Are They Really Double-Checking, or Just Telling Us They Are?

Taking a Look at the Value of Student Self-Assessment

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Description of Classroom Context

Gray’s Woods Elementary is one of eight elementary schools in the State College Area School District. It was built less than ten years ago, and is in a quickly, expanding housing area. My third grade classroom is made up of ten boys and nine girls. One boy’s family is of Indian descent, but there is no other racial diversity in our class and very little in the school. There is more evidence of racial diversity in other buildings of our school district. Some students come from prolific family situations, while others are more rural and less privileged.

Our mathematics curriculum currently in place is Investigations in Number, Data, and Space. The curriculum for third grade is divided into nine units, each concentrating on conceptual and procedural understanding. In mathematics, we have two students that receive Title 1 instruction. One student receives two hours per day of supplemental math instruction, because she is well below grade level in this area. This student does not participate in group-assigned math homework or class work. Most of her math instruction and homework is worked on individually with a teacher or specialist. About twelve of the students in our classroom are testing either Basic or Proficient in our mid-year assessment. However, we have six students placed Below Basic.

Typically, our students complete independent work and bring it to a teacher, saying that it is complete. Independent work can include anything from timed multiplication tests to review worksheets to practice of just-learned concepts. It also refers to homework completed the night before. Usually, a teacher will look at independent work briefly, circle errors, and send the page back for revision. This
may happen several times for one assignment. Usually, the errors are simple computational mistakes and are less likely to contain deficits in understanding. In a similar way, students complete math challenges for points that lead to classroom rewards. For these challenges, students often turn them in incomplete or partially incorrect. This results in the student losing some of the points, but still receiving partial credit. Students that have a tendency to turn in messy and inaccurate work tend to do so on a regular basis. At least three students consistently turn in assignments about five minutes after starting (when it should take 15-20 minutes). These students have a tendency to make simple errors and have a lower rate of accuracy than they are actually capable of producing. In a similar way, even students with a lower level of understanding seem to have the same gap of accuracy when completing work quickly versus taking their time. In my study, I will take a look at eighteen of my math students, only excluding one student who is not in the room for math. This group represents a wide range of ability, achievement, and work ethic.

**Main Wondering**

*During mathematics independent work, how does self-assessment affect third graders’ work ethic and self-awareness of it?*

**Sub Wonderings**

- How does the accuracy of our math challenges (which provide bonus points) compare to the accuracy of regular classroom work?
How can we get students to complete quality work the first time?

What effect does time spent on task have on student accuracy?

How does parent involvement and knowledge of quality of work affect “personal best work”?

How does “personal best work” student modeling affect other students’ quality of work?

What ways can teachers instill an intrinsic motivation for ‘personal best work’?

How can these interventions or work habits be instilled in students across the curriculum?

**Data collection and analysis**

**Rationale**

I chose to examine self-assessment as a tool for improving students’ work ethic in mathematics independent work. The two categories of data that I concentrated on were “Before Implementation” data and “During and After Implementation” data. My claims are based on this data.

**Before Implementation**

Pre-data was collected from students by checking accuracy levels of math challenges (bonus work.) Students’ math class work and homework were also assessed based on three dimensions: Mastery, Computational Errors, and Conceptual Errors. Students were then referred to during later data to see if correlations were present between this and other data.
During and After Implementation

Students were provided with a thorough description of the sticker assessment system each time they self-assessed. The system was based on students choosing a green dot, yellow dot, or red dot sticker to represent the amount of effort given to the specific assignment. Descriptions of each ‘dot’ are as follows:

- **Green**: “You should choose a green sticker dot for your work if you are extremely proud of your work and felt that you did your ‘personal best.’ This includes double-checking your work and thinking hard about the strategies you are using.”
- **Yellow**: “If you choose a yellow sticker, it means that you did complete your work, but that you don’t feel that it was your ‘personal best.’ You may have rushed a little bit, or forgotten to check your work.”
- **Red**: “A red sticker means that you are just having an off-day today and might not have put much effort into the assignment.”

Students were encouraged to ask questions, and then privately choose a sticker from a sheet and place it directly on the math page they were working on. Finally, they would place the papers upside down on the desk. The whole process did not take very long once students became familiar with the self-assessment process.

