Practical Thoughts for Training New Teachers

ALBERT TOWLE, San Francisco State College, San Francisco 94132

How can we promote in the science methods courses those attributes of good teaching? The author points out that college classes and high school classes have many common challenges. Perhaps there can be some sharing of common goals. The author is Professor of Biology and co-author of Modern Biology.

Although colleges and universities have minimum requirements for majors and minors in each subject area, these requirements are not inflexible, and students enrolling in methods courses have various backgrounds. Each graduate has a specific area of emphasis, areas of weaknesses, and an individual set of experiences which all have played a role in shaping his attitude toward science and toward teaching itself. Realizing these individual differences, a question I would like to pose is: "Should the methods courses attempt to standardize the future teachers to equip them to teach in a certain prescribed manner or from certain prescribed courses?"

I would like to propose that it would be better for the students of our public schools if we concentrate on taking advantage of the uniqueness of each personality and developing this toward generally acceptable standards recognized in good teaching. Much time has been spent, in the past, on defining a "good teacher," but, I believe, this is not as difficult as one might first assume.

From the student's point of view a good teacher is an understanding person who likes "kids," is fair, and makes his subject interesting. Thus, teaching is a very personal matter involving communication between the teacher and *each* student. Under this definition, a good story-teller might qualify as an excellent teacher. Pedagogically, then, we must add to the student's definition: A good teacher is well versed in the subject matter. Administratively (and practically), class control has to be efficiently maintained. These qualities, simply stated, can be considered desirable to be recognized and developed by the beginning teachers.

If we can agree to these attributes of a good teacher, how can we promote them in the education and methods courses? The sense of fairness is allied with the acceptance of each person as an individual. In order to do this, a teacher must recognize, and take into account, the social and cultural background, the ability level, interests, and previous educational experiences of students in the classroom. Background courses in sociology, educational and child psychology are, therefore, significant in the preparation of good teachers. Graduate seminars (associated with methods courses or student teaching) which center around specific and realistic cases may provide worthwhile experiences for future teachers. Some examples are:

1. Sally remains after class to talk to the teacher. She tells him that she is unable to do her homework because her mother is in the hospital and she must clean house, prepare dinner and take care of 3 younger children.
2. At a P.T.A. meeting Joe's father tells you that his boy is going to attend one of the top universities and that he had better get at least a "B" in your course. So far, Joe hasn't been very interested and you feel that he doesn't have the ability to do college work.
3. On an all day field trip Jim and Pete have been found smoking in a rest room. This is an infraction of the school's rules which would require suspension.

When considering the above anecdotes, it will become apparent that there is no one solution to any of them. There are many variable factors. What, then, is the value of such problems? Similar

problems for consideration have been discussed by Cruickshank (1966). They focus attention on the individual.

In today's world we are very conscious of subject matter. The journals are filled with good, well written articles on how to teach about DNA, how to teach about field biology, how to teach about evolution. These are good articles and worthy of consideration, but we need more articles on how to teach children. We need more understanding on the psychology of learning. We need more emphasis on the humanistic approach in spite of the rising teacher-pupil ratio.

Science, as a process, can be taught at any age level. The concepts and relating of science, however, must be modified to fit the understanding of the student. In discussing the qualities of a teacher, Ginsburg (1965) states: "he must have certain perceptive insights that permit him to relate to the needs of the students." The importance of considering the characteristics of the learner are also emphasized by Pella (1966).

A first-grader, for example, can be shown specimens of liverworts and mosses. He can learn to recognize them and even find them by going to damp, shady places. The sixth grader can talk about the *environment* of liverworts and mosses. He can also give some reasons why they may be found where they are. The eighth and ninth-grader will be able to study the life cycle of the liverworts and mosses, and he will be able to understand why they are considered to be primitive plants. Some elementary principles of photosynthesis also will be within his understanding. Later, however, when he is in high school and has some understanding of basic chemistry, he can begin to understand the energy transfer from the sun to the chemicals involved in photosynthesis. Liverworts and mosses may now be examined from an evolutionary point of view and greater complexities of the group can be considered. On the college or university level. the liverworts and mosses may be observed again in greater morphological, taxonomic, and biochemical detail.

At each maturity level of a student, then, the process of science can be used to increase the understanding of the individual. The elementary processes are those of observation by which comparisons and basic inferences can be made. If a high school sophomore has never seen a liverwort or a moss, the first process would be to observe them. Next, where do they live? But this is the first grade level! Correct, but observation is the first grade level of science, and it must not be omitted from presentation of any science course. Observation is the process that enables the teacher to bring the varying backgrounds of his students to a common starting point. This is also clearly stated by a position paper of NSTA (Decker, 1962). "Descriptive science or natural history, because it provides the basis for scientific inquiry and plays so prominent a role in a child's conventional experience;" is one of three aspects of the scientific enterprise that must be a part of the science curriculum.

