TRAINING BIOLOGY TEACHERS AT UWEC

We hear a great deal these days about the Crisis in Science Education. Headlines in newspapers, articles in science and education publications, and lead articles in Time and Newsweek all proclaim this great problem to our nation's population.

With the problem so stated, the next move in the scientific process is to form hypotheses as to how the problem might be solved and then to begin experimentation to test those hypotheses.

Fortunately or unfortunately, the scientific process is rarely used by politicians, educators, and/or others when attacking such a vast problem as this. Tests show that kids are not being educated as well as in the past (based on lower ACT and/or SAT scores) and the Russians have kept people in space longer than the U.S. has, thus something must be done to alleviate this "Crisis in Science Education". What should be done? Family situations have been blamed, kids need the backing and urging of their parents if they are to get the most from their education. Teachers cannot adequately work with students who are not in the correct mind set for learning. Longer school years and longer school days have been suggested. These ideas have met with much consternation and opposition from both parents and teachers, to say nothing of the thoughts of the kids! Pour more money ($) into our schools and into programs which might help teachers to do a better job; money solves all problems! Raise the pay ($) of High School teachers and they will all automatically and immediately do a better job of educating our kids. Money still solves all problems! And many more ideas have been discussed and set forth to solve this problem. I am certain that none of these solutions, alone, will be adequate to completely solve this crisis but that probably a combination of many will finally be used together in this quest.

There is one other aspect, however, which I believe is most important in attacking this problem, at least long range, and which I have not seen discussed; that is the aspect of the training or educating of our future high school science teachers. In the recent report of the National Commission on Excellence in Education published in The Chronicle of Higher Education, May 4, 1983, is the simple statement: "teacher-preparation programs need substantial improvement". Since I am a teacher of a Biology Methods course and have long been interested in education at both the university and high school levels, I feel that the way in which our future teachers acquire their education and the ways in which they are trained to teach can and will have a profound effect on their own teaching.

I am aware that many college and university professors could care less about the training and/or the learning situations of these future teachers. Some have thoughts about their training but, not being in the School of Education, feel that they have no influence or bearing on the situation. During a panel discussion at the recent A.I.B.S. meeting in Grand Forks, I heard a well known biologist claim that the School of Education at his institution had no contact with the Biology Department and that future biology teachers may not even be Biology Majors, at any rate, he had no idea what or how many Biology courses these students were required to take. They were obviously undertrained and it was all the fault of the School of Education. It is easy to place blame elsewhere and take the burden off our own shoulders but this certainly is not going to help alleviate the problem!

With these thoughts in mind, and in hopes of stimulating discussion and a sharing of ideas about the training of future Biology teachers, I will describe the situation at U.W.E.C., especially with respect to the Biology Teaching Methods Course which is an area where I feel that I can have some influence on our future Biology teachers.

In Wisconsin, certification to teach biology is granted either to Biology Majors or to

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Biology Minors if their Major is another of the Sciences (Chemistry, Physics, or Earth Sciences). This means that Minors with an English, Psychology, or Physical Education major are not certified to teach high school Biology! A Biology Major with a Physical Education minor would be certified to teach both Biology and Physical Education.

At U.W.E.C., a Biology Major must complete a minimum of 36 credits: 4 credits each of General Botany and General Zoology; 4 credits each of an Animal and a Plant Kingdom course; 4 credits of Genetics; 8 credits (two courses) in Advanced Botany; and 8 credits (two courses) in Advanced Zoology. In addition, one year of Chemistry is recommended and is a prerequisite to several of the advanced courses.

The minor must complete the same 16 credits of General Botany and Zoology and Plant and Animal Kingdom courses, along with one Advanced Botany and Zoology Course. These courses provide a broad base of both Zoology and Botany as background for these future teachers. It should be noted that the U.W.E.C. Biology Department recommends that only the Majors should teach, even though the Wisconsin Department of Public Instruction certifies the Minors as well.

In addition to the Major and Minor and General Education requirements, the students must complete the education sequence of courses. In the freshman and sophomore years Speech, Educational Psychology, Adolescent Psychology, and a Conservation course should be completed. In the junior year, Methods in the Major and Minor are required after the Introductory Education course. These courses are prerequisites for the student teaching experience. During this experience, the students are in the public school for a full semester. For the first half of the semester, the student teachers have one full day of Education classes each week at the University and observe and apply what they have learned for the next four days while in the high school classes. During the last half of the semester, the student teachers assume heavier teaching loads with classes in both their Major and Minor culminating in a full class load for the final couple of weeks. During the entire semester, the student teachers work under the guidance of a cooperating high school teacher and are visited by both a professor from the Education School and the Methods professor from their major discipline.

During the senior year, either before or after student teaching, History & Philosophy of Education and Reading in the Secondary School are required.

Having provided this overall picture of the educational requirements of future biology teachers at U.W.E.C., we will now focus on the Biology Teaching Methods course, a 2 credit course which meets twice a week for a total of 4 hours. The first meeting of the week is a one hour class devoted to discussion led by members of the class. The second meeting is a 3 hour class which is usually held in the laboratory and focuses on laboratory exercises, experiments, and the techniques of teaching in the laboratory.