Disclaimers on Data Collection:
Students were informed that the self-assessment would be a private moment for them and would not be shared with any other students.

Students were informed that the self-assessment would not have any overt effect on the grade they earned on the assignment. The grade would be purely computational – how many they got right or wrong.

Students were informed that the self-assessment would be explained in detail to parents and that they would be taking home some papers with a sticker from them, as well as a grade from the teacher. Students were encouraged to discuss this process with their parents.

   Parent Email: Appendix E

**Evidence**

Student Surveys (Appendix A)

Student Artifacts (Appendix C)

Analysis of Student Artifacts (Appendix B)

Parent Email (Appendix E)

**Claims and Evidence**

**Claim 1: Using a stickered self-assessment technique was effective for about 50% of my students in creating “personal best” work as well as improving work ethic.**

Six of the nine students in this category felt their work improved because they had wanted to be able to give a green sticker as a self-assessment. They specifically said they wanted to try harder and felt that they did try harder once the
self-assessment started. One student said she felt that the reason for her improvement was “Because it is like I am giving myself a grade then the teacher gives me another grade.” This response shows me that this particular student not only understood that she was responsible for analyzing her own work, but that she also recognized the significance of the teacher’s assessment in being compared to her own.

Two of the nine students in this category felt that they had improved solely based on the grades they received. These two students said that because they had started to get more check pluses (higher grades) than they had before, that they had improved. They didn’t comment to the fact that the self-assessment did or did not have a direct connection to the improvement.

The last student said that he knew he had improved because the self-assessment stickers and the grades he was receiving had generally matched each other, so he felt that he had improved from earlier grades. This is an interesting perspective as well, and shows that this student valued the teacher’s assessment so much that he compared the correctness of his own assessment to it.

Claim 2: The other 50% of the class, which are students who produce consistently excellent work or consistently mediocre work (self-stated), are likely to be indifferent toward methods of self-assessment during independent math instruction.

About fifty percent of the class (5 male, 4 female) indicated on a survey that their attitudes toward their math work and their performance on math work hadn’t
changed from before implementation to after the implementation of the sticker self-assessment strategy. These students fell into a few categories.

One category was the students whose work was stated by them to be consistently excellent (2 male, 2 female). These students are four of the students who consistently produce excellent work with evidence of effort and dedication each time they complete a worksheet, homework assignment, or assessment. The two male students are some of our few leaders in math bonus work (challenges) in our classroom, and all three of these students have shown over time their consistency in producing high-quality independent work.

Students represented in the next category (2 male, 1 female) were students who consistently varied between ‘yellow’ and ‘green’ stickers. These students stated on the survey that they admitted to sometimes feeling ‘green’ and other times feeling ‘yellow.’ There was no indication that they felt they did not have room for improvement, but at the same time, they did not show any change in work ethic or attitudes towards their work ethic based on their answers to the survey. One student stated it this way: “I always do my work, but I could do better work,” while another claimed, “I always feel like a yellow sticker and a green sticker.” In the third student’s statement, he disregarded the self-assessment altogether, by saying, “I always have the same handwriting and thinking.”

There were a few students who did not fit into either of these categories. One male student chose not to comment, while one female stated an important discovery for me, which was that she didn’t know if her work had improved “because we’re just learning something new in math.” This idea helped to guide my data analysis by
realizing that the changing of units and subject areas in math made it difficult to assess students’ progress because of the many variables involved.

**Claim 3: Many students typically feel that when they self-assess and it doesn’t match the teacher’s grade, that they must have made a mistake in their own self-assessment.**

Interestingly, twelve out of fifteen students that took the survey claimed to be honest about their assessments 100% of the time, even though most students (9/17) had the idea that if their self-assessment didn’t match the grade given by the teacher, that they must have been incorrect in their assessment. Many of the students said they felt “guilty” “sad” “upset” or “confused.” Others claimed that they must have placed the wrong sticker “on accident.” Only four students made the claim that the teacher had been the one to make a mistake in assessment. Perhaps the most interesting aspect of this group was the one student that had a thorough understanding and knew that there were multiple perspectives involved in the self-assessment and teacher assessment.

