

Writing to Understand Content through Inquiry

TE 843 Special Topics Project

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Paul Booth

When I started this course, as stated in my Professional Development Plan, my focus was to have my students learn strategies to better understand what they read. I have always felt, as a math teacher, my biggest issue is that my students cannot read the problems they are trying to solve. In the years I have been teaching math, most all of my students have been strong readers, placing in the top fifth of the North Carolina End of Grade Exam (EOG). This leads me to believe that theirs is not a comprehension problem but a problem of truly understanding the material. Buehl argues: “[S]tudents struggle to read mathematical text in large part because such text is predicated on what students have previously learned.” (Buehl, 2011)

My school has students from 52 different elementary schools, which means that they vary widely in terms of what they have or have not learned. I chose to do an inquiry unit that incorporated writing because I am running out of time to get through my content area, and we are moving into topics that my students will have to build upon in future classes. “When we tell - only imparting information to our students - they tend to forget much of it within two weeks and practically all of it within two years. Research has found that when we teach students how in a meaningful context, students have the motivation to use the conceptual material. Through doing, they learn more deeply, and retain what they have learned.” (Wilhelm, 2007) “Incorporating writing is critical to help students deepen their understanding of mathematical concepts and that there are powerful, time-efficient ways to do this.” (Totten, 2005)

With the limited time that I have to get through the material I still need to cover by year’s end, and given that I am teaching it to children at vastly different levels of background knowledge, I hope that this inquiry unit will bring my students up to similar levels of understanding in a quick time frame. It was with this history in mind that I planned this lesson.

I chose to do my inquiry unit on the topic of Volume, meeting Common Core State Standard: CCSS.Math.Content.6.G.A.2 *Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.* (CCSS, 2012) This is my school district's first full year of Common Core. Last year, we were asked to start to incorporate the standards, but we were still tested on the old 2003 standards. Not all teachers were able to teach to both sets of standards so my students' background knowledge is piece-meal, to say the least. In fifth grade they should have been taught to understand that volume is how many cubes can fit into a shape, and they should understand some of the vocabulary associated with volume. The reality is, however, that those topics were not a priority for some fifth grade teachers and so some of my students lack that background. With this in mind, I wanted to do a student-centered lesson that would allow me to monitor and quickly remediate the students who were not up to speed.

The format of my lesson involved students working in groups, and it gave me the time to walk around and work with those students needing extra help. I started my lesson with one centimeter cube, two small cardboard boxes, and the following prompt: *"It is your first day working at Nestle, and your new boss has asked you to recommend which of the two boxes would be best to ship their new candy cube. In your letter to your boss please explain clearly how you came to this conclusion and how many cubes would be able to be shipped in each box. Please refer to each box and each box's dimensions (length, width and height)."* Inclusive of my goals for this lesson, I wanted to "extend and deepen students' knowledge." (Graham, 2007) by using

this R.A.F.T. writing activity. I differentiated the lesson for my higher and lower students. For the lower students, I broke down the prompt into a few questions including the following: how many cubes could fit into each box; which box do you think your boss at Nestle would prefer; and why? I have found that my lower students do better when they have a step-by-step process to follow.

When I was composing my writing prompt - what Wilhelm calls the “Guiding Question” - I followed his suggestions. “Honors students need for an inquiry to be interesting and relevant in their terms.” (Wilhelm, 2007) That is why I choose the topic of Nestle, and had them address the letter to their boss, who had the same name as our school principal. I also tried to keep it open ended enough to allow different discussions in class. The lack of specifics about what would make the “best” box led to discussions about cost of material and surface area, total weight of the boxes, cost of shipping, and caloric intake. I chose to have my students make a value judgment between the two boxes, because I did not want them merely to create a letter; I wanted them to *evaluate* the two boxes and then write about the evaluation in their letters. Creating the guiding question was the most challenging part of the activity. This is where I need the most practice.

Once my students finished collecting the data on their boxes, I had their groups of four make one rough draft of their box recommendation letter to their boss, in the spirit of *Eleven Elements of Effective Adolescent Writing Instruction* (EEEAWI) (Graham, 2007) on Collaborative Writing. “Collectively, these investigations show that collaborative arrangements in which students help each other with one or more aspects of their writing have a strong positive impact on quality.” (Graham, 2007)

If I were to do this assignment again I would replicate the lesson in terms of having them write in groups, but I would change it so that each student would write his or her *own* letter. I had a problem with all the groups' letters sounding too similar. Their homework that night was to work on their own drafts of the letter that they would present to different small groups the next day. The group times gave me an opportunity to walk around to monitor progress, work with students who were struggling, and to make sure the class was aware of time constraints (Wilhelm, 2007). I collected and graded the letter for content knowledge.

I understand that this inquiry activity may not have worked for my entire class, and I did not expect it to. "Not all elements are effective with all students and all teachers. Sometimes positive results are not seen immediately; implementing new elements of instruction often requires a significant investment of time to reveal their full potential." (Graham, 2007) There were some students who really got into it and wrote several pages and really got out of the activity what I wanted. Others seemed to view this assignment as torture. They did not want to "play the game" and they did not want to write the letter. I think the higher the buy-in, the easier it was for those students to show that they understood the material.

My school has a forty minute-long flex learning time each day. In the past, we have used this time for many of the following things: to teach IB topics, to work with our lower students and to challenge our high fliers. I could use this time as a trial-and-error time to hone my skills as an inquiry unit planner and guiding question creator. I could plan more units like this one to not only improve lesson planning but also to help my students become more comfortable with the process that is needed for an inquiry lesson.

Bibliography

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