student needs to work toward mastery on. Before a single lesson is taught about the material students know what is expected from them and what they need to be able to do in order to get a desired grade.

Before an assessment, students are given a performance rubric that the teacher will use to determine the strengths or weaknesses of the students work. In order to align learning target with students grades, grading rubrics are used to guide faculty judgment when evaluating students' performance on assessments (Dinur & Sherman, 2009).

The reason teachers use rubrics in standards-based grading is because they can be created for a variety of situations that can show knowledge and skill on certain tasks. Rubrics contain qualitative features that can be used to determine performance criteria of formative and summative assessments scores which students can use as a form of feedback (Kan, 2007). If a student completes an assessment, gets it back and is given a rubric score of three, the student can look at the rubric criteria and understand why he or she was given that grade based off of the work they did. Rubrics also help the teacher decide where to focus instruction and on specific parts of problems that students struggled with (Reeves & Stanford, 2009). If a teacher notices

the same mistake over and over on an assessment they can bring attention to it in class and show students why they are receiving a certain score.

Grades

Why a new style of grading? For a long time now, grades have been examples of unreliable measurements because teachers who work in the same building and teach the same course have different criteria that they use to determine a student's grade (Guskey, Swan, & Jung, 2011). With standards-based grading you get rid of all the non-academic parameters, leaving just a grade that tells you what a student knows. Teachers are required to base their students' grades on the individual states' learning standards. Guskey, Swan, and Jung stated "To assign grades, teachers must analyze the meaning of each standard and decide what evidence best reflects achievement of that specific standard" (p. 53). Grades should not reflect a student's behavior in class or their level of effort in a positive or negative way. Students need to understand where their grade comes from and what they need to do to earn their desired grade. Grades need to show students, parents, teachers, and administrators what individual students know and what they need to work on to be successful not only in the math course, but in the future as well.

Homework

For most students, homework is very vital to the learning process. With standards-based grading, students are still expected to complete their homework, but their overall grade is not rewarded or harmed by completing or not completing the assignment because it is classified as practice. If I were to ask an athlete what practice is, I assume he or she would tell me it is "where we learn plays and improve our skills." A quarterback might throw 100 passes each day

hoping to get stronger and more accurate with his throws. During practice, it does not matter if he misses a target or gets intercepted. With the feedback from his coach and his wide receivers he will eventually become a stronger and more accurate quarterback (Deddeh et al., 2010).

When you are learning new material, it is important to make mistakes and learn from those mistakes without getting punished for it. On the flip side, if you know the material, you will not get docked points by not completing an assignment you deem as busy work. We all learn at different rates and in different ways, so why should we expect all students to do the exact same amount of practice?

Feedback

Feedback is one of, if not the most important things a teacher can give to help their students learn. Researchers Hatie and Timperley (2007) explained that its purpose is “to reduce discrepancies between current understanding and a goal” (p. 86). There are different types of feedback that can be given formally or informally, to groups or directed toward one individual. For feedback to have a positive effect on learning it needs to be clear, purposeful, meaningful, and compatible to student’s prior knowledge. It needs to prompt the student’s current knowledge, have low task complexity, and must relate to a specific goal. Feedback that involves a motivational statement has little effect on students learning. For example, telling a student that he did a good job on a learning target or stating you rocked that assignment has little effect on learning. Stating what important step they did or did not do allows student to either ingrain what they did right or fix/relearn what they have to do in order to get the right answer(s) has a positive effect on learning (Hatie & Timperley, 2007).

Formative Assessments

“Formative assessments, done well, represents one of the most powerful instructional tools available to a teacher or a school for promoting student achievement” (Stiggins & DuFour, 2009, p. 640). Teachers can use formative assessments to tell how individual students are doing or provide feedback to all students. When providing feedback to students, it is easy to identify where students are struggling, and the teacher can adapt instruction or provide specific feedback that would be helpful for the student in learning the material.

