

Next Generation Science Standards (NGSS) are based around several tenets about the nature of science and how important implementation of those characteristics are in science education today. In my classroom, I teach several lessons in which it is very important for students to understand these tenets in order to truly develop methods for thinking about the world through a scientific lens. This also allows students to understand how scientists are continuously working to interpret phenomena. In particular, when I teach a unit titled Global Climate Change, my students look at a wide variety of evidence based research to gain a deeper understanding of the scientific consensus. They use the data from various sources such as NOAA and NASA which gives them examples of the different methods, models, and theories proposed to explain the rise in global temperatures. They can also see that the data is being continuously collected as scientists are constantly revising knowledge. These important concepts can also be utilized for deeper comprehension of every single unit throughout the course of a class. I think with the knowledge on the nature of science, students become adults who are better able to analyze information and become scientifically literate.

Crosscutting concepts imbedded throughout the NGSS help integrate several important tenets on the nature of science as well. I believe several of my units allow students to understand these ideas. The Global Climate Change Unit helps my students see science tries to address questions about the natural world and how disrupting the order and consistency in natural systems impacts life on Earth. Students analyze how increased levels of carbon dioxide which are outside the natural levels have caused changes in our atmosphere and thus various other systems.

Even though I know some of my units are very grounded in the tenets laid forth by the NGSS, I have some improvement to make in order to fully implement them. Meaningful alignment to the NGSS requires a shift in the way I have been teaching science for many years. It is clear that students will become more scientifically literate adults, and thus more informed global citizens, if they believe these truths about the nature of science. I think many of my units are still stand alone units which do not help the students understand some of the crosscutting concepts necessary for this understanding. I am constantly working to try to utilize units and lessons which require more student involvement as they take responsibility for learning. According to Koehler et al. (2016), teachers must become facilitators of learning activities rather than just dispensing knowledge and requiring memorization of facts. I believe my science curriculum must be adjusted to reflect this new method. I need students to engage in more meaningful activities which will help them better interpret other scientific findings. This will also allow them to apply that skill to other phenomena in the natural world. I have also learned that I need to be more intentional about the words I use when I have discussions with my students. Choosing appropriate alternatives to some commonly used phrases that misrepresent the nature of science can help students understand the importance of evidence and inference in science (Schwartz 2007). I think this will also

take some adjustment and practice in order to shift away from my typical lecture based classroom to a student centered, project based, learning environment.

The General Principles for K-12 Engineering Education lays out several ways in which the field of engineering can be incorporated into various other disciplines. I believe science content overlaps greatly with engineering principles. Scientific inquiry in my classroom can be supported by allowing students to engineer solutions to real world issues. They can look at various issues and see how scientists have to have an understanding of engineering in order to come up with solutions to make our lives better. Students can also see how engineers have come up with tools and technology to help us collect and record data. Being able to portray the importance of engineers in the data collection process of science is important when incorporating these concepts into the unit. I think it's imperative for students to know that many of these fields overlap and help each other through the inquiry process.

A third engineering principle important in science education is to promote an engineering state of mind. According to Katehi et al. (2009) this includes the following: systems thinking, creativity, optimism, collaboration, communication, and attention to ethical considerations. These are all extremely important in the modern science classroom as students need to be able to work together to solve problems creatively and efficiently. Scientists must also make ethical decisions as they work through the inquiry process.

Teaching students about the Nature of Science in the modern classroom will be extremely important in the future. Students are entering into a society full of readily available information and they must have the skills necessary to discern and interpret scientific information from pseudo science. It is the responsibility of science teachers to utilize resources such as NGSS to help meet this responsibility.

References

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