

Read Three: Giving Story Problems a Purpose

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*“The students know how to do the math, they just don't understand what the question is asking.”*

In the five years that I have been teaching at my school I have been teaching the sixth grade “high fliers”: that is, the honors students, and I have said some version of this quote a hundred times. These students were placed in sixth grade honors math because of their fifth grade End of Grade exam (EOG). On that EOG they placed in the top twenty percentile in mathematics and in the top ten percentile for reading, for the state of North Carolina. My school is a magnet school whereby students from fifty-two area elementary schools are eligible to attend via lottery. Most students were the top students at their respective elementary schools and unfortunately have not had to work very hard to be the top math students. They believe that math is easy and can be done quickly.

In my math class I have always focused on the story problem. In real-life, no one stops you on the street and asks, “Quick, is 654,321 divisible by three?” Nor do they ask you, “What is the absolute value of these 25 numbers?” My focus on the story problem and the level of effort that my students now have to put into math problems is a rude awakening for many of them. For the first time in their lives, they are getting these problems wrong.

They are getting the problems wrong not because they are not capable of doing the math or because they are not strong readers. They are getting them wrong because they do not know how to read the math problem. They do not know how to attack the problem. In the past, in an attempt to address this problem, I have tried to fool them as my strategy. I have given my “Stanley Test”. This is an adaptation of the problem where I give the students a set of directions. The first step tells the students to read all of the directions completely before starting any work.

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The very last direction informs the student that it was all a trick and that he or she should not do any work at all. Since students do not read carefully, they miss the trick and end up doing work that they did not have to do. In my version of the test, I have them do a few silly math problems then draw a cow and name him “Stanley” before the last step reveals that they should have read the directions all the way through. I post some of the better drawings of “Stanley” around my room as a reminder to slow down and read. This method draws some attention to the problem but it obviously is not the total solution.

I have also used the S.O.L.V.E method to address the reading problem. The S.O.L.V.E method has my students: Study, Organize, List each step, Verify, and Examine. Each step has two to three sub-steps. The challenge with this method, however, is that despite its raising my students’ scores, it takes too long. My students end up taking about 15 minutes per problem using the S.O.L.V.E. method. Additionally, the students have stated some dissatisfaction with being made to solve the problem a set way, not giving them freedom to use their own strategies.

In my years as a teacher I have fielded questions from students where it was clear to me that they never fully read the problem. A few months ago I assigned one of my favorite problems, the locker problem. This problem describes 1000 students opening and closing 1000 lockers that are multiples of their number in line (person three opens or closes lockers 3,6,9, and so on). This year, I put the students in pairs and gave little direction except: “read the problem and answer the question.” I was extremely disappointed with the results. The problem only explains what the first four students do and then asks: “what lockers are left open after all the students have gone by”. Most of my students only solved the problem for the first four students, showing me that they did not read.

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If I had a nickel for every time one of my students told me that they do not understand the problem I would not need to teach anymore. When I ask what part of the problem they do not understand they claim: “all of it.” The students seem to know there are words on the page, but they have no idea what those words mean or where to start. I understand what Diane Metsisto claims in Literacy Strategies for Mathematical Instruction in that math has its own language, and students can get lost in the double meaning of the words. I do not believe that not understanding the words is the case with my students. My students all read at an advanced level and are very familiar with words that have multiple meanings. I understand the problem to be that “the basic structure of mathematics problems differs from that of most informational writing.” (Metsisto, 2005) If my students were more familiar with the structure of the story problem, they would understand more.

I believe that if I get my students to slow down, they will actually think about the math they are doing and notice the mistakes that they are making and be able to correct them. It never fails that four of the first five papers turned in will have some silly mistake. I have never heard it said but my students act like there is some prize for being the first one to finish. I guess there is a prize: a few regrettable mistakes. In the past, in an attempt to slow my students down and reflect, I have required that all work be written in complete sentences, but this only works if they actually take the time to read the sentences that they write.

I have a few sayings in an attempt to highlight this issue: If your answer does not make sense, it is wrong. Check your units, a 200 meter door is a little too tall, could it be 200 of something else? Remember Stanley. Even with all of these sage words, I still have students answering a problem that asks: “What percent was the discount?” with an answer like, \$1.50. I

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want a way to reinforce “. . . the idea that a piece of mathematics text needs to make sense (and that it can make sense) is exceedingly important.” (Metsisto, 2005)

I created a template that would replace the S.O.L.V.E. template. When I created the new template entitled “Read Three”, I wanted something shorter than S.O.L.V.E. and more open-ended. I believe that “students using their own strategies to solve problems and justifying these strategies also contributes to a positive disposition toward learning mathematics.” (Wisconsin Center for Education Research, 2007) I wanted a template having only a few steps that would really focus my students on the problem. In Miller and Koesling’s article “Teaching for Understanding,” I found their practice of having their students read the question three times to be a good fit. Miller and Koesling suggest: “It comes from breaking the problem-solving process into small pieces that the student is able to successfully negotiate. First read. Reading for understanding: What is the real-world setting of the problem? Second read. Identifying a problem-solving process. Third read. Solving the problem and checking for reasonableness”. (Miller, 2009)<sup>i</sup>

In the Read Three template, I follow Miller and Koesling’s suggestion with two additions of my own. I added guiding questions to the template because “asking students questions about the text structure can help them to focus on the idea that texts have an underlying organization.” (Metsisto, 2005) I continued with Metsisto’s suggestions , “Also significant are questions about the meaning of the problem, such as, ‘Can I paraphrase the problem?’ ‘Does the problem make sense to me?’ or ‘Does my understanding incorporate everything I've read?’” (Metsisto, 2005) Finally, between the second and third read I have my students apply a mathematical strategy of their choosing to aid in solving of the problem. “Students have to visualize the problem's context

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and then apply strategies that they think will lead to a solution, using the appropriate data from the problem statement.” (Metsisto, 2005)

My new template follows these simple steps with their guide questions: *First Read: What is the story?* *Second Read: What is the question?* *Apply a Strategy:* *Third Read: Does my answer make sense? What are the units for my answer?* “When math teachers link classroom instruction to students’ intuitive knowledge, students can take classroom instruction a lot farther.” (Wisconsin Center for Education Research, 2007)

I started my data collection by giving all of my students a Base Line Activity. This Base Line Activity was used to show the growth with the classes that were using the Read Three. It also let me gauge the level of difficulty of each problem when compared to the classes that did not use the Read Three template. I introduced Read Three as a warm-up. Two of my classes were given the Read Three format, and were told how to use it. The other two class were given the same warm-up question without any guidance. My four honors classes can be grouped into two sections as follows: high honors (Block 1 and Block 5) and low honors (Block 2 and Block 3). The two high honors classes do much better than the two low honors sections, as may be obvious. Even in those two sections there is a hierarchy. Block 5 and Block 2 do better on my assessments than Blocks 1 and 3, in their given categories. I gave the Read Three warm-up to the lower classes in each section (Blocks 1 and 3). I hoped that the Read Three would give a noticeable advantage to the lower classes, and I would see their scores rise to compete with the other two classes. These warm-ups were given to my classes in three consecutive days after they had all been reintroduced to the topic of percents the week before.

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I found that the Read Three was able to increase my students' ability to answer story problems with a higher level of accuracy. This is evident in both my 1<sup>st</sup> and 3<sup>rd</sup> block's data. Forty-one percent of my Block 1 class got the Base Line problem correct. When given the Read Three template that level jumped to 71%, 53% and 80% correct for days one, two and three respectively. This is significant when you compare it to my Block 5 data. My Block 5 is the strongest of my four math classes. It had 65% of its students get the Base Line problem correct, and then when given the warm-up without the guidance of the Read Three template they were 53%, 47% and 84% for those three days. My Block 3 students were given the Read Three, and showed growth even though it was modest when compared to my Block 1. My Third Block's numbers were 24% for the base line and 40%, 33% and 80% for the three days of Read Three.

This data shows that giving students a purpose while reading story problems can help them actually truly read the problem, which will lead students to understand what the problem is asking. The growth that the two classes showed encourages me to develop the Read Three template so that it can be used throughout my school. I understand that to do this I need to make some changes. First, I will put in a line asking for a quick estimate. This would be beneficial to reference during the third read. I would add a guiding question in the third read that asks if the students were close to their previous estimate. My last change would be to remove the question that asks: *what are the units for my answer?* This question caused more confusion than enlightenment and it did not flow easily with all questions. I would replace it with the question, *How do you know your answer makes sense?* This would have my students truly focus on their answer, instead of what they do currently and just answer "Yes".

I need to develop some aspects of the Read Three in order for it to be something that my students use without prompting. Right now, it is taking too long. I know the time constraint

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may be a product of my students' not being comfortable with the format. To speed it up, however, I will start to remind the students what they should be thinking about on the first two reads instead of having them write it all out. I also noticed, especially with my lower kids, I need to improve my students' selection of mathematical strategies. This was evident in the lack of variety of strategies and their lack of efficiency in using them.

With these suggested changes and developments I think that this will be the answer to most of my math questions. It should slow my students down and focus their reading, giving my students a real opportunity to successfully answer story problems accurately and consistently. It will allow students to show me that they know the math instead of becoming lost in the math problem.



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<sup>i</sup> **References**

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