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Methods of STEM

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Nature of STEM

Sifting through all the facets of the Nature of STEM (NOSTEM) you cannot fail to notice that all the parts overlap from time to time. As a High School Science Teacher that has multiple preps it was not hard to pinpoint the primary focus for my track, the Nature of Science (NOS). As for the enhancement for NOS it makes it difficult to decide. When teaching Chemistry and Physical Science the natural inclination is to reach for the Nature of Math (NOM). When teaching Earth Space Science and Environmental Science a teacher can see the good of enhancing their curriculum with the Nature of Technology (NOT). For time purposes we will dive into the NOT when choosing to enhance the Nature of Science.

The Nature of Science (NOS) is where I spend my time. The primary goal for the NOS is to help cultivate a scientific literate person. To accomplish this NGSS states that through rationale and research educators and guide students to be scientifically literate. A major emphasis in NOS to be able to tell the difference between a hypothesis, inference, model, theory, and claim (NSF, 2007). NOS is broken down into two major categories practices and crosscutting concepts. Each category, respectfully, has four parts. Practice focuses on investigation and empirical knowledge. The students should be open to revision considering new evidence.

In the beginning of the year my curriculum goes into our worldview. I am currently teaching at a Christian school. So, the emphasis on our worldview and science is always touched in the beginning. I always date a certain question. Is the earth a sphere or flat? Obviously, most students answer sphere. I do have about one or two students in every class that will state flat- even Christians have their odd debates. This is where the fun investigations begin. I asked them to begin to investigate their beliefs. Why do they think the world is round? Why do they think the world is flat? This opens the door to the practice of science. They must seek knowledge and they need to be open to new evidence.

As we begin to dive deeper into the question and into the nature of science, we hit the cross-cutting concepts throughout the year. What are the ways we know what we know? We start questioning the human endeavors. Did someone really fly to the moon? We address questions about the natural world and how it was created. We discuss the cyclical nature of the world and nature. Needless to say, the students always debate this question throughout the year. The staff members get annoyed at times, but it is important for the students to ask questions and seek answers. The students begin to ask them questions and ask their views. Trust me even the staff members have begun to question. But that is the beauty of science. Reflection is important. It is the accumulation of science knowledge.

Enhancing the Nature of Science

Erin E. Peters-Burton states that the nature of engineering and the nature of technology tend to be about shaping the world, and the nature of science and the nature of math tend to be about discovering the secrets of an already established natural world (Burton, Unknown). since the primary focus is the nature of science it's only natural to pull in the nature of technology to enhance science.

As the students discover the secrets of science in the world. It's only natural to want to help it. Technology activity is purposeful and directed toward specific goals and sometimes the results are unintended (NSF,2007). During my environmental science class we studied coral. This was a natural place for us to study because we do live in Florida. Most of the students that take this course are very familiar with our environment. When they began to study coral and the importance of those ecosystems, not only to our oceans, but for our environment they saw the slow destruction and the depletion as something that was endangered and in need of help.

Technology is moving fast. They began to develop higher order thinking skills as a began to question ways to investigate the temperature of the water. As the water begins to get warmer the quarrel begins to die. They began to be even more interested in our field trip to the sea turtle preserve so they could ask questions on the coral. Even though they did not come up with an invention or a way to help the coral. Did not mean that the intentions were not there- if the fires were stoked. This is where the nature of stem really makes a difference. I was missing a facet. The nature of engineering.

How We Can Overlap to Make A Difference

As I continue to reflect on that lesson of coral. I do realize I was missing something. I had multiple students that were really concerned for the coral and the environment. After this project-based learning unit I could have push them into a career that was meaningful or a passion. Instead of stoking the fire I let it sit.

The nature of engineering would've been a nice fit. Yes, technology is always goal oriented and spurred on by a need or a curiosity. NOT and NOE is the study of humans influencing the world. They could've influence the world for better. When integrating stem, educators will have more opportunities to truly integrate the subjects, and educational researchers will have more opportunities to conduct investigations (Burton, Unknown). Having a NOS, NOT, and NOE would've completed the lesson on coral reefs.

When adding the engineer facet of the nature of stem we could have tied and mathematic concepts, skills, and habits of mind through an engineering design approach (Kateri, 2009). We would have been able to tie in other subjects For our data analysis of temperature of water.

The Christian school that I work at is in an urban area. We have a diverse student body. There is a lack of diversity in STEM careers. Being that the students were very interested in what was being taught I would have opened the doors to students from these underrepresented groups. Helping them realize that they too can get into a career that is just not the usual doctors, nurses and teachers.

Conclusion

The integration of STEM is important. When we cross cut concepts throughout the year the students benefit. It is pretty simple to include all of them because they all stem from the same tree. It just takes time and reflection to build our lessons.

References

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