

BYRAM HILLS CENTRAL SCHOOL DISTRICT
ARMONK, NEW YORK

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Title of Project: Using Standards Based Grading in the Mathematics Classroom
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School/Grade: Byram Hills HS- Grades 9-12

SUMMARY OF *INVESTIGATORS OF PRACTICE* ACTION RESEARCH PROJECT

Context:

This past year I taught sophomore Geometry as well as senior AB Calculus. For the past few years, I have worked on developing strategies to help my students improve their “Habits of Mind” (as described by Costa/Kallick) while building resilience, problem-solving skills, and flexibility in their mathematical thinking. In my classroom, the students are arranged at round tables where they use the cooperative learning model on a daily basis. On most days students are using whiteboards and dry erase markers to show their reasoning on selected problems as they engage in lively discussions. Students then share their findings with their peers and their final results are challenged by both myself and their peers to ensure accurate mathematical reasoning, as well as good mathematical language and notation. This model enables me to circulate around the room having individual and small group discussions, challenge or remediate individual students, and listen in carefully to how my students think about particular problems. It is not uncommon to find me working on a particular concept with one table, while a second table puts up their work for the class to view, and three other tables are engaged in a lively debate. To an outsider this model may look chaotic, but it has helped me promote the strategies I mentioned above.

Over the last two years in particular, I have collaborated with colleague researchers about the importance of timely and meaningful student feedback. The classroom model described above gave me more opportunities to meet with individual students and discuss their personal strengths and weaknesses. Often when I met with a student who had just done poorly on a particular assessment, I was met with comments regarding the loss of points rather than the understanding of content and errors in reasoning. More disturbing to me was the number of students who were willing to just “give up” on trying or coming for extra help in the quarter because they felt their average had already suffered from the assessment and that they would rather put their efforts into a subject where they still had a chance to be “successful”. These comments made me question my own practices. What practices did I have in place that showed students that I valued their “grit”? How could I encourage students to value learning over grades? I began to question students about grading in general and read several articles and books that discussed different grading methods. Near the end of this two year period, my chairperson, Lisa Pellegrino, mentioned that she had done a trial run of using Standards Based Grading (SBG) in her AB Calculus classroom. Her invitation to join her in using this grading method began my newest investigative research project.

Action Plan:

Originally, I planned on focusing on how standards-based grading (SBG) might impact my

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students' academic assessments. After an initial survey about grading and a follow-up conversation after the first assessment, I found that SBG may have additional impacts on students. As a result, my research question became ***“In what ways does Standards- Based Grading impact student achievement, testing anxiety, and student work habits?”***

Initially, I gave my Calculus students a general survey which assessed their general feelings about testing as well as how they felt specifically about Math assessments. The student responses showed that an overwhelming majority of the students

- thought grades were used to convey to teachers and colleges how the student was doing
- felt grades were sometimes arbitrary and unjust
- did not feel the results of the assessment would change how they approached their next assessment

Addressing Math assessments, more than half of the students mentioned words such as anxiety and frustration. In addition, students felt that often, the grade did not accurately reflect their understanding of the material.

From the start I referred to several texts for information and practical suggestions:

- “Seven Reasons for Standard-Based Grading”*, Expecting Excellence October 2008, Patricia Scriffiny, ASCD
- A Repair Kit for Grading: 15 Fixes for Broken Grades*, O'Connor K., 2007
- Marzano research.com (free resources)
- “Does Eighth-Grade Mathematics Teaching in the United States Align with the NCTM Standards?:Results from the TIMSS 1995 and 1999 Video Studies*,Jennifer K. Jacobs, James Hiebert, Karen Bogard Givvin, Hilary Hollingsworth, Helen Garnier and Diana Wearne Journal for Research in Mathematics Education, Vol. 37, No. 1 (Jan., 2006), published by NCTM
- Practical Solutions for Serious Problems in Standards-Based Grading*, Thomas R. Guskey
- Materials found on the district websites of other schools using Standards-Based Grading: Sheridan County School District #1 (Ranchester, WY), Pelham, NY,Aurora Public Schools (Aurora, Colorado), and Renton HS

The first challenge faced was how to explain the SBG process to both my students and their parents. A handout was given to the parents at Back to School Night and a presentation was given in class to my students. That information is detailed below.