The overall course objective for this class is that: Class members will begin to think and work like teachers. This is a radical departure from the learning experiences which most students have undergone to this time! They must now begin to plan their own work, plan for the work of their students, think about ways and means of presentation, analyze curricular materials and laboratory experiments, and think about the best ways to evaluate the work of their students. Instead of being assigned work and told what to do, they must now put the shoe on the other foot and, without prodding or a great deal of encouragement, must think about assignments and units to be studied by their students! How is this change accomplished?

The semester is divided into thirds with the first five weeks devoted to preparation of
the mindset, becoming comfortable with instructing others, organizing for instruction, and learning of available materials to use in teaching. The second five weeks consists of a good review of the curricular materials available to the biology teacher, both textbook type materials and laboratory manuals and associated experiments and exercises. The final five weeks is "putting it all together", a time for each class member (teacher) to take over and teach the rest of the class. At this time, a TV camera is trained on the "teacher" and after the experience the TV tape is viewed and reviewed by the "teacher" and the course instructor!

We will now look at each of these portions of the semester in more depth. During the one hour discussion periods of the first third, students are picked to be discussion leaders for the class. The general topics for discussion are: Impact, Objectives, and Foundations for Biology teaching; Approaches to and changes in Biology teaching; Organization and evaluation in Biology teaching; and Contemporary Biology Curricula. As background for these discussions, students read from five different texts: Creative Biology Teaching by Harding, Volker, & Fagle; Teaching Science in the Secondary School by Kahle; New Directions in Biology Teaching by Hickman and Kahle; Science, Students, and Schools by Simpson and Anderson; and Biology as Inquiry by Voss and Brown. Since these books are shared among the students, each student reads only selections from each assignment. The discussions bring out comparisons, examples, and problems from each of the texts as studied by a portion of the class.

During the three hour sessions of this third, several things are undertaken. 1. Some time is used to conclude discussions from the previous period. 2. Each student reports on one or two periodicals of interest to high school students and teachers. Comparisons are made and possible uses of these periodicals is discussed. 3. A review of AV equipment available for use in future presentations is undertaken. 4. Time is made available for discussion of computer use and "hands on" evaluations of software. 5. Time is spent with catalogues, looking up various items, checking catalogue numbers, comparing prices, etc. 6. Inquiry slides and filmloops and other "up to date" inquiry and IGE materials are studied. 7. Students attend the annual Northwest Wisconsin Education Association meeting held at Eau Claire's Memorial High School.

During the middle five week period, current curricular materials are examined in detail. In the one hour periods, textbooks and laboratory manuals are discussed and evaluated and a laboratory experiment is chosen by each teacher to set up and do during the three hour period. At this time, each teacher will have prepared a lesson plan and two quizzes for the particular experiment to be run. Materials must now be gathered and the experiment accomplished. Toward the end of the three hour periods, evaluation of each of the experiments is done by each of the teachers and there is time for questions and comparisons of the experiments with those in other curricular materials.

In the one hour periods of the final five weeks, student led discussions include: 1. Reviews of the various curricular materials, now that many have been studied in some detail; 2. Studies of optimal facilities and equipment for high school biology teaching; 3. What can be done without optimal facilities and equipment? 4. The problems of student teaching and job hunting for that first teaching position. 5. What might the future bring for high school biology teaching?

During the three hour periods of the last five weeks, each teacher gets two or three opportunities to teach the rest of the class. Smaller classes get more chances! The first of these teaching stints is a fifteen minute demonstration type of presentation. The final presentation is a 45 minute class period. Both of these presentations should be inquiry oriented and both are reviewed by the teacher and the course instructor. The teacher must
provide, before each session, a lesson plan and two quizzes, either of which could be used at the conclusion of the class period.

During the last three week period, each teacher must also complete the final exam. The problem is to outfit a new High School laboratory with equipment and materials to adequately teach a general biology course to 25 students. Order forms must be filled out and catalogues consulted to complete this project. A limit is set on the budget for each year and each teacher must include a summary of expenditures from each company to be presented to the school board.

The most difficult part of teaching this course for a science oriented person is the evaluation of the work accomplished by each of the teachers! The instructor doesn't have numbers and statistics to divide A's from B's, etc. Only observations of discussions, lesson plans & quizzes produced, taped teaching experiences, final exam orders, and attitudes expected of a teacher are at hand for the purposes of grading. Despite this drawback, there have been very few complaints about grades received for work accomplished during the course. This may be due to the fact that the instructor constantly emphasizes two points to these future teachers: 1. No on ever said that teaching was going to be easy! and 2. Life isn't fair.


The Biology Core Curriculum
Robert D. Muckel, Doane College, Crete, Nebraska

At the AMCBT meeting I compared biology core curricula at selected colleges in 1965 and 1983. Also, I reviewed the recommendations of the 1967 study of core curricula in biology by the Commission on Undergraduate Education in the Biological Sciences (CUEBS). The discussion which followed was focused on the nature and development of the biology core curriculum. Because of the participant concern about the issue a subsequent meeting was held where individuals volunteered to attempt to identify major core topics that should be included in the education of all biology majors. This information will be collated and published in BioScene in order to allow evaluation and suggestions by all AMCBT members. It is hoped that these efforts will eventually lead to recommendations on the biology core curriculum.

(Editor's note: This next feature is a copy of Purdue University's "Core Biology Program Policy" which is reprinted here because of the interest generated by Bob Muckel's discussion. Hopefully, the April issue of BioScene will include further discussions on this topic.)