**Other findings (related to Sub-Wonderings)**

- One Red Dot
  - Only one student placed a red dot on their paper, and it was a student that got every problem correct. It was a simple multiplication sheet, and the student said that he rushed through it.

- Parental involvement
  - Even though an email was sent home to parents (Appendix E), they did not become involved in the process at all. Student surveys showed
that students did not discuss the stickers with their parents, and I received no correspondence with parents either.

- Challenges
  
  o The accuracy of math challenges was even lower than the general accuracy of other math independent work. The self-assessment strategy didn’t make much difference here.

**Reflections, Further Wonderings, and Future Implications**

*Next time...*

If I were to create this experiment again, which I may very well do in the future, there are several things that I would keep the same, and there are several aspects of the inquiry that I would change.

An extremely powerful tool in this inquiry was using an unpredictable schedule for the self-assessments. I noticed from the first day as a teacher that students were more aware of their own work, because they never knew when a self-assessment would be asked of them. This is important to the integrity of the exploration. I would also most definitely keep the sticker system in place. The simplicity of the stickers and the visual cue of the colors help students with different learning styles to feel successful in participating without looking at a difficult rubric. Also, even though I received little evidence that parents were involved in this study or even talking with their children about it, I would still try harder to include parents as a part of the self-assessment team. I would perhaps invite the parents in to observe rather than just sending an email home.
There are a few changes that I would make when studying this topic again or even when using it in my classroom. First, I would want to carry this method of self-assessment across the curriculum instead of only limiting it to independent math work. There are very interesting ways for students to self-assess and peer-assess in writing, reading, and other areas that I haven’t had the opportunity to explore. On the other hand, I would also consider limiting results by concentrating on only one achievement group at a time. This way, I could find more definitive answers about the self-assessment because I would be using the study on students very similar in achievement and ability. Lastly, as an organizational tool, I would create a simple rubric that students could refer to that was posted in a prominent place and was color-coded. This way, students can always be reminded that they could self-assess at any moment, and they also would have the ability to make sure they are being accurate by checking the criteria at any time.

*Further Wonderings*

- What does self-assessment mean to third graders on a psychological level?
- I wonder how repeated, uncaught errors in math affect self-assessment?
- Is it self-defeating to students if they don’t reach their goals?
- How do students interpret self-assessment as explained by a teacher?
- How could I expand this exploration with the addition of peer assessment?
Implications for the future

Self-assessment is an important tool to use in any future classroom of mine, and potentially with any subject. I hope to continue to explore with it and tweak it as I gain more experience and knowledge on the subject. It would be interesting to explore this with other age groups and grade levels as well. I just think that if fifty percent of my students were able to conscientiously improve their work ethic and attitude towards math because of a few well-thought out sticker choices, that I should keep pursuing the idea of self-assessment.
Annotated Bibliography

This survival kit is not only for principals; there are many valuable ideas and resources for teachers as well. What I found helpful were the successful trials of using three categories of performance for students’ self-assessment of effort given as something separate than achievement and progress. This issue is something that I’ve struggled with because of the idea that students can improve without attaining the ideal academic achievement, while effort is a separate issue altogether. The rating system of EE (Exceptional Effort) SE (Satisfactory Effort) and ME (Minimal Effort) was a good reinforcement of my green, yellow, red self-assessment strategy.


This resource discusses the several parts to a student’s achievement in school. The collaborative process described in this book includes the teacher, the parents, the district, and the student him/herself. This book, along with an idea from my mentor, encouraged me to include parent communication in the process of my inquiry to make it a more collaborative effort. It also gives ideas for making students more involved in their work and gives specific strategies for self-assessment.


This article, although dated, provided some interesting insight about the roles that teachers and students play in the classroom when it comes to assessment. The author identifies four specific roles that are involved in the creation and assessment of any assignment. The four roles are Doer, Judger, Observer, and Actor. In the text, the author describes the student being the primary Doer and Actor in the past, with the teacher being the Judger and Observer. This information helped me think about how I could change the process to being student centered from beginning to end, before the teacher even got involved.

Ma, Xin and Richard Millman. “Using Self-Assessment and Peer Assessment.”