Basic Guidelines of SBG:

- Measurement experts such as Peter Airasian (1994) explain that “educators use grades primarily to give students feedback about their progress and achievement, to provide guidance to teachers for instructional planning, to provide guidance to students about future coursework, and to motivate students.” Assessments should be MEANINGFUL tools to help students, teachers, parents, administrators, and counselors understand what course material has been mastered thus far and what topics need further practice and remediation.
- In each marking period, students were given a list of the standards for that marking period.
- In general, students were not receiving percentage scores on assignments and tests.

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Instead, they had attached to the assessments a sheet listing the individual standards and a grading score of 1-5 next to it, which corresponds to the student's conceptual understanding and mastery of the concept. A score of 1 or 2 indicated to the student that they fell below the state standard, 3 was meeting the standard, and 4 and 5 showed a mastery of the standard.

- I provided feedback in a variety of ways: oral, written comments, classwork presentations, etc. I wanted to shift from discussing how many points something is worth to what a student is learning and specifically what they might need to work on.
- Groupwork, although a valuable tool in the classroom, is not used for personal evaluative purposes. Although we value attendance and punctuality, assignments completed in a timely manner, participation, effort, and good behavior, these are NOT to be a part of the assessment process.
- Students receiving a 3 on a standard had opportunities to improve their score with later formal and informal assessments. Students receiving a score below 3 who wanted to receive a higher score needed to make test corrections, come for extra help, and share their reflections about their assessment misunderstandings/errors first.
- The final grade for a standard or quarter grade may not necessarily be the product of averaging.
- Recognizing that students learn during the instructional process, the grade for a unit of study will be focused on what a student knows at the end of the unit. A significant difference in SBG is that students will have multiple opportunities to show mastery of a standard before the grade is final.

Sample of what a student will receive on their assessment in addition to comments:

Standard	Questions	Performance
Limit Definition	1,3	4
Alternate Definition of Limit	2,6	2
Product Rule	5a,7,8	4
Quotient Rule	4,5b	3

Sample of what a student will receive at different points throughout a marking period:

NAME:	Quarter _____
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Review	2	4			3	4	4			4	4
Implicit Differentiation	4	4	5			5			5		5
Differentiation Inverses	3	4	2	3	3		2	3	3	3	3
Motion		4	3		4			4			4
Curve Sketching			4	3	2	3	3	3			3
EVT/MVT/Rolle's			5		4	5		5			5
Optimization			1	2	2	3	3	3			3
Related rates					3	1	3	3	4	4	4

- In order to earn an A+, you should have at least 6 5s, with the remaining standards at 4.
- In order to earn an A, you should have at least 4's on all standards.
- In order to earn a B+, you would have a combination of 3's and 4's.
- In order to earn a B, you would have mostly 3's.
- In order to earn a C+, you would have a 2's and 3's (more 3's)
- In order to earn a C, you would have a combination of 2's and 3's (more 2's)
- A D would be a combination of 2's and 1's
- An F would be all or almost all 1's

Throughout this process I gave students surveys, had many small group conversations, discussed the process with my chair Lisa who was also using SBG, and had the chair of the Guidance Dept. also observe my lessons as well as speak with several of my students.

Results:

Positive Outcomes

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- ❑ The first very noticeable change was **less anxiety** around testing. Students voiced this over and over to me.

“On the test, I was a bit confused about question 3. Normally, that’s when I would panic and start to realize how many points that would cost me. I felt so calm and moved on. Later, I remembered how to approach question 3. I think normally I would have made a lot of careless errors worrying about how much that question was worth.”

