

## Why STEM?

Breaking it down as a chemist, STEM is as fundamental to education as the atom is to animateness. The purview of interactions becomes a study in not only chemistry, biology, earth science, physics, and mathematics, but life itself. The emphasis on STEM teaching provides methodology for inquiry that benefits students in all areas of disquisition. Whether we are curious about English, history, art, foreign languages, or, of course, the sciences and mathematics, STEM teaching requires students to be actively engaged in their discourse.

Coming from a background in chemistry, I have discovered the challenge lies within each individual as well as our reciprocal actions. STEM emphasis equips us with the framework for careful inspection, analysis, and conceptualization. While chemistry is a challenging subject to teach, it affords students the schema for exploration of their world.

We use chemistry everyday even when we are unaware of these interactions. Teaching with a STEM mindset allows us to foment that genius all people carry for acquiring new knowledge. Chemistry could be considered a gateway course necessary to enter many fields of investigation. Therefore, it is so important for students to grasp the basic concepts of chemistry before continuing their studies in diverse fields of inquiry.

Branching out through the study of chemistry, I find the Science Olympiad competition has made me aware of the importance of the interconnected applications of science, technology, engineering, and mathematics. When students compete in Science Olympiad trials, they are challenged to use all of their skills to solve problems, just as STEM education suggests. The competition requires students to go beyond the classroom, explore engineering, and succeed in real problem solving. In other words, the applications are integral to how we live not just content to master for testing. Students who compete in these events are those who have learned experimental design and have become real scientists, examiners of the world in which they inhabit.

STEM education demands an active approach to learning, hence the demonstration as a means of inquiry. Mixing chemicals and seeing the interactions between them in chemistry is exciting for students and offers a visual component to schooling. Teaching chemistry keeps me “in shape” in that I am constantly in the laboratory, experimenting alongside my students. In fact, as well as in theory, we are all students.

Research is a key component of my STEM and chemistry classroom. My students are encouraged to research and submit their work for publication, sharing acquired knowledge in the program era of learning communities. To foster this style of learning, I guide my students to compete in regional science fairs. Many of my students have gone on to win competitions and advance to higher level competitions because one success builds upon the next. Last year, one of my students was invited to Stockholm, Sweden in order to compete in the international competition for the Stockholm Junior Water Prize. In this STEM process of learning together, we now have a greater appreciation for clean

water and have been able to bring this understanding of water chemistry to those around us.

STEM is about learning to approach problems with a blend of instinctual confidence and careful deliberation. It is a misnomer that we designate STEM as science and mathematics based. Perhaps it is easiest to enact the STEM approach in a science class, but the STEM approach can and should take place everywhere – in and outside of the classroom of any subject. Whether it is diluting a solution to a specific concentration in a chemistry laboratory, deciding how textual sources contribute to the thesis of an English essay, or figuring out how to match tones in a landscape painting, STEM is an effective way to resolve daunting tasks. STEM is much more than a four-letter acronym for Science, Technology, Engineering, and Mathematics: it is the foundation for learning how to live a successful life in any discipline. This is why I advocate for STEM.