SCIENCE EDUCATION

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Utilizing Predicted Grades. Charles L. Gehring, Professor of Life Sciences, Indiana State University, Terre Haute, Indiana.——The average scores for the 1978 Scholastic Aptitude tests (SAT) follows: Nationally, Verbal-427 and Math-467; Indiana, Verbal 412, and Math-455; Indiana State University, Verbal-390, and Math-422. I.S.U. has an "Open Admissions Policy" which obviously skews the scores to the lower side. This author has organized and coordinated a nonmajors general biology course for 15 years, and course enrollment ranges from 650 to 850 students per semester. The 736 enrolled in the course during the Fall 1979, represent the spectra of aptitudes, attitudes, motivation, etc. Is there a prism available which reveals the various portions of the spectra?

This author utilizes predicted grades (based on: SAT-verbal, SAT-math. Converted High School Rank, and a constant) to identify three major segments of the course enrollment. One, the F and D students; two, the B+ and A students, and three, the C, C+, and B students. Unfortunately, group three (C, C+, and B) students receive less attention and consideration, and receive less encouragement than either of the other groups. As a result the attrition rate of this group is extremely high; therefore much of the potential of this group is never realized. It is time to look for those factors which will provide the proper environment for this large segment of our student population. Society cannot afford to waste/squander these minds.

Using a "Discovery" Approach to Teaching the Scientific Method. William G. Wert, Associate Professor of Life Sciences, Indiana State University, Terre Haute, Indiana.——This is a method by which I have most successfully been able to lead students through the scientific method, by suggestions and giving them the feeling of having actually performed problem solving, with student involvement and discovery, making it a game. Key points have been observation, interpretation of facts, discarding unusuable hypothesis, creation of new hypotheses and the use of imagination. The student's handling of things involves a reward and feeling of accomplishment and a final discovery that they have used the scientific method. This method allows all the students to inquire and discover as they proceed through the steps of the scientific method without realizing this until they have actually accomplished it. The whole class really gets involved and interested as the problem is first presented to them and continues until the final discovery is made. This method can be accomplished by utilizing a chalk board, three series of sixteen blocks or squares drawn on the chalk board and four each of four different key colored blocks of construction paper to

fit the squares on the board. Many modifications of this method may be used depending on the room facilities such as magnetic chalk board, projection facilities, or the various individual preferences of the teacher and the level of sophistication of the class.

EXPER SIM as an Aid in Developing High School Science Propects. GARY E. DOLPH, Indiana University at Kokomo, Kokomo, Indiana.——As any judge at a high school science fair knows, the number of unimaginative projects presented greatly exceeds the number of innovative projects. However, this lack of innovation is not an accurate representation of the ability of the students. It is a reflection of the instructor's success in getting the students to ask the right questions and to develop a research strategy to answer those questions. In practice, science is taught by having the students carry out "classical" experiments from a laboratory manual. Scientific method, the basis for developing an innovative science fair project, cannot be taught in this format. EXPER SIM is a set of computer programs and instructional materials which may be used to teach research techniques. EXPER SIM does not emphasize data collection. The data for an individual experiment are already stored in the computer. Instead, EXPER SIM allows the student to develop research strategies to extract the correct data from a large pool of possible answers. By using EXPER SIM, a considerable amount of time can be saved, while the student compares the results of different experimental designs. Once the students have learned how to develop their own research designs, they can proceed to the actual laboratory experiments required for their science projects. Currently, EXPER SIM programs can be purchased from CONDUIT or developed by the individual instructor.

Lap-Dissolve Slide Projection Sequences Used in Teaching Chemistry Concepts. G. M. BODNER and THOMAS J. GREENBOWE. Department of Chemistry, Purdue University, West Lafayette, Indiana.——Most science educators agree that students learn 'better' when the scientific phenomena under discussion can be demonstrated. Recent work on concept formation has led to two suggestions: (1) what student learn through the use of lecture demonstrations or other visual effects (slides, video-tape, film) is different from what they learn during a verbal presentation; (2) illustrating live demonstration with companion line drawings is better than just performing the demonstration or showing a picture of the phenomena.