“Usually, I leave a math test full of dread. I know there is always a question or two I didn’t answer completely or correctly and all I can think about is how many points the questions were worth and would it hurt my average. Knowing I had more opportunities to show you I could do those type of questions relieved that pressure a lot.”

“I never thought I’d say this but testing is a bit more fun. I said it, fun. I sort of enjoy the challenges of certain test questions, and usually I can’t appreciate them at the time because all I can think about is my grade. Definitely a more relaxed situation.”

- ❑ Students were more **persistent in their problem-solving**.

I noticed this change in both class and testing problems. Students would return to a certain question over and over and use multiple approaches.

- ❑ An unintended but pleasant development was that students’ **work habits began to improve**.

After the first problem-set was assigned, several students came to class unprepared. Students were asked to present their solutions on the whiteboards and then the class discussed the approach used and worked on expanding the concept and using proper language and notation. The unprepared students sat there copying with little participation. With the next set, all students came with work. I asked the three who were unprepared why they had completed this assignment. One student responded,

“I didn’t fully know how to do the first set of problems, so I just didn’t. I saw though that the students who put problems up weren’t always 100% right and were even sometimes totally wrong, but it was OK. It was hard to be part of the discussion because I hadn’t given the questions the same time.”

Since students had opportunities to demonstrate understanding informally in class, I saw students taking better notes and ask more clarifying questions. Students arrived to class ready to work and present. They sought each other out more often for remediation and support rather than just relying on me. Some additional comments heard in class noted below.

“ I got the right answer, but I like the way you did it. Can you come to my table to go through it with me again?”

“ Did you think about the cone problem from last week? Let me find it in my notes because I think it’s related.”

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“Mrs. O’Connell, I know we moved on to another question, but can we go back? I think ____’s notation isn’t clear.”

“Are you really not telling us? No table knows how to do this!” A few minutes later, “Everybody try something...we can get this!”

- ❑ The **conversations** following a test were **centered around learning and not grades**.

I immediately noticed a shift in how students approached me in the days following an assessment. Since there were only comments/questions (no loss of points) after each of their problems, students used the feedback as jumping off points to begin a conversation. Even when there was a reference to the 1-5 scale, it tended to center around ways to improve.

“I really feel I know this topic pretty well but your comment suggested I work on explaining my reasoning more clearly. Can I see you tomorrow after school to work on this?”

“Guys, I got three 2’s on this. I can not do related rates to save my life! Who mastered this? Help me.” Later to me, “Don’t worry, next time these will be at least 4’s..._____ has shown me where I went wrong.”

“Yes! Yes! Yes! I finally got the 3! (after getting a 2 three times!) Now I get this. I’m glad I didn’t give up. Watch out 5, here I come.”

“I know I got a 5, but you commented that there may be a better approach. Can you show me?”

“Mrs. O, I know we both got 4’s but _____’s way of doing it is so much better than mine. She should show the class how she did it.”

- ❑ I had a **better understanding of each child’s strengths and weaknesses**, but more importantly, so did they!

Challenges

- ❑ The process was **time-consuming**. I had to use some class time to explain SBG to students on multiple occasions. I needed time to write meaningful feedback and to create new assessments which reflected my new SBG approach. In class, I needed to have time to address individual student concerns. After school, I needed to create and give multiple assessments, look at test corrections, or work on additional practice questions with my students.
- ❑ **Grading did not match the current system used at the school**. The first quarter was not an issue because the students had my system and I wasn’t posting traditional grades to the portal. Then the school opened the parent portal to be live. Remember that if a student had all 3’s out of 5, this would be a B for SBG grading purposes. On the portal however, this registered as a 60% or F. I did have to reassure several parents of the true grade. Although it wasn’t fully resolved, as students and their parents began to trust SBG, this issue became

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easier to deal with. At the end of the quarter, I did need to hand calculate grades and often override those in the portal.