Summary

This chapter looked at comparisons and differences of standards-based grading and traditional grading as well as the government reforms that are currently impacting education in our schools. As an educator, remember that standards-based grading is an alternative to the traditional grading system, but no matter what grading system you chose to use, all teachers should provide their students with clearly defined standards so students know what is expected. As Guskey stated in 2009, “well-defined standards identify the specific knowledge, skills, abilities, and disposition that we hope students will acquire through interactions with teachers and fellow students in school learning environments” (p. 1). In the final chapter I will explain what I have learned from my research, my recommendations for future research, and my implications for practice in the classroom.

Table 1**Key Articles**

AUTHOR/S	TITLE	RESEARCH/ QUESTIONS	METHODS	PARTICIPANTS	FINDINGS/ LIMITATIONS
Phelan, Choi, Vendlinski, & Herman (2011)	Differential Improvement in Student Understanding of Mathematical Principles Following Formative Assessment Intervention.	Does using our strategy improve student performance on assessments of key mathematical ideas relative to a comparison group?	Students took a pretest and a transfer measure at the end of the year. Treatment students completed formative assessments. Treatment teachers had exposure to professional development and instructional resources.	85 teachers and 4,091 students were included.	Results indicated students with higher pretest scores benefited more from the treatment compared to students with lower pretest scores. In addition treatment students significantly outperformed control students on distributive property.
Bouck & Kulkarni (2009)	Middle School Mathematics Curricula and Students With Learning Disabilities: Is One Curriculum Better?	1. What factors of curriculum, time of assessment, and exam type impact the performance of students with learning disabilities on assessments? 2. What factors of curriculum, time, and exam type impact the self-reported calculator use by students with learning disabilities on assessments?	Students in participating classes completed 16, 10 minute assessments over the school year. The assessments were one of two types: multiple-choice assessment and one open-ended problem-solving assessment; eight were completed of each. The first assessment was given in the middle of September and the last was completed at the end of May.	13 sixth-grade students and 15 seventh-grade students with learning disabilities educated in inclusive mathematics classes	No statistical evidence that one curriculum was better or worse for students with learning disabilities. The major limitation from the research was the low number of participants.

Table 1 (continued)

AUTHOR/S	TITLE	RESEARCH/ QUESTIONS	METHODS	PARTICIPANTS	FINDINGS/ LIMITATIONS
Pollio & Hochbein (2015)	The Association Between Standards-Based Grading and Standardized Test Scores as an Element of a High School Reform Model	1. Does a stronger association exist between standards-based grading and standardized test scores than with traditional grading practices? 2. Does a stronger association exist between standards-based grading and minority or disadvantage students' standardized test scores than with traditional grading practices?	This study utilized a non-equivalent control group design and quantitative analyses to compare the association between classroom grades and standardized test scores. Data Collection and Analysis: The data for the study included the students' final grades, standardized test scores, and basic demographic information.	The study examined student performance from 11 high schools operating in a large metropolitan school district. The sample of students included two cohorts of 1,163 and 1,256 11th grade students who completed an Algebra 2 course and the state standardized test.	Results indicated that the rate of students earning an A or B in a course and passing the state test approximately doubled when utilizing standards-based grading practices. In addition, results indicated that standards-based grading practices identified more predictive and valid assessment of at-risk students' attainment of subject knowledge. The main limitation to this research is that they only looked at students' grades in Algebra 2 and the KCCT includes Algebra, Geometry and Algebra 2 standards.

Chapter 3: Conclusion

State and district reforms happen all the time in education and how teachers grade might be the next big thing that changes. When parents look at their child's gradebook or report card they think that the grades that are listed show what their child knows. I am not sure all gradebooks currently out there do that. Ten years ago, many educators never heard of standards-based grading; now you hear about it all the time in classroom and school districts. Some schools have fully integrated standards-based grading where other schools have departments piloting standards-based grading. The more I research and discover, the more I like about the foundation of what standards-based grading really is about. The state of Minnesota and other states alike have given its teachers the tools to create a standards-based gradebook off of the current state standards that are in place. After you break down the standards, it gives teachers and their department an accurate picture of what is expected for students to learn while in school. Creating a gradebook that can show the strengths and deficiencies of a learner from grade to grade can help the student understand what they need to work on as well as helping the future teachers of this student. We all know that no one knows how long it will take anyone to learn something, but if we grade on specific learning targets it gives teachers and students the ability to know what they need to improve on and reassess when they feel comfortable. Standards-based grading also takes away the guessing game of how much percentage you should make each category in the gradebook or how many points to give to an assignment or activity. The goal is for students to actually learn and not to just do. If students are just attempting an assignment to complete it but not to actually understand it, they are not really learning anything that will help them after they leave school. If a student is unable to complete a homework assignment because