We will describe a technique known as Lap-Dissolve Slide Projection (LD) which enhances the instructors repertoire of presenting science concepts and demonstrating scientific phenomena. In LD, two matched slide projectors are focused on the same screen, allowing their images to overlap and then the image thrown by one projector is slowly dissolved into the image from the other projector. Several advantages of LD relative to video-tape and film will be discussed. We will demonstrate how the LD technique is applied to certain aspects of teaching chemistry, including (1) SN_1 and SN_2 reaction mechanisms; (2) 3-D concepts used in crystal structure; (3) correlating live

demonstrations and representative line drawings in atomic structure; (4) illustrating concepts such as paramagnetism of liquid oxygen.

Electrochemistry Demonstrations with an Overhead Projector. C. R. WARD, T. J. GREENBOWE, and D. A. DAVENPORT. Department of Chemistry, Purdue University, West Lafayette, Indiana.——The overhead projector, a common piece of equipment in most lecture rooms, can serve as a versatile projection source for many chemistry demonstrations. We have developed a series of clear plexiglass templates to facilitate working with solutions during demonstrations with an overhead projector. The templates serve to securely hold the beakers, electrodes, salt bridge, and interconnecting wiring to the overhead projector. An inexpensive and easily made hydrogen electrode for use with the templates will be demonstrated along with additional electrochemical demonstrations. Also, a unique sacrificial electrode will be demonstrated.

Attitudes Towards Teaching Science: A Demographic Study. MARVIN BRATT. Early and Middle Childhood Education, The Ohio State University, Marion, Ohio 43302.——In an attempt to isolate demographic variables which may contribute to a teacher's atitude towards teaching science, a questionnaire was distributed to 81 students and teachers in the teacher education program at The Ohio State University during 1978-79. In addition, each teacher completed the Bratt Attitude Inventory, an inventory of attitudes towards the teaching of science. The scores on the attitude inventory were correlated with each of the demographic variables using the Pearson Product Moment Coefficient of Correlation. The study yielded eleven (1) significant correlations of interest to science educators.

The results of the demographic study and correlations are reported as well as interesting data on the subjects' backgrounds in science. The data suggest that renewed effort is needed in supplementing the backgrounds of elementary teachers in the area of science.

Agronomic Coop Intern Program for Undergraduate Students. C. L. RHYKERD*, B. O. BLAIR, A. R. HILST, R. C. KEEN, and A. D. GOECKER, Department of Agronomy and School of Agriculture, Purdue University, W. Lafayette, Indiana.——More than half of the undergraduate students in the School of Agriculture at Purdue University have non-rural backgrounds. This lack of practical agricultural experience places these students at a disadvantage in agricultural courses in the University as well as the agricultural job market upon graduation. A coop intern program was initiated in the School of Agriculture at Purdue University in 1975 to provide the non-rural students an opportunity to obtain "hands on" experience in agriculture. This program requires an extra year for the student since the student must spend four school terms working in some phase of agriculture. Upon graduation, in addition to the B.S. degree diploma the student also receives a certificate which documents his completion of the agricultural coop intern program.

To-date more than 40 students have been involved in the agronomic coop intern program. The students which have completed the program

have had numerous job opportunities upon graduation and have advanced quite rapidly in their agronomically related jobs.

Types of agronomic coop internships include seed, fertilizer and agricultural chemical companies, state and federal agencies such as ASCS, SCS, and the U.S. Weather Bureau, grain and livestock farms, and golf courses and lawn care services.

The agronomic coop intern program has been well received by our undergraduates. Students involved in the program have become highly motivated by their "hands on" experience resulting in improved academic performance upon return to campus.

Field Studies for Elementary Children: A Role for Colleges in their Communities. Larry Yoder and Marvin Bratt, The Ohio State University, Marion, Ohio 43302.——The authors were asked by elementary teachers and by the GATEWAY project, a program for gifted elementary children in the Marion City Schools (Ohio) to conduct field trips indoors and out of doors on the Marion campus of The Ohio State University. Activities were designed to present experiences in ecology, conservation, biology, and earth science; and they utilized the assistance of faculty and students in botany and education at the university. Elementary students visited the animal room and biology and geology laboratories, and in all areas they were encouraged to touch and examine the displays. Visitors out of doors had the opportunity to fish, collect and observe small invertebrates, hike the trails and wade in the cattail pond. In addition, small groups of students were asked to make extended observations while they remained quiet and motionless. These half-day visits were enthusiastically received, and we are considering all age groups as we develop our natural area on campus. We have developed a printed guide of objectives for campus field trips which is distributed to area teachers. Our project is one example of how those in higher education can contribute to the needs of schools that are near a college campus.