- ❑ There were **some issues using the 1-5 scale**. Some of the students had been receiving the same grade on several assessments even though there was some improvement in their work. Not wanting students to get discouraged, I began to add in .5 increments. For instance, a student might have been 3 on their last few assessments, and although not yet at a 4 level, I decided to give a 3.5 to show the student that I had noticed improvement as they worked toward the new level. At the end of the quarter, I saw these as 3's but some of the students argued that they should be rounded to 4's and thus raise their overall grade. My policy throughout this process was to have open and honest discussions with the students as we worked through these issues. The students were split, but we did agree that the .5 increment policy would be eliminated. I met with the 4 students this affected individually and we both made a case for why it should stay a 3 or be made a 4. The conversations were meaningful and at the end only one grade was changed.
- ❑ Throughout the process, my expectation was that students would see their score in a particular standard stay the same or began to improve. This was true for the most part. There were some **unusual circumstances**: the student who had a one-time 4 or 5 followed by a string of 3's, the student who bounced between 2's and 4's, and the student who was consistently a 4/5 student and then had a test with all 1/2's. As a class we discussed certain scenarios, without specific students mentioned. The class agreed that just like one poor testing moment didn't dismiss your high scores, one high score didn't dismiss the lower scores. It was agreed that consistency and overwhelming evidence was needed. The student who had all 1/2's had just decided to "not try" because she had several other exams that day. The students were even appalled! They understood the drop if it was related to illness or personal tragic circumstances, but just not giving it your best was not OK. One student even eloquently stated better than I could:

"When someone does that, it puts this whole process in jeopardy. We have all benefited from Standards-Based Grading, but for it to work, everyone needs to buy in and trust each other. The whole idea we always talk about is doing our best and helping each other get better. Someone not doing that is being selfish to everyone here." The student who had not prepared for the test approached me later to apologize and even suggested the act should lower her overall rating.

Implications:

Despite the challenges I faced, specifically the time challenge, I whole-heartedly plan on using SBG again. Going forward, I feel more confident and understand some of the challenges I will face. At the end of this year, I interviewed numerous students at length and with the exception of two students, all supported this method of grading. The two who were not in favor explained that although they received higher grades than they would have in the Traditional system, there was much more work expected of them. I pushed back asking them if they felt they had learned more because of SBG. One response was very interesting:

"I had to learn more because you have to participate, make test corrections, and actually talk to you. It is much easier to get a B and not do those things than get a B+ and have to do all the extra work. I guess it depends on what matters to you. You made us learn even if we didn't want to...we're seniors. (chuckles) I will say this...I worked so hard to get that grade. I really worked for it and I can't always say that."

I also enjoy what one young woman wrote me at the end of the year:

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“At first I saw this as an easier way to get an A or A+. Who wouldn’t want more chances to raise their grade? Somewhere along the way, I stopped caring about that. I just wanted to show you my best (show myself my best) and for that, I say thanks Mrs. O’Connell.”

I think that other teachers considering this should do a small test run first to gain comfortability and to establish that needed trust relationship with your students and their parents. It also helps if you try this in a solo course or alongside a colleague using the same method. I can anticipate conflict if different teachers use different grading methods for the same course.

Other researchers have supported the ideas presented here:

Grading and reporting around specific standards, while using the accompanying strategy of formative assessment with feedback related to progress toward standards, has been shown to significantly boost achievement and motivation for students. Its powerful impact on student learning has had an incredible effect on standardized testing when compared to other intervention strategies, which is supported in the research by Black and William (1998) and Hattie (2009).

I feel that all classes can incorporate some aspects of SBG into their assessments. Perhaps, give back an assessment with only feedback and no grade. Give students a second opportunity to assess on a topic and stress that part of the new grade will depend on how well they incorporate the feedback. Eliminate “pure averaging” where one bad day can significantly lower an average and can also discourage a student to continue to work hard. Discuss assessment concerns with your classes.

I plan on using this again in Calculus and incorporating aspects of it into my other classes. I think all grading systems have their pros and cons, but as our world and students continue to change, our grading methods should also evolve.