This article talked about an experience that two researchers had with teacher interns at the University of Kentucky. The idea of using self-assessment and peer assessment in teaching a mathematical concept gave me an idea for one of the interventions I was going to use. When students think that they are going to present their work to another student by means of teaching the lesson, in this study, students were much more likely to do high quality work. A combination of self-
assessment and peer assessment was used to create intrinsic motivation in these students.


This ERIC article on performance assessment was not directly related to self-assessment, but tackled the important issue of accountability. As the article states, testing is often rote and one-dimensional. By opening up the idea of using alternative assessments, whether for special needs students or typical students, accountability becomes important for the students involved. They talk about having an accountability model, which relates to self-assessment because students go through the process of becoming accountable to themselves. During my self-assessment inquiry, the most powerful tool was the students’ learning to be accountable to themselves. This was a helpful piece to read in order to understand the thought process behind making students responsible for self-assessing.


Because my inquiry started as a question about gifted math thinkers and how to empower them in self-assessment, I found this as a valuable resource on alternative assessment and mathematics instruction in general. Motivation is discussed, which I think is a big issue for many of the students who have high confidence and think that they will do well on something without double-checking
it. Although this is a lengthy book, chapters 4, 24, and 25 are very helpful. These chapters discuss ways to have students self-assess, ways to motivate all students to do their best work, and ways to include alternative assessment among peers.


In the Frequently Asked Questions section of this article, they answered what I have been wondering since the beginning, which is whether students tend to self-assess fairly. This article claims that with the right amount of explanation and direction, as well as teacher influence, students normally do a fair and reasonable self-assessment. I also found that this article also outlines specific and ordered instructions for teachers’ implementation of self-assessment into the classroom. They show an interesting diagram about how goals and effort meet to create self-achievement, which is then analyzed by self-assessment. Because of this, I realize that in the long term, goals would have to be adjusted often.


This article from Education World helped me to think beyond the walls of my inquiry to self-assessment used as a yearlong tool for progress monitoring and assessment. In this situation, a school was able to successfully
integrate a student/teacher/parent relationship and monitor the student’s progress by conferencing. The student had kept detailed records and portfolios, which made parent attendance skyrocket. This is what I would like to see with my math self-assessment, a partnership between the student and him/herself, parents, and teachers.


Chapter 5 in Van de Walle’s book on Mathematics is devoted entirely to assessment. I could use this resource in both data collection as well as student self-assessment techniques. Self-assessment is included, as well as tips for grading, creating surveys and interviews on math thinking and learning, and looking at assessment standards as well as techniques of assessment.


In Zimmerman’s article, he identifies an important correlation: self-regulation and learning. Students’ capability to analyze their own work and respond to it are central to his study. This is only an excerpt, but he also touches upon achievement and how it is related to student learning. This article is important to my inquiry because of its’ broad definition of student self-regulation and its impact
on education. This helps me to find a basis for the mathematics self-assessment that I want my students to acquire.
Appendices

Appendix A – Student Survey

Name: __________________________________________________________
Date: 03/31/2011

Circle the answer that is closest to how you feel.

1. How often do you think you give an honest answer when you put a sticker on your math work?
   Always          Most of the time          Sometimes          Not often

2. Which statement is most like how you feel about the math stickers?
   a. I think my math work had the same quality before we started using the stickers and after we started using the stickers.
   b. I think my math work has improved since we started using the stickers.
   c. I think my math work has gotten worse since we started using the stickers.

Write a sentence or two that tells why you think this: __________________________
_______________________________________________________________________________
_______________________________________________________________________________

3. When you take a paper home to your parents and they see which sticker you gave yourself, how does that make you feel?

_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

4. What happens when the sticker you put on your paper doesn’t match the grade given to you by a teacher? For example, if Molly put a red sticker on her paper but still did very well, or if Tom put a green sticker on his paper but missed almost all of the questions. Write what you are thinking or feeling when this happens.

_______________________________________________________________________________
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Appendix B
Appendix C – Student Artifacts

Finding Angles (page 2 of 2)

Use your straws to make angles of different sizes. Draw a picture of each angle you make. Then find 2 or 3 objects in the room that have angles that match these sizes, and record the name of each object.