The differences between public biology and private biology were clearly stated in a recent article (Alexenberg, 1967), and the value of private biology is obvious. Every biology teacher has had the experience of conducting a laboratory exercise on the fresh-water algae. What is the most frequent source of excitement? "Something is moving!" "What is it?" Other students migrate to the scene of activity to observe darting paramecia or a nematode threading its way among the filaments of stationary *Spirogyra*. Does the teacher tell the class to ignore the moving things and get busy with the study of algae? A farsighted teacher would have allowed time in the laboratory for the anticipated wonder and amazement of these interesting organisms. Here is an opportunity to utilize the spontaneous interest to bring in some concepts of ecology and behavior. But what if this "unexpected" exploration should last most of the period? What about your lesson plans for tomorrow's lecture on the morphology of chloroplasts? It can wait. Capitalize on this rare moment of unified interest, for these periods of excitement are not frequent.

Although all good teachers attempt to build exciting laboratory experiences into their courses, they are all subject matter oriented, teacher organized, and often too structured and dull for the students. I certainly don't mean to infer that a good teacher will have highly pitched and motivated students for 180 days of the school year. One of the most important things we can do for these high school students is to teach them self-discipline and a feeling of responsibility toward their individual education. This is not accomplished by reading books. It is done by way of reason, examples, and the ability to convey the significance of an inquiring attitude. Students are, then, more apt to realize the significance of public biology. A text or scientific article can convey facts, acceptable by today's scientists, but often the cooperative venture by which these "truths" have been derived are overlooked under the guise of expediency to "cover" a text

For stimulation of interest and appreciation of the beauty of nature, then, acceptable standardized curricula can be profitably enhanced by a teacher's special area of competence. The teacher who digresses from the text for two weeks to present a unit on the life cycle and relationships of the oak moth in the habitat may be doing much to create a desired attitude toward biology. Another teacher in the same school may have received an M. A. in botany, having investigated the effects of various herbicides on certain lawn weeds. One of his diversions from the standardized course should include investigations involving weeds. By presenting these uncommon areas, the teacher is able to talk freely about specialized areas of biology with

a familiarity that conveys personal biology to his students. The significance of "individualizing" a course can be clearly recognized when one has the exciting experience of spontaneous near total involvement of his class—demonstrated by informal talking and sharing of ideas and questions about biology. A situation of this nature may not frequently occur, but when it does the teacher and most students are afforded a glimpse that: teaching is enjoyable; learning can be fun; learning can be interesting; biology can be a continuing source of interest because it surrounds us. Beginning teachers should be alerted to the value of such personal experiences so they may analyze them carefully in attempts to create repeat performances. The recognized value of the teacher's personal experiences has been recently expressed by Payne (1967) when he said, "He should have an individuality all his own and without it he will never be a good teacher."

Now, there seems to be a contradiction. On one hand I am saying, "We should teach science by using the methods of science." On the other hand I am saying, "We should teach science by reading about the 'facts'." Some may interpret my remarks as, "Let the students and teachers go off on tangents." I believe all three are important. There must be a balance in various methods utilized in the teaching of science. The use of any method at the exclusion of others is a grave error. As Morris (1966) points out, there is value to memorization of "facts."

The balance may vary with the composition of individual classes, but all methods should be used. Ideally the teacher takes each individual student where he is and provides the opportunities to go as far as he can in his understanding of the subject area of the course. Practically, however, the increasing size of the classes in many of our public schools makes this task more difficult. Discussions, reading of the text, and lectures may be used to provide a nucleus of subject organization around which the labs can be developed. For the creative teacher the existing commercially produced laboratory manuals will serve as excellent sources of ideas around which student laboratory experiences may be developed.

It is easier, perhaps, for a teacher to regard "exposure" as teaching. The dilemma facing teachers with large classes composed of mainly verbal students is great. The problem of financing equipment is often a major one. The lower ability student would find more interest in "sciencing" rather than reading. He doesn't like to read. He doesn't know how to take care of equipment either! It, then, becomes the obligation of the teacher to show them the value of cooperation in caring for equipment, having empathy for living things, and the value of reading. It is not easy to find background material within the reading scope of these students, and they are often faced with the problem of being forced to examine meaningless pages of words too complex for their understanding. They may copy meaningless answers to questions from the text and not even know what they have written. We must seek material within the grasp of each student if we are going to be responsible for scientific literacy.

Before a teacher can be concerned with the problems of individual students, he must be well-versed in his subject. As any professor of science teaching methods knows, it is fallacious to assume that even the science majors have a firm enough understanding necessary to teach a year's high school science course without much review and updating his own background. The importance of continued learning is obvious (Peterson, 1966). This updating is not going to be accomplished by the methods course nor by review taking place the summer before the first teaching experience. The differences between knowing a subject to pass an examination and understanding a subject to provide valuable learning experiences for others are many. It often comes as a surprise to beginning teachers to realize that they are going to learn more than the students.

Through the science methods courses, a perspective teacher can learn how to approach an unfamiliar area. If it has been four years since his exposure to the liverworts and mosses, for example, his re-study of the topic with the prospects of actually teaching it, will give him new insights into methods of explanation, possible laboratory experiences, and types of leading questions for the high school students. In order to develop meaningful activities, the teacher should ask himself: "Why should this topic be covered in high school?" "What should the students remember about this topic?" "Is this topic within the understanding of the average student in my class?" "How does this relate to the entire field of biology?" Incorporation of such an analysis into the new teacher's thinking will start to give meaning to his teaching by bringing about an awareness of the maturity level and ability of the student.

