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Motivating Students with Forensics / Professional Development Challenges

A Success in Science Education: Using Forensic Science to Motivate Students

"When will I ever need to know this?" Is there a science teacher anywhere on the planet that has not heard this delightful query from a student? And yet there is a valid point to be taken from the question and I submit that as a science teacher, or any other educator, if you cannot articulate a practical answer then perhaps the curriculum you are "covering" needs to be revisited.

The testing data clearly shows a drop off at the secondary level in student performance in both science and mathematics. And yet our high schools look the same as they did fifty years ago and course offerings hold fast to the college preparatory menu. Despite Einstein's famous statement, "Insanity is doing the same thing over and expecting a different result," high school science offerings continue down the same path: physical science, biology, chemistry and physics.

Fortunately I found administrative support about 8 years ago when I had, what was then, the unconventional idea of initiating a forensic science program at Somers High School. Indeed not all students will become the next Dr. Henry Lee, but very likely all will be called on to evaluate the probative value of physical evidence that will seal some citizen's fate within a courtroom setting. What better service to the community than to produce scientifically literate jurors?

Many secondary students have identified themselves as "good in science and math" or "bad in science or math" by the time they land in middle school. They come to high school with a firm belief that certain courses are not for them and in "opting out" of traditional courses such as chemistry and physics never gain a deep understanding of how the natural world works. But given a context of an authentic situation, be it a car accident reconstruction or a paternity case, the students' pre-conceived notions that a particular concept, protocol or problem is College Physics or AP Bio are abandoned. It never occurs to them that they are doing work that is "too difficult" for them. Labels disappear as interest motivates the students to learn the science content necessary to answer the question at hand.

Given an interesting setting in which to use science and mathematics students of all "ability" levels dig in to find possible solutions. As students offer explanations for the sequence of events, they then formulated questions and investigations to prove or disprove their theory. Students soon realize there is more than one path to take in the resolution any query.

Over the course of seven years of teaching forensic science I have seen students change their post-secondary plans to pursue studies in molecular biology, chemistry, engineering and fire science. Several students who planned on pursuing careers in criminal justice suddenly realized the valuable role science plays in the jurisprudence system. Other students who were staunch anti-science folks were the biggest fans of the course. "It isn't like other science classes-it's interesting. There is a real purpose to what we are doing," reports one student who previously claimed he loathed science. I watched seniors who struggled through biology three times flourish in forensic science class.

The context of forensic science allows each student to advance his or her understanding of the role of science in "the real world." I believe the reason course was and continues to be a success in science education is the simple fact that each student takes with them a positive, interesting experience working as a scientist within the classroom. All student successes centered on the realization that science is dynamic and exciting discipline and not a daunting, unattainable volume of knowledge for the intellectually superior. As secondary schools around the country look to the future and consider high school reform I am certain the courses similar to this one will receive the attention they deserve.

A Vexation in Science Education: What kind of professional development experiences for K-12 science teachers will ensure sustainable, effective science instruction?

Grant monies continually pour into professional development programs to enhance content knowledge and update teacher pedagogy for science educators. And yet the work done in summer institutes, seminars or course work is often ineffectual in changing instructional practice. Student test scores and enrollment in post-secondary science study continue to decline. Without timely "at the elbow support" teacher behavior/practice slips back into old, comfortable and often less effective habits.

The challenge is to create a professional development model will provide ongoing professional development in science centered on issues specific the areas of content, pedagogy and student work. This fall a small pilot

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professional development program for 20 science teachers will be sponsored by the Connecticut State Department of Education. Teams of grade 9-10 teachers will meet monthly to look at student work, share best practices and develop lessons. The group will have urban, suburban and rural schools represented with no more than 20 teachers participating. My vexation centers on how to most effectively structure the professional development sessions to improve teaching and learning.

The problem of providing effective professional development for secondary science teachers is complicated by the composition of the teaching population in need of professional development. Many new science teachers are entering the field as a second career after working in research, engineering or business. Content mastery is not an issue for the vast majority of these candidates and yet pedagogy is a major stumbling block. Fast track certification programs may not meet the needs of this population. Unless ongoing professional development and support is available retention of this teacher subgroup may be disappointing. And the new teacher who may be assigned a mentor still may not have a supportive collaborative teaching environment.

The most challenging group in need of professional development is the veteran teacher who shuts the door, refuses to change/update content or pedagogy and believes he or she doesn't need any professional development. This group often is not taking advantages of local professional development opportunities. Administrators can only reach that teacher population within the confines of the school day, yet another stumbling block in delivering professional development.

- How can a small professional learning community comprised of teacher teams across Educational Reference Groups (ERGs) move the practice of science teaching forward?
- Can regular professional conversations about standards, inquiry and student work improve teaching and student learning?
- What is the optimum frequency of these professional development sessions?
- Can a small professional learning community address the wide range of professional development needs?
- What professional development issues are most pressing and should be addressed first?
- Will this effort create more building level leaders in the science content area?
- And lastly, how can the impact of this model be measured?