4. Make an angle that is much smaller than a right angle. Draw your angle. Objects with this angle:

\[ \text{My pencil} \]
\[ \text{Top of pencil} \]

5. Make an angle that is much larger than a right angle. Draw your angle. Objects with this angle:

\[ \text{My side} \]
\[ \text{Top of my head} \]
Building More Triangles and Quadrilaterals

Follow the directions below to make triangles and quadrilaterals with your straw building kit. Draw a picture of each shape you make, and label the lengths of the straws you used for each side.

1. Make two different triangles that have all sides the same length.

2. Make a triangle that has a right angle.

3. Make a triangle that has three different side lengths.
4. Make an angle that is much smaller than a right angle.
   Draw your angle.
   Objects with this angle:
   
   

5. Make an angle that is much larger than a right angle.
   Draw your angle.
   Objects with this angle:
   
   

First at least three things you know about angles.
You may draw pictures if that will help you explain.

- A square has 4 sides, both has 4
- Vertex has more than one line of symmetry, both have 4 right angles and 4 sides.
- Rectangle has opposite sides of equal lengths.
Building More Triangles and Quadrilaterals

Follow the directions below to make triangles and quadrilaterals with your straw building kit. Draw a picture of each shape you make, and label the lengths of the straws you used for each side.

1. Make two different triangles that have all sides the same length.

2. Make a triangle that has a right angle.

3. Make a triangle that has three different side lengths.
## Appendix D – Artifacts Analysis

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Appendix E – Parent Email

Hello Parents of Room 82!

I wanted to give you a quick update about a new method of self-assessment we are trying for math. After students finish a math worksheet, activity, or challenge independently, they will be asked to provide their paper with a green, red, or yellow sticker.

The green sticker represents a student’s very best work. A green sticker means that the student believes they have put 100% of their best effort into the activity, double checked it, and feel confident that they couldn’t do any better.

A yellow sticker would show considerable effort put forth by the student. This means that the student feels they did mediocre or average work, but that they did not double check their work and probably did not give 100% of their effort to the activity.

A red sticker shows that a student was simply feeling off that day, or didn’t understand the concept well enough to complete personal best work.

You will start to see math papers coming home with stickers on them, and please know that the stickers are your student’s self-assessment of their own work. These papers will also be given a grade by the teacher that reflects the work done and is not related to the self assessment. It will be interesting to see how our work improves as we begin to self-assess!

Please feel free to email us if you have any questions!

Cheryl McCarty and Christina Allen
Appendix F – Inquiry Brief

Christina Allen
Inquiry Brief

*Please note: Inquiry Brief was part of initial questioning and wonderings which have changed over time*

Context

Gray’s Woods Elementary is one of eight elementary schools in the State College Area School District. It was built less than ten years ago, and is in a quickly, expanding housing area. My third grade classroom is made up of ten boys and ten girls. One boy’s family is of Indian descent, but there is no other racial diversity in our class and very little in the school. There is more evidence of racial diversity in other buildings of our school district. Some students come from prolific family situations, while others are more rural and less privileged.

Our mathematics curriculum currently in place is Investigations in Number, Data, and Space. The curriculum for third grade is divided into nine units, each concentrating on conceptual and procedural understanding. In mathematics, we have two students that receive Title 1 instruction. One student receives two hours per day of supplemental math instruction, because she is well below grade level in this area. This student does not participate in group-assigned math homework or class work. Most of her math instruction and homework is worked on individually with a teacher or specialist. About twelve of the students in our classroom are testing either Basic or Proficient in our mid-year assessment. However, we have six students placed Below Basic.
Typically, our students complete independent work and bring it to a teacher, saying that it is complete. Usually, a teacher will look at it briefly, circle errors, and send the page back for revision. This may happen several times for one assignment. Usually, the errors are simple computational mistakes and are less likely to contain deficits in understanding. In a similar way, students complete math challenges for points that lead to classroom rewards. For these challenges, students often turn them in incomplete or partially incorrect. This results in the student losing some of the points, but still receiving partial credit. Students that have a tendency to turn in messy and inaccurate work tend to do so on a regular basis. At least three students consistently turn in assignments about five minutes after starting (when it should take 15-20 minutes). These students have a tendency to make simple errors and have a lower rate of accuracy than they are actually capable of producing. In a similar way, even students with a lower level of understanding seem to have the same gap of accuracy when completing work quickly versus taking their time.

