



In My Opinion

Increasing Physics Enrollment in Your School

by Earl Barrett, eBarrett9@cox.net

Forty-one years of teaching nearly every science course offered in high school has given me a pretty good perspective on science teaching. All physics teachers who are practicing a teaching style that actively engages students know that they teach a course of great value to young people. Active engagement techniques used in teaching physics allow the student the intellectual freedom to be an integral part of the learning experience—from planning a laboratory experiment to finding answers to questions, to collecting and analyzing the data, to formulating precise written language and mathematical expressions that describe the results. Working in small lab groups allows students to develop team-building and work-related skills. Confronting students with novel situations provides the opportunity to apply the newly learned principle, so depth of understanding can be measured in a meaningful way. Counselors, administrators, and fellow staff should be invited to be project judges whenever possible.

So why aren't all students taking physics? Why are most schools built with only one physics classroom? There are many reasons that have little to do with the quality of the physics instruction.

High school students, with the help of their parents, make their class

selections each spring, or as part of a total four-year plan. There are many motivational factors that influence the decision to enroll in physics. In my experience, those students who take physics fall into two distinct groups: high achievers taking AP or advanced courses and the college-bound all-American average student.

For parents of high-achieving students, the selection is often directed by the potential to earn high grades as well as the credit the student can earn from the course. They know that high GPA and AP credits are important for getting into institutions of higher education. If an A is not probable, or if no weighted grade is available, the course has less of a chance of being selected by this group of students. This group is also influenced by the past history of their peers and their perceptions of status. If the class has a good past reputation and most of the “best students” are signing up, the class stays on the must-have list. Status can be improved by having a highly knowledgeable instructor, a track record of success, and, most importantly, the recommendation of the “best students” to their younger peers. If high school instructors want to grow their advanced course, they must keep it relevant, enjoyable, and make it possible for students to earn a good grade with sufficient effort. The

course can be rigorous, but it must be reasonable and fair.

The second group, the all-American college-bound average students, is the real growth group. They don't want easy courses. They want a relevant, enjoyable experience where good grades and usable future technological skills are attainable. Recruiting these students can become a dogfight with fellow teachers if you don't work on developing a big picture of what is best for kids in the department. This is where the support of the department chair and the district curriculum director is also important, so make sure they realize the role physics plays in the development of understanding science and why encouraging students to take physics will strengthen all areas of science instruction.

The following ideas are the steps I would suggest to reverse the present mindset and make physics the core of a science curriculum that will adequately equip our students to compete with the rest of the world.

Step one in the process is being prepared to share physics instruction with another colleague. Is there someone else in the department who can be encouraged to teach physics with the active engagement philosophy? Do you know someone in another school or department who would be

a like-minded colleague? With the support of these colleagues, approach the principal to share your vision and bring evidence of the benefits of an expanded physics enrollment. Point out the positive impact physics can have on school standard test results. Emphasize the impact physics can have on the development of critical thinking and reasoning skills, essential 21st-century skills. Try to get a commitment for a second physics lab down the road and propose sharing lab space with a second physics teacher. I shared lab space for two years before we were able to create another physics lab, and in the end it was worth it.

Physics teachers must also sell their class to the teachers of the “lead-in” classes (usually chemistry). A culture of success in science must be created. From day one, our chemistry instructors at Dobson would talk about the values of physics to a strong science foundation. They also encouraged students to think about taking two science classes at the same time, so they didn’t have to choose between AP Biology and Physics. The whole department needs to take pride in the expansion of physics as a win for all science students.

It is also imperative that each teacher take the time to meet with the

counselors to discuss with them the benefits of taking physics. My experience is that counselors may convey their own personal fear of physics to students, or provide guidance based on the mistaken belief that students must be great in advanced math to achieve success. I have even found some gender bias, but at Dobson High we prevailed. Fifty-five percent of all physics students were female. Counselors must be able to convey to each student the benefits of taking physics as well as share anecdotal evidence of how the course has helped former students in college. This one-on-one time with counselors is vital for recruitment for all levels of physics. Counselors need to know why knowledge of physics is as important for a future biology major as is a course in human anatomy.

And now for the secret I have been holding back. The number one reason kids take physics in high school is the special things you do, things that emphasize the application and relevance of the principles they are studying, things that put the “pfun” in physics. These things are incredibly time-consuming but ultimately personally rewarding for you and the students. Believe it or not, years later I would meet former students who would tell me they took physics

because of the yearly trip to Six Flags Magic Mountain amusement park, where they would apply their physics skills to the rides that were used for discussion back in class. In the case of my advanced classes, I required four projects as part of the curriculum. I am amazed that they never talked about their wonderful whiteboard experience or the classroom investigation they did—they would talk about *their* PROJECT.

For example, one year I had students in every advanced class spend their own time observing a special needs class. As a small group they interviewed one student and tried to find a problem the student was experiencing. In one case it was an inability to open a can of pop without help. I taught the “Dartmouth Problem Solving Loop” as part of the physics curriculum, and the physics students used the loop to plan and build a pop opener the student could use independently. All of this was done outside of normal class time. The unexpected return was a lasting friendship between the group and the special needs student for the rest of the year.

For me, more students taking and having success in physics is the most important change our schools can make to improve science literacy.