they do not know how to do it, is that really their fault? Or is it some of the teachers' fault? Now, if you assign points to the homework, the student might feel like a failure, and if no late assignments are accepted, that student probably will never finish the assignment. This can then have further negative implications for the student because they will probably struggle throughout that portion of their formative and summative assessments. On the other hand, if students buy in to the fact that school is about the learning process and if they do not understand it the first day that they will not be punished for it, I believe that it gives students a better chance to learn and succeed. As a result of standards-based grading, students are showing more progress and learning on the in class assessments that are given and there is evidence of standards-based grading grades correlating to standardized assessments. Another positive that comes from standards-based grading is that students start asking to reassess because they know they can do better and want to improve. They stop asking for extra credit and understand that they need to understand the material to earn the grade they desire.

Recommendations for Future Research

In the future, researchers should focus on the effectiveness of standards-based grading in high schools. With school districts implementing standards-based grading, now is a great time to see the influence it has on student achievement in school. This can be done using grades and end-of-the-year assessments to see if there is a correlation between the two. In addition to that, future researchers should focus on following multiple groups/classes through Algebra, Geometry, and Algebra 2 and see if a correlation exists between all three courses and the Minnesota Comprehensive Math Assessment (MCA) standardized test juniors take in the spring.

Another focus of future research should be on whether or not standards-based grading has an impact on the education gap of minority and at-risk students.

Implication for Practice

Since making the switch to standards-based grading a couple years ago, I have noticed a change in overall understanding of material in my classroom that correlates with the research I have found throughout this paper as well. In my classroom I will continue to create an atmosphere that encourages students to learn from their mistakes and grow from them without being penalizing during the learning process. I will allow students to re-take summative assessments when they are ready for them because I do not know how long it takes each student to fully learn a specific learning target. Lastly, I will continue to educate students and parents about the importance of standards-based grading.

For some educators and teachers, I know that change is hard, but I will continue to be an advocate for standards-based grading because I see the impact it has on my students. As the high school math curriculum leader in North Branch, I have already had many discussions with my principal and curriculum director as well as other mainstream curriculum leaders, and I will be sharing my findings with them in upcoming meetings. I will explain what a district-wide or vertical standards-based gradebook could look like, and how parents, students, and teachers could benefit from it. Currently, if I or any of my colleagues were to look at any of my eighth-graders report card from last year, I would have no idea what each student is proficient or deficient at. If I were able to look at a standards-based gradebook, I would understand why some topics are more difficult for students than others or could anticipate where students might struggle or succeed. This would allow teachers to make more accurate beginning-of-year

reviews and it could become a living breathing document for each student. If students were engaged in standards-based grading and learning from a younger age and all students could see reassessing as a positive motivation to learn and succeed, it would lead to more learning and higher assessment scores.

Summary

My intent with this paper was to provide educators, teachers, and administration with information and resources about standards-based grading and the impact it can have on student achievement. I also wanted to provide an accurate picture and answer to what I believe grades really mean. For me, a grade is a collection of students' knowledge at a given time in the learning process. All students can work toward mastery of all learning targets, and timeframes should not get in the way of learning. If this is the case, the grade provides an accurate portrait of what students know and gives them the opportunities to improve when the student is ready to do so. This process does take time and buy in from teachers and students and is not something that you will be able to change in a day. But when it is fully implemented, it creates an environment that is all about learning and not about completion or compliance.

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