**Rationale**

Students finish their work and bring it to the teacher saying, “I’m done.” Most often, in this situation, the student is not done. There are several simple mistakes that could have been rectified by a simple double-check. But even when prompted, students will not take the initiative to thoroughly check their work. This results in inaccuracy and less than their ‘best work.’ I want to find out what will motivate students to create their best work all the time when completing mathematical work independently. By trying a few different techniques and taking data each step of the way, I hope to find the answer to this question.
Main Wondering

During mathematics independent work, what measures most effectively create accurate self-assessment in third graders?

Sub Wonderings

- How does the accuracy of our math challenges (which provide bonus points) compare to the accuracy of regular classroom work?
- How can we get students to complete quality work the first time?
- What effect does time spent on task have on student accuracy?
- How does parent involvement and knowledge of quality of work affect ‘personal best work’?
- What ways can teachers instill an intrinsic motivation for ‘personal best work’?
- How can extrinsic motivators be used without creating a dependence on them to perform “best work” by my students?
- Can these interventions or work habits be instilled in students across the curriculum?

Data Collection

Time sweeps of student work on mathematics class work, homework, and formal assessments will be annotated with the time started, time finished, teacher prompts, time spent rechecking, and accuracy level. Students will not be compared to each other for the duration of this study; they will only be compared to their own personal achievement on each observation. Personal surveys and interviews with the children will be conducted at the beginning and the end of the data collection period to see how attitudes toward self-correction have changed based on the trials
conducted. Perhaps most importantly, student artifacts of independent work will be used and analyzed.

**Timeline**

Week 1: Feb. 7 – Feb. 11
- Finalize question and sub questions
- Weekly inquiry update (Due 2/8)
- Collect 3 different samples of math independent work (class work, homework, or assessment) from each student.

Week 2: Feb. 14 – Feb. 18
- Collect 3 more samples of independent work
- Create surveys about ‘personal best work’
- Create rubric to place student ‘personal best work’
- Inquiry brief draft due Feb. 18

Week 3: Feb. 21 – Feb. 25
- Continue collecting student work
- Conduct student surveys with all students
- Conduct pre-interviews with 4 students (from varying achievement groups)
- Inquiry update due
- End pre-data collection
- Analyze data

Week 4: Feb. 28 – March 4
- Continue collecting student work
- Conduct student surveys with all students
- Email parents
- Inquiry update due
- End pre-data collection
- Analyze data

Week 5: March 7 – March 11
- Spring Break

Week 6: March 14 – 18
- Start intervention one – colored dots each student places on their work to show effort made. Green = personal best. Yellow = average. Red = Unacceptable. Record time spent, teacher prompting, and accuracy in data. Teacher will respond with colored dots to show how they feel about the work. Work will be passed out the next morning to show teacher assessment and correspondence with student assessment.
- Interview about intervention one
- Final inquiry brief due March 2
- Inquiry update due
- Analyze data

Week 7: March 21 – March 25
- Start intervention two – each day during morning meeting highlight one student’s specifically personal best work. Describe aspects of the work that make it excellent. Reward the student in some visible way, such as lunch with
the teacher. Have a discussion about personal best work. Give examples of teacher personal best work and anecdotal stories about how best work provided good results.

- Inquiry update due
- Interview about intervention two
- Analyze data

Week 8: March 28 – April 1
- Inquiry update due
- Interview about intervention three

Week 9: April 4 – April 8
- Final data collection (post interventions)
- Collect student work and analyze
- Conduct student interviews and surveys
- Compile evidence
- Inquiry update due

Week 10: April 11 – April 15
- Compile evidence and make claims from the evidence
- Inquiry update due
- Draft Paper due April 8

Week 11: April 18 – April 22
- Work on revising Draft paper
- Inquiry update due

Week 12: April 25 – April 29
- Work on revising Draft paper
- Practice for presentations
- Inquiry conference April 30
- Final Paper Due May 1