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A New Approach to the Training of Chemistry / Physics Teachers

Kenneth E. Borst
Rhode Island College

Tentative Program:

Thursday, February 22
4:00 - 6:00 P.M. - Registration - Iowa Memorial Union
7:00 - 9:00 P.M. - Banquet and First General Session - "An Interdisciplinary Approach to Population Problems," Dr. Willard Jacobson, Science Department Chairman, Columbia University; Introduction of Student Research Participants.

Friday, February 23
7:15 - 8:00 A.M. - Breakfast
8:15 - 9:15 A.M. - First Student Research Symposia; Presentation of high school student research reports.
9:30 - 11:45 A.M. - Laboratory Visits and Concurrent Sessions; Choice of University Lab visit, including a research scientist presenting current findings and efforts.
Noon - 1:00 P.M. - Luncheon, Iowa Memorial Union
1:15 - 2:30 P.M. - Second Student Research Symposia; Presentation of high school student research reports.
2:45 - 4:00 P.M. - Rap Sessions; Small informal group discussions on such topics as drugs, V.D., pollution, etc.
4:00 - 7:00 P.M. - Free Time.
7:00 - 9:00 P.M. - Second General Session; "Remote Sensing of the Environment," Dr. James Taranik, Remote Sensing Supervisor, University of Iowa.

Saturday, February 24
7:30 - 8:15 A.M. - Breakfast
8:30 - 10:00 A.M. - Third Student Research Symposia; Presentation of high school student research reports.
10:15 - 11:45 A.M. - Laboratory Visits; Choice of another University lab visit and discussion of careers in fields of interest.
Noon - 1:30 P.M. - Buffet and Third General Session; Keynote Address, NASA Speaker, Huntsville, Alabama
1:30 P.M. - Check-out and Departure

Applications and further information concerning the Symposium can be obtained by contacting: Dr. William L. Sharp, Director, Iowa Symposium, 459 Physics Building, University of Iowa, Iowa City, Iowa 52240.

A NEW APPROACH TO THE TRAINING OF CHEMISTRY/ PHYSICS TEACHERS

Kenneth E. Borst
Associate Professor of Chemistry
Rhode Island College
Providence, Rhode Island 02900

In 1950, during my first week as a junior high school science teacher, it became apparent to me that my training to become such a teacher was almost a complete waste of time. I have also observed that there has been very little effort on the part of colleges to change the situation and, although great strides have been made in using "discovery" approaches (CBA, CHEMS, PSSC, IPS, ISCS, etc.) in the secondary schools, the college teachers, for the most part, still go through their ineffectual patterns of teaching science teachers in the same way that they teach potential scientists, and the major tool of ineffectual teaching, the "lecture," still holds its honored place. Furthermore, since people usually teach the way they were taught, the products of these sterile teaching methods are likely to be ineffectual also. A logical solution would be to use good teaching techniques continuously during the entire undergraduate preparation of science teachers. This is the route that Rhode Island College elected to take in 1970 when the physical science department was asked to take part in an innovative chemistry/physics teacher preparation pilot program. We are now completing our second year as a pilot school.

The courses used in the pilot program have been, or are being, developed by the Physical Science Group (Uri Haber-Schaim, Director), PSG, located at Newton College of the Sacred Heart, Newton, Massachusetts. Although the courses used a variety of approaches, the majority of the time devoted to the learning process is spent in the laboratory and little or no "lecturing" is done during the first two years of study. The third year course will divide instructional patterns roughly equally between laboratory experiences, formal classroom discussion, and independent study. It is hoped that we will educate a group of science teachers who will be "guides in learning, rather than dispensers of information." (U. Haber-Schaim)

Improved instructional patterns are not the only features of the pilot program, however. The program is designed to draw on students who are interested in science and mathematics, rather than "drop outs" from professional

physics and chemistry programs. Subject matter and methodology are combined by utilizing a great deal of peer teaching during the first two years. This peer instruction is in the form of "pre" and "post" lab discussions, problem solving at the board, "lecture-demonstrations," and cleverly designed questions that require individual laboratory investigations and reports. The division between chemistry and physics is greatly reduced and the courses are physical science courses rather than "chemistry" or "physics."

The following is a brief outline of some of the subject matter content taught or planned for the first three years of the PSG program.

Semester 1. (College version of IPS)
A study of basic properties of matter leading to the establishment of the elements of an atomic model.

Semester 2. (College version of PSII)
A continuation of the first semester dealing primarily with the connection between electric charge and atoms and leading to the study of various forms of energy.

Semesters 3 and 4. (Two separate courses)
The kinematics of waves and the dynamics of particles (including charged ones), a continuation of the study of electricity to include AC circuits, and a very intensive study of chemical equilibrium are the main features of these sophomore courses. Chemical kinetics, functional group chemistry related to structure, and electrochemical processes are included.

Semesters 5 and 6.
This two semester course will be used to tie together microscopic properties and atomic properties. On the static side this includes a correlation of properties such as electric and magnetic constants, index of refraction and heat of sublimation, and energy levels and interatomic potentials. On the dynamic side, a study of chemical and nuclear reactions from both the thermodynamical and statistical points of view will be made.

The senior year, which includes student teaching, will have a course dealing with theory and problems in modern chemistry/physics.

One of the most important features of this pilot program is the inclusion of specially designed ancillary courses in English, mathematics, and manual arts. The correlation between the physical sciences and the content of the mathematics package has been particularly successful. The shop course includes basic woodwork, electronics, and glassblowing and a project mode of instruction is featured. The making of PSII equipment stands, IPS cube and slab sets, and PSSC momentum carts are typical projects.

Although it is too early to classify our program as a "success," some favorable results are obvious. Our sophomores appear to be exceptionally optimistic, extroverted, and industrious - all excellent traits to have in a teacher. We have had a 300% increase in the number of students electing to major in secondary education with a physical science major and our students do our recruiting for us. The fact that the five members of our department who have been involved in teaching the courses so far are unanimous in their conviction that these students "really understand the major concepts of science," is certainly an indication of "success."

CONTINUED N.S.F. SUPPORT FOR SUMMER INSTITUTE AT THE UNIVERSITY OF IOWA

Word has been received from the National Science Foundation that the Interdisciplinary Environmental Studies Summer Institute has been funded for another year. Two previous environmental summer institutes have been conducted by the Science Education Center. Brochures and applications will be ready for distribution to prospective participants early in the spring of 1973. More information regarding the institute will be included in the February issue of ISTJ.

JOURNAL ARTICLES WELCOMED

Iowa science teachers are requested to submit teaching tips, notices of events, or anything that would be of interest to other science educators. Please submit articles to the ISTJ editorial staff.

(Ed)
