

The Nature of Science in My Classroom
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NGSS were approved on June 5, 2013 in the state of Kentucky (education.ky.gov). Since that time I have had to readjust my focus on science and how I teach my students. These new standards encompass three facts of science education: crosscutting concepts, core ideas, and science and engineering practices.

For the last 20 years of my career, I have always given direct instruction, formatively assessed, and then gave a summative assessment in my classes. Direct instruction involved notes, quizzes, videos, and then a test. I must admit that it was easy! However, now I am trying to regroup to include the idea of phenomena and collaboration into my lessons. I am currently using the Illinois Next Gen Working Storylines which were implemented by a group of life science teachers in Illinois when they were presented with the task of rethinking their teaching to incorporate what the NGSS prescribes. Dr. Jason Crean, a high school and college life science teacher, spearheaded this group in order to give teachers more guidance on the “how” to teach their students in the way that places the learning on them (ilscience.org.)

These storylines group the Next Gen standards into “stories” that have a common phenomena. Students engage with the phenomena and then learn to ask questions that become the driving questions behind our unit of study. As we progress through the storyline, students always come up with more questions that we add to our driving questions board. Students are immersed into many activities such as virtual tours of the African savannah, examining real life data from the ocean of the Pacific Northwest to determine why otter populations are disappearing, and even looking at real cancer cells under the microscope. The material is already created by this group and is available to anyone who wishes to access it. I must admit this has

been so much easier for me to use because I felt clueless as to how to create my own units with NGSS. Does it have drawbacks? Yes. My collaborative teacher doesn't like that I am teaching this way. It puts all the work on the students and it really makes them evaluate, examine, and propose new ideas. For once, they are doing the work and I am guiding them. This is hard for some people to accept. Students have been spoon fed for so long and this is difficult! Is this curriculum perfect? By no means is it perfect, but it is serving as a good springboard for me to begin actually understanding how the nature of science piques interest and then lets the students build upon their own natural curiosities. That is the goal of science instruction today...let the students investigate their own questions and experiments while the teacher guides them.

I chose to examine the Kentucky Academic Standards for Mathematics. According to the education council, the new standards “provide a valuable context for learning and the opportunity to solve problems in a relevant and a meaningful way” (education.ky.gov.) As I look through the background of these standards, I see much of the same contexts and vocabulary that I see in the NGSS. Students are expected to (1) use real world learning to make predictions, (2) find solutions, and (3) determine if those solutions make sense (education.ky.gov). This is right on par with the NGSS. Students are expected to be able to use critical thinking to propose solutions to real world problems and collaborate with peers to test those solutions. I think that as high school teachers, we specialize in content, and we tend to become silos. We don't realize the overlap that our disciplines have, and we often miss the opportunity to collaborate with other subjects.

As I work through my PLTW curriculum for BioMedical Science, many opportunities to enhance my teaching with Math skills are already built in. Students are graphing data they have

collected in various experiments. They are determining the rate of cooling of a deceased individual and then calculating the time of death. My upper level students are using ratios to compare cancer risks in fictitious patients. They realize that math and science do not stand alone. Science **is** math! They often fear the math that is used but we work through it together.

My regular biology classes are another case. Students are heterogeneously grouped into my classes and there are students who struggle with simple math properties and those who are advanced. Because of this I often do not focus on math as much in these classes. It becomes a catastrophe when one group completely shuts down because they believe they shouldn't be doing math in Biology. I am trying to get my students to understand that science has a lot of math associated with it. You cannot "do" science without doing math. My goal is to find opportunities to incorporate math as much as possible into my regular classes and let my students feel accomplished when they are able to grasp a math concept in their science class and it makes sense! When that occurs, I will feel like I have successfully combined the two disciplines.

Bibliography

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