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Teaching a Science Seminar in the Teachers Institute

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Joining the efforts of the Teachers Institute was an easy decision. Even on reflection, after working in the Institute, my reasons seem sound and my expectations reasonable.

I was curious about high school teachers and about the teaching profession. I knew the public image of teaching was one of a profession in disarray. There is a lack of budgetary support from taxpayers. Newspaper and journal articles report teacher burn-out, declining scores of American youth on standardized tests, low aptitude scores of those entering teacher education programs in our colleges, and a flight of teachers, especially in math and science, from classroom to industry. Calls for new approaches to teacher certification or recertification and new programs for continuing education (staff development) also abound. Perhaps the Teachers Institute would be one of the better vehicles to improve this situation, I thought.

There were other reasons. I knew I had a very personal stake in the quality of public education; I had several children partaking therefrom. I had already had my share of "lectureships" in elementary school rooms; the Institute provided me a new teaching experience, one that would have let me know more about the high school student and classroom. I also believed in the efforts to increase service and participation of my university with the surrounding community to build town-gown ties.

There was one further reason that was explicit for me, a professional reason. I am a human biologist, a medical geneticist. I see daily the ignorance and prejudice of genetics knowledge extant in our populace. My colleagues and I have concluded that the education of the younger generation, starting in elementary school, will be the only practical means of overcoming this knowledge gap. I hoped the Institute might provide some help and experience in that direction.

In sum, there were several reasons to join the effort. I did so and have taught one seminar that examined human fetal development. There were some problems, but generally the seminar worked very well. I shall share

both the factors that seemed to make it work well and those problems or barriers to success that I witnessed.

There is major strength in the format of the seminar. Both the time-frame, about four months, and the group size, ten to twelve persons, foster solid accomplishment. The seminar came together with Fellows who had chosen the general theme. I further found it useful to allow refinement of the seminar topic during the first one or two meetings. The Fellows required an overall structure for the seminar but their input to its definition helped cement their commitment and the ultimate utility of their written units.

The seminar setting and the presumption of collegiality encouraged dialogue and participation right from the outset. The Fellows brought their knowledge of the classroom and pedagogical techniques and the seminar leader his knowledge of the subject matter and of how to organize the information. Without anyone holding a monopoly of skills there developed a comfortable feeling of each person helping every other person, including the instructor.

The requirement of a work product and the nature of that product are central to the Institute's design. This requirement forced progress by stages throughout the classes that were scheduled. Despite the anxiety felt by some Fellows, the curriculum units provided the goal and ultimate sense of pride and accomplishment that characterized the seminar. The units had immediate value. They were ready for the coming year's classrooms, and they could be shared with fellow teachers. Each Fellow in the Institute was working very directly on his or her own professional requirements and teaching plans.

For the Fellows a major value of participation was the meeting of peers. Teachers learned to know each other well through working cooperatively on a joint product. They also became comfortable using one another's work and with the concept of borrowing and sharing within and between school buildings. Too often, apparently, the schoolroom teacher feels isolation in his or her own classroom.

In addition to the concept of each other being a resource, the seminar also demonstrated to each of the Fellows the usefulness of many community facilities. These included the libraries and museums of the University, access to research scientists and their laboratories, and the existence of local industries that shared particular areas of interest. These resources provided invaluable aid for the development of curriculum units, especially of laboratory exercises, and they will continue to be used by the teachers.

Problems in leading a seminar were also recognized. Some of these must be common to any seminar, but others are perhaps more acute for

a seminar in one of the sciences. An example of the former was a wider disparity in the quality of curriculum units than I had expected; this resulted in some disjointedness in the overall product of the seminar. There were also different targets for the various units, and this detracted somewhat from a unified product. Some teachers taught mainly slow track students, others gifted students; some had captive, and thus too often bored, students; some taught in sixth and seventh grades and others in eleventh and twelfth. These differences provided the challenge to avoid too narrow a focus for any given unit; the challenge itself was worthwhile but not always successfully addressed.

The more difficult problems that I found while leading this seminar came because of the nature of science and because the subject matter was that of a very active science. The information gap between the Fellows and the seminar leader was great, and it was easy for him to appear as "too expert" and to overemphasize the role of lecturer. The Fellows would then be too much like students eager for facts that were entirely new to them. There is an information explosion in many of the sciences and teachers out of college a few years must be especially diligent to stay abreast of even one area. Many teachers are expected to teach more than one area of science today.

Resources are also difficult to supply to teachers in the currently active sciences. Textbooks are outdated and information is scattered in current journals. Experimental methods are restricted to modern, active research laboratories, and materials for classroom teaching too often remain two steps behind.

The development of useful laboratory demonstrations or exercises was only partially accomplished in our seminar and this provided considerable frustration. In a primary sense, science is characterized by experimental observation and inductive reasoning. These should be interwoven along with facts in science curricula so that students have experience with the scientific method, so important in a modern society. Laboratory exercises often are expensive, and monetary considerations cause further difficulties to curriculum design. Ingenuity and adequate time to develop experiments can surely improve this aspect of a science seminar, and explicit recognition of this need should be present from the outset.

The experience of teaching in the Institute brought many satisfactions to all of us in the seminar. Importantly, there were new friendships, new paths for trusting relationships to aid the teaching function, and pride in a cooperatively produced product. Better teaching would seem to be inevitable from the confluence of a better information base, shared and refined teaching techniques, increased confidence and motivation, and access to colleagues both at a university and within the school system.