



## **Reminiscences: PSSC Experiences Revisited**

*by Edwin L. Goldwasser*

It is always a mixed pleasure for me to be asked to describe my role in some activity that took place more than a decade ago. On the one hand I enjoy the nostalgia that accompanies any such venture. On the other hand it is only then that I realize that my reconstruction of events would have been far easier and infinitely more reliable had the request been made when I still had a functional memory. In any case, the request has been made, and I've decided that my memory of those events is more to the point than would be a research project to ferret out what officially recorded facts might be found.

As my memory has it, the time was somewhere during the fall of 1956. Professor F. Wheeler Loomis, Head of the University of Illinois Physics Department, was approached by Professor Jerrold R. Zacharias, chairman of a newly formed Steering Committee of a Physical Sciences Study Committee (PSSC) that had been established at MIT. That Steering Committee had a membership of about twenty distinguished physics teachers, active researchers and a number of highly placed university and government administrators. Loomis and Zacharias had worked together at the "Rad Lab" at MIT during World War II and had developed a close, working relationship. It was certainly that relationship that led Zacharias to approach Loomis with a suggestion that the latter might explore with his faculty the possibility of collaboration between Illinois and MIT in pursuing the ambitious goal that had been embraced by his PSSC Steering Committee.

That goal was the creation of a new high school physics course that would represent a no-holds-barred alternative to the then-current high school course. Loomis himself had always had a strong commitment to strengthening the quality of the teaching of physics at the college level, and he felt that the numbers and the quality of students enrolled in college physics courses could be significantly increased and enhanced by improving the quality of high school physics courses and teaching. In responding to Zacharias, Loomis agreed to serve as chairman of a cooperating Illinois group if there were sufficient interest in forming one. His own enthusiasm was contagious.

Initially about a half a dozen individuals expressed an interest in attending a December planning meeting at MIT in order to get a better feel for the direction in which the project was moving and to get some idea about how an Illinois contingent might fit in. Our interest in pursuing the matter further was motivated largely by a deep dissatisfaction with the quality of high school physics courses (textbooks, in particular) of that day. (As I remember it, our "bête noire" in that era was a widely used text book in which the frontispiece was a picture of a steam shovel --- misguidingly suggesting that that was an informative characterization of the discipline of physics.) In those days there was a general belief (justified by reality in many cases) that the teaching of physics in high schools was relegated to the care of any available staff member -- often, if not usually, to the coach of a football, basketball or baseball team.

Following the December meeting a few of us agreed to spend the summer at MIT to participate in more detailed discussions about the project in general and also in some more sharply focused discussion of possible roles for an Illinois group. By the end of the summer meeting it was agreed by all that a multi-pronged approach would be required to



accomplish the major changes that were felt to be necessary to bring the teaching of physics more closely in touch with the reality of the status and the ongoing progress of that discipline. To realize this kind of improvement it was decided to give up the standard packaging and ordering of the various parts of standard physics curricula and to start the course with a more fundamental look at space, time and measurement. Not till the third of five parts of the new course does the text address Newtonian mechanics.

The multi-pronged approach was envisioned to include, first and foremost, a new textbook, and work on such a book was already well advanced at MIT. In addition to the new book (which would define a dramatically new approach to the teaching of physics in high school) there would also have to be invented a set of new, inexpensive classroom demonstrations, new laboratory experiments and it was decided that a set of movies should be made to be stand-ins for demonstrations or experiments too difficult or too expensive for the average high school. Those movies were to feature currently active physicists as principal protagonists. Somewhat independently an effort was to be made to enlist the help of a number of distinguished physicists to contribute to a series of small, paperback books presenting their picture of their specialty or of their favorite giant in the history of physics. (One of my favorites was a biography of Galileo, authored jointly by Laura Fermi, a one-time physics teacher herself, and Gilberto Bernardini, an active worker in the field of elementary particle physics.) Finally, Zacharias realized that with adoption of the new course there would likely be a disconnect between that course and the then standard College Board Examinations. He initiated conversations with the authors of those exams to arrange for a different examination to be created for students who had been taught physics the PSSC way.

As for the Illinois group, we decided that major participation in continuing work on the text would be difficult at a distance of 1,000 miles from the principal authors at MIT. Rather we felt that our group, to work efficiently, should have a large measure of autonomy so that our work could proceed as an almost independent entity. We asked for and were assigned the creation of a Teacher's Guide that would introduce a teacher to the philosophy of the course and that would attempt to give help to a neophyte teaching the course for the first time. Homework problems that were devised at MIT were sent to Illinois where solutions were worked out and imbedded in the Teacher's Guide. Wheeler Loomis chaired the start of that effort during 1957 - 1958.

I happened to have had a previous commitment to spend that year in Italy on sabbatical leave. When I returned to Urbana, I was taken by surprise when Loomis asked me to take over the chairmanship of the Illinois group. The group consisted of people who had very strong ideas of how the course material should be presented. They were independent-minded and liked to work independently. Various chapters of the text were assigned to individual members of the group, and they produced drafts of what they thought was needed by a neophyte teacher. I received all those drafts and tried to edit them into a certain degree of uniformity. My rewrite of each chapter was then passed back to all members of the group for comments, corrections and new ideas. Those, in turn, were passed back to me, and I forwarded them to MIT for their consideration and comment. There was a continual traffic of materials --- text book chapters from them to us and Teacher's Guide chapters from us to them. Those exchanges gradually led to a meeting of the minds and to the preparation of two independent books.



Even before the first editions were published, drafts were used at a number of schools where there were "master teachers" who had been actively involved in the production of the materials and who were ready to take the plunge of teaching the new course. At Illinois we were fortunate in finding a mathematician whose home was in our College of Education, but who himself had, on the one hand, some background in physics while, on the other, he had experience in the creation of a ground-breaking new math course, "The New Math", that had been developed at Illinois several years earlier. He taught the embryonic PSSC physics course at our University High School. One or another member of our group attended each of his classes at "Uni". We and he fed his experiences, reactions, comments and advice to the group at MIT. Our group was also fortunate in having, as a colleague, Gilbert Findley, another member of our College of Education and previously a teacher of high school physics. He served as an adviser and editor of our work while also serving as a liaison between the PSSC and teachers trying out the PSSC materials.

With the "completion" of the Teacher's Guide" I felt that the work of our group had reached a natural end. Improving, editing and updating had to be a continuing process, and a new corporation, Educational Services Inc. had been created at MIT to take over those functions. I ended my own involvement in the project.

Shortly afterwards I was unexpectedly called back for one final, fascinating venture. A group of faculty members at Makerere University in Uganda had learned of the PSSC program and had asked that they be given the PSSC materials and the training necessary to introduce the new course to schools in Uganda. Zacharias decided that it would not be wise to use PSSC materials in a setting in which previous courses were not bringing students up to a level of preparation adequate to enable them to handle the PSSC materials. I was asked to go to Uganda, to visit a cross section of schools and to advise him whether or not such an experiment had a good chance of succeeding. That I did, and it is a whole story of its own. I was joined in Uganda by Francis Friedman, the principal author of the PSSC textbook. All I can report now is that I did not feel that the average school in Uganda prepared students adequately for use of the PSSC course. I believe that the requested help was not immediately offered, but I also believe that several years later that decision was reversed.

I soon became deeply engaged in my own research in experimental elementary particle physics and lost direct communication with the PSSC project.