Thoughts on My Experiences with *PSSC Physics*

by Robert Stair

My first exposure to *PSSC Physics* was in name only. In 1967 I attended an NSF-sponsored "Space Science" program offered by the University of Bridgeport for high school students during the summer between their junior and senior years. With the typical hubris of high school students of the time, my fellow attendees and I began comparing our schools to see whose school was "the best." Several of us, thinking we might be interested in studying physics, had tried to learn a bit more about the textbooks and curriculum that we would be facing in the upcoming year. Some had spoken with teachers, some had spoken with older students, and some had checked out a book for the summer in order to get a head start on their studies. One person pointed out that at his school, students were actually constructing some of the lab equipment before performing physics experiments and that sometimes they had to figure out the lab procedures themselves. When I asked what book his school used, the reply was "*PSSC*."

At the time I had no idea what the acronym stood for, let alone anything about educational pedagogy. The idea of students playing a part in the preparation for a lab, rather than having it handed to them with a set of step-by-step instructions, was so far from anything I had experienced up to that time that there was very little that I could contribute to the discussion. The physics book that I had examined in preparation for my senior year was a typical science book of the time. It consisted of chapters that covered isolated topics, and it did not contain any labs. Labs, if any, were to be provided separately by the teacher.

Following high school, I attended Case Western Reserve University. My alma mater is widely recognized for the quality of education that it provides. The mere mention of its name has opened doors for me that might not have otherwise opened. But in the late 60's and early 70's, it is a fact that physics education at CWRU was very traditional. Whether as a result of this traditional approach or whether it had to do with my own rate of mental maturation, I graduated with a fairly good background in isolated physics topics, but little understanding of how all of this knowledge fit together. Years later, it would be *PSSC* that would bring together all of the things I had learned as a physics major and allow me to integrate my knowledge into a coherent "world view." In this sense, my experience with *PSSC* is not unique. In subsequent years, many teachers have told me that they actually learned much of their physics from *PSSC*.

My next contact with *PSSC* did not come for many years. Instead, I taught junior high physical science using *Introductory Physical Science* (*IPS*) – unaware of the author team overlap between *IPS* and *PSSC*, but realizing that this was the kind of curriculum that had been discussed at Bridgeport. Then, after transferring to a high school, I was asked to teach the second semester of *PSSC*. Doing so without having ever taught the first semester and without having ever taken a *PSSC* workshop was a real eye opener! (I had taught *Modern Physics* while obtaining my teaching certificate.) With *PSSC*, for the first time, I was confronted with a curriculum that was not a series of isolated topics. Incredibly, it had a developmental sequence that modeled the processes of real science by using labs to justify what was written in the text! Never having attended a *PSSC*

workshop, this "storyline" took me a few years to fully appreciate and utilize. I made many mistakes along the way, supplementing with drill-and-kill worksheets and other assignments that really did little to advance the storyline. Let's just say that the students I had during those first years were very kind!

In the late 1980's, I met Dr. Uri Haber-Schaim for the first time when he was visiting Colorado and meeting with area physics teachers. Soon after that, I attended the *PSSC* workshop at Colorado School of Mines. This workshop both increased my understanding of the *PSSC* program and my understanding of physics.

A couple of years later, I was invited to participate as a pilot teacher for the Seventh Edition of *PSSC*. I immediately agreed, but had no idea what I was getting into! Every sentence, every lab, every question was to be tested with students to make sure that it did what it was intended to do in furthering students' understandings of physics. Pilot teachers from across the country submitted weekly summaries of the work they had done with their students, the problems they had encountered, test results, samples of students' work, the amount of time spent on each section and each chapter, which questions were assigned to students, and possible wording changes for those questions and for the text. Only after all of this extensive feedback was analyzed and numerous changes were made was the Seventh Edition published.

As the pilot program progressed, I realized that it was one of the many things that set *PSSC* apart from contemporary programs. The authors had recognized that no matter how clearly one might think a passage is written, there is no way to truly know how it will be interpreted by adolescent minds (or by the minds of teachers!) until it is tested in real classrooms. No amount of reading and reviewing by scholars and editors can substitute for actually having students read and do the labs – and then making the appropriate revisions. This is why *PSSC* labs actually worked! It is also why even though the Seventh and final edition of *PSSC* was published in 1992, it is not uncommon, even today, to hear a new lab experiment compared to the *PSSC* "Collisions in Two Dimensions" lab, a newly designed piece of equipment compared to the *PSSC* ripple tank, or a new film compared to *PSSC* films such as "Frames of Reference."

In the mid-90's, I had the opportunity to work very briefly with Uri Haber-Schaim as he was putting together a chapter on sound for the Fifth edition Italian version of *PSSC*. In that brief exposure, it was obvious that the attention to detail, to storyline, to speaking from real data, and to the accuracy of the material being treated had not changed from the work begun by the original *PSSC* group in 1956. And above all, it was obvious that the commitment to teachers and students had not changed from that expressed in an October 19-20, 1962 memo titled "Some Topics for Discussion by the Planning Committee." In a section of that memo called "Future Edition of the *PSSC* Material," it was suggested among other things that "changes will be limited to sticky parts" and that new problems "will be tested this year and next in the schools."

Most recently, I had the extraordinary opportunity to observe and participate in a much scaled-down version (without NSF funding!) of the process that led to the development of *PSSC*. Beginning in January of 2000 and lasting for the next two and a half years, I worked with Uri Haber-Schaim, Reed Cutting, Graden Kirksey, and Harold Pratt to produce a middle school textbook – *Force, Motion, and Energy* (*FM&E*). I learned very

quickly that beginning the development of a high-quality science textbook has very little to do with writing. Instead, as was the case with the development of *PSSC*, the initial emphases are on the end goal and the testing of student laboratory experiments. What is the big idea that students will work toward and know by the time they complete this text? What labs will students perform to justify and achieve that goal? What labs are too dangerous, too expensive, or too time-consuming for students to perform, and would be better treated by real data presented for analysis in the text? And, perhaps most important of all, how do these labs and text analyses fit into a coherent storyline (rather than isolated units) that will move students toward the final goal?

As can be seen by this example, even though it is no longer published, *PSSC* is always in the background providing a meter stick by which all physics curriculum development efforts are measured. The heyday of *PSSC* lasted decades. It was coming to an end just as the current emphasis on standards was coming into its ascendancy. But in physics, it was and is the standard by which all programs are judged.