

Objective Methods in Teaching Biology

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No one can miss the widespread interest and enthusiasm shown in a *World's Series*. Baseball occupies the headlines of daily papers, and becomes the chief subject of conversation on the street and in the classroom.

In the classroom the "shop" boy who is not bookminded, and who obtains little from the use of textbooks, becomes an authority on baseball among his more academic classmates. He knows the relative strength of the competing teams and the past performance of each outstanding player. To him each big league player has become a real personality because he himself has played baseball, he has talked baseball, and he has read about it in the daily papers. Hero worship based upon personal standards of appreciation and civic pride have produced an intrinsic interest in the subject, although he may never have seen a real big league game. Active interest has become functional enjoyment based upon a very elementary understanding of human behavior through personal experiences.

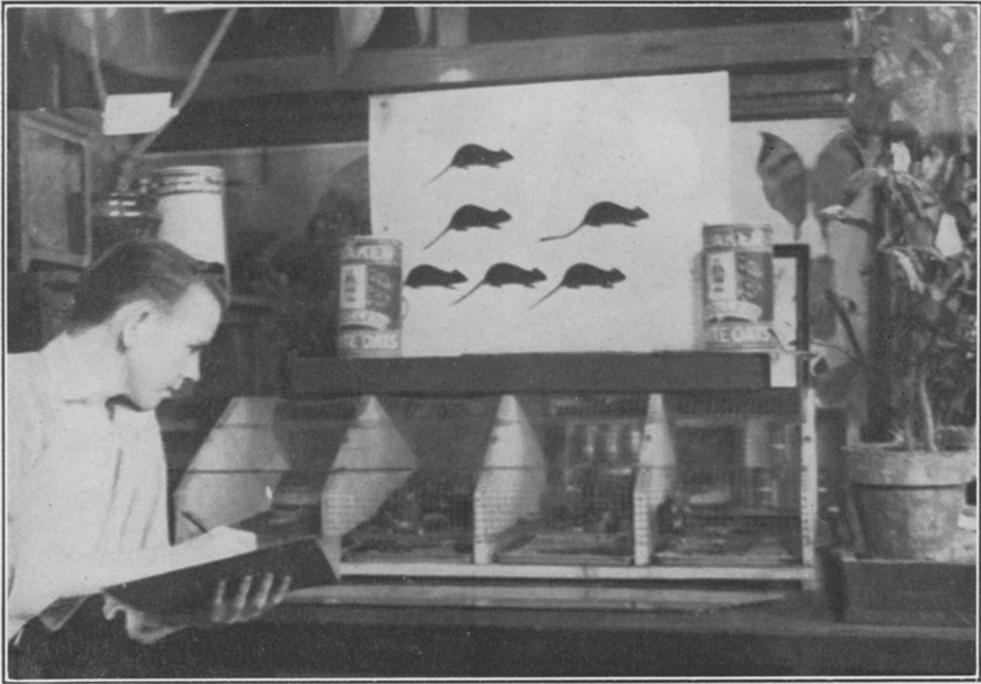
Most teachers will agree that baseball interest and enthusiasm are not present in the same degree when we study a problem in Biology or the biography of some great benefactor of humanity. In contrast the situation is too often a very artificial one lacking the momentum provided by proximity of experiences in the life of the student. Presentation through the more or less technical language of the printed page only helps to

magnify abstractions with the net result that the whole lesson may be a mass of confused ideas with little or no relationship. The organization of any classroom procedure must consider this fact if interest is to be maintained. A great deal of time must be spent in building up an objective background to which more abstract ideas may be attached. We cannot expect young students to think successfully about things in which they have had few or no concrete experiences. Concrete experiences help the student to understand, apply, and recall what he has learned. It is therefore imperative that each part of a classroom procedure should contribute its share to some objective plan as a whole.

AN OBJECTIVE APPROACH

A successful approach to a subject may provide the "steam" that may carry a student through the term with interest and enthusiasm. A poor approach may "kill" interest to the point where it may never be regained. A successful approach, therefore, is usually psychological.

It is neither necessary nor always desirable to call every lesson a problem. Problems stated as such do not always produce problem solving attitudes on the part of students. In fact the very sense of mastery which is necessary for the solution of any problem is sometimes "killed" at the start among the more unsuccessful by the statement of the problem itself. Consequently the re-



Experiments Make Breeding and Feeding Objective

sponse is often negative and an attempt is made to avoid the situation at hand by transferring attention to something more objective. The object of attention may be a classmate or some of the live material around the classroom.

The very nature of avoidance mechanisms is an indication of the type of approach necessary among young students. An approach to a Biology lesson in high school should be a pleasurable experience involving personal standards of appreciation which have been built up by the teacher around concrete things through exploration and discovery. At this point the problem may be introduced incident to and not accidentally into the lesson. Proper appreciation will provide the momentum which will carry critical thinking to its logical conclusion.

DEFINITE ASSIGNMENTS

Assignments for high school students should be short in order that attention may be focused on one phase of the work at a time. A short assignment is objective because the entire procedure is within the grasp of each individual at a glance, and it allows little latitude to "wander" from the prescribed task at hand. Short assignments can be dictated to the class by the teacher without any great loss of time, while the hearing, writing, and discussion that may be involved will help to make the procedure more objective.

The wealth of natural materials that may be built up in a laboratory by the functional co-operation of its students may surpass a teacher's wildest imagina-



A Chemical Garden Makes Plant Nutrition Objective

tion. Through judicious collecting and preserving over a period of years enough materials may be collected for individual student work. A supply of individual materials, where possible, is a very important factor in maintaining interest, focusing attention, and in providing the proper "atmosphere" for work in the high school laboratory. Groups may work more or less successfully on the same object, but no matter how small the group may be or how sincere their purpose there is nearly always an element of "play" that enters the picture which causes distraction and interferes with optimum results.

OBJECTIVE RESULTS

A high school Biology Laboratory usually reflects the type of teaