

## **Summative Thoughts on Rule of 3 Case**

### **Tim Boerst**

*In looking back over my case based work this school I noticed several things that might be worthy of comment at this juncture.*

#### **Multiple, but Incomplete Rationale**

First, this case, my fifth since starting TRG in 1998, has the most thoroughly developed set of rationale behind its practices. My rationale for exploring the Rule of 3 range from:

- its subject matter connection (embodiment of important dimensions of mathematics).
- encouraging more rigorous mathematical work on the part of students and myself, while at the same time not requiring the development of an entirely new curriculum.
- alignment with new NSF endorsed mathematics texts that our district will be adopting and with the measures of student competency that are currently used in the district (MEAP and CTBS)
- meeting the needs of students (at first I was just focusing on the top performers who needed a challenge and then increasingly on meeting the needs of all students)
- addressing parental concerns about student learning opportunities
- a personal need to explore an area that I had considered to be a strength through TRG style reflection.

Even with this rationale there are still two more that I have not addressed, at least explicitly. First, more than other cases, work on the Rule of 3 has shown me that I need to work on my content knowledge for teaching, specifically what each of the representations looks like in relation to the different problems that I have students explore. This is interesting since I thought I was (and others consider me to be) pretty competent in mathematics. A second and more glaring oversight on my part was how little I did to look deeply at how my work on the Rule of 3 was impacting students. In the past I did a much better job of looking carefully across students to see if my case based work was having the impact I was hoping for. I seemed to be hunting for examples of the Rule of 3 in use while not simultaneously looking at how it was not being used, how it was being misused, how it stifled or pushed different students. I do not write this to imply that I didn't think about students (because I did), but rather to make the point that whatever our interests may be, we must keep the rationale of "because it helps students to learn better or more deeply" in the forefront. For instance, I did notice that quite a few more of our whole group conversations in math class ended up looking for generalizations related to the problems that we were exploring. That sort of growth in opportunities to engage in sophisticated thinking (either to produce it or to hear/think about it) constitute an improvement in the classroom environment for learning mathematics that *could* help all students. Looking across assignments and students could give me an even better idea about the Rule of 3 as a worthwhile tool for improving the learning experiences/products of my students.

#### **The Rule of 3 in South Redford Next Year**

Next year the context for mathematics teaching is going to look far different. With this in mind I thought it would be important to think about the connection between this case and what will be happening next year. First, in all likelihood math menus will be unnecessary as Math Trailblazers invests heavily in problem based mathematical learning. This is far different than our previous text where teaching and learning through problem solving was essentially absent. Second, there appears to be a nice overlap of the criteria in my new menu scoring tool and the components of the K-5 rubrics in Trailblazers. However, it looks as though I will need to create

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some kind of sheet that students can use to self assess with these criteria so my new rubric might help in that area. I noticed that when I explicitly attended to using multiple representations in the scoring tool, more students included this kind of work. I will need to think about how the Trailblazers rubrics encourage Rule of 3 representations. Third, a huge component of effective teaching with the new text series will be the extent to which teachers can draw the mathematics out of the problems that students solve. How teachers orchestrate individual, small group, and whole group work on problem based experiences is going to be a big issue in the district and I feel like I have a leg up on that discussion. With your help, I have thought through different approaches to instruction and assessment related to problem based teaching. I am beginning to see the interconnections of mathematical strategies and representations, but also the importance of personally exploring these interconnections so that I can point student in productive directions (like “chef’s recommendations” if you will (thanks Josh)). For instance, I think that Rule of 3 representations might initially make most sense to students as alternative ways of communicating their mathematical ideas. Later as student gain expertise with these multiple representations they may be able to use them as strategies to arrive at initial solutions (not just variations of ways they might use to communicate their solutions). At the same time I can point them toward different representations depending upon their goals, skills, and problem parameters. I also can break out of my own habit of overvaluing numerical solutions/textual explanations and endorse graphs and equations as valid means of representation and proof that don’t necessarily require elongated textual components to “count” as high quality responses.

**What is Next?**

In terms of what is next for me, I hope to take what I have learned about the Rule of 3 to be a better user of our new text series. I would love to consider how this plays out in when curriculum materials actually support, instead of impede, this sort of instruction. I will need to come up with better ways to more comprehensively think about student growth and learning, but here again I think the text will scaffold this work. In addition, I think far more people will be thinking critically (but hopefully not in close-minded “this-series-won’t-work” fashion) about mathematics instruction, so I am encouraged by the thought that I might be able to benefit from more wide spread attention to problem based instruction. I have also been able to locate some more recent research on the place of algebraic thought and representations in math instruction. This is a final piece that has been lacking in my Rule of 3 work. So with peers, curriculum material, and research support, I should be able to make some real progress in thinking about the Rule of 3 next year.