Although the selection of texts and related reading is important, the way in which they are used is, perhaps, of greater significance to the students. The teacher who plans for individual differences, including attention span, interests and abilities, is going to present more meaningful content to the student. Certain concepts of molecular biology, for example, can be presented to students at many grade levels. A sixth grade teacher can proudly say, "I am teaching my pupils about the atomic theory and molecular biology." The students may memorize details and diagram DNA for an examination, but are they learning? Do they have enough background to relate, see the significance, and understand what is being presented? Chemical structures are "meaningless to chemically unsophisticated stu-

dents" (Ausubel, 1966). I believe *background material* can be understood by students in the sixth grade, however. They can observe effects of molecular "behavior." There are many good experiments on air, temperature, water, animal behavior, organismic variation, etc., that can involve and stimuate students at this grade level. This is how chemically sophisticated students are born!

Some of the most frequent comments from student teachers are: "They don't want to learn." "They can't read." "They don't know anything." These are comments involving the average high school students.

This reaction is usually not toward the student teachers. It is an attitudinal reaction toward content and methods all too often not meaningful to the students. Biologist and biology teachers have an advantage over other teachers which is frequently overlooked. That is, the subject itself is exciting and the self-motivation exists. We, as teachers need to realize and capitalize on it. The wonder and appreciation for life does not come from reading texts and answering questions at the ends of chapters. It comes, rather, from observing life itself; it comes from asking questions; it comes from farsighted, interested persons; it comes from inspiring examples.

The task of the teacher, then, is to direct the activities of students within an organized framework. In studying mollusks, for example, a discussion of the various classes and characteristics of each class may prove to be boring and meaningless. Many are marine and only the preserved remains may be observed. The students may find difficulty in framing good questions. They need reference points. If they were to be afforded the opportunity to observe a snail crawling in a garden, however, one might elicit many good questions. Since most teachers can't accompany their students in the early morning or evening hours when the snails are active, an assignment might be given for this activity. You will immediately think of many factors making this suggestion impractical. The next best thing is to bring terrestrial snails into the lab for observation. If the laboratory exercise is not too structured and detailed, the students will begin to ask and answer their own questions. They will, undoubtedly, think of having a "snail race." How fast do snails move? Will their speed be affected by any physical factors? If an entire laboratory period brings realization that temperature, humidity, surface, or food, might affect the activity of the snail, many avenues are opened for meaningful discussion. The opportunity for the activity, then, was provided by the teacher within the framework of the curriculum.

Class control is another attribute of a good teacher. It would be an error if you were left with the impression that I am naive enough to assume that a well-planned student activity would eliminate behavior problems. Student teachers can be given pointers to assist them in routine classroom procedures such as roll, starting class, collecting and passing out papers, and dismissing class. Attention to efficient methods of routine will help to set the tone of the class.

Cooperation, pride in one's work, and self-control are important goals of all the high school classes. Self satisfaction in learning and achieving are within the grasp of everyone. As we learn from our readings in child psychology, and as we can observe, the growing years are filled with anxieties and frustrations. A mature, understanding teacher can help the growing up process by patient talking to individuals and by accepting each student as a worthy person. This is not, by any means, an easy thing to do, and it adds to the complexities of teaching. How many times symptoms are treated rather than the basic causes of behavior! Class control, then, reflects the respect of the students and the teacher for one another. The manner in which class cooperation is achieved will vary with individual personalities.

It is anticipated that this discussion will cause reflections and thoughts involving the personal nature of teaching. It is further hoped that we all take a good, long look at what we are doing in our classes. Prescribed courses, standardized syllabi, or standardized methods do not make good teachers. Perhaps the most accurate evaluation of a teacher's competency is known only to the teacher himself and realized by his students many years later.

■ REFERENCES CITED

Alexenberg, Melvin L. 1967. Biology education in the elementary school: the first task and central purpose. The American Biology Teacher 29(3):175-179.

Ausubel, David P. 1966. An evaluation of the BSCS approach to high school biology. The American Biology Teacher 28 (3):176-186.

Cruickshank, Donald R. 1966. Simulation, new direction in teacher preparation. Phi Delta Kappan 48 (1):23-24.

Decker, Donald G. 1962. The NSTA position on curriculum development in science. The Science Teacher 29(12).

Ginsburg, Benson E. 1965. Preparing the modern biology teacher. BioScience 15(12):769-772.

Morris, Daniel Luzon. 1966. The "New Science" in high school—an objection. The Science Teacher 33(11):80-83.

Payne, Fernandus. 1967. Thoughts on the training of teachers. The American Biology Teacher. 29(1):49-52.

Pella, Milton O. 1966. Concept learning in science. The Science Teacher 33(12):31-34.

Peterson, Glen E. 1966. Some observations on biology teachers and teaching. The American Biology Teacher 28(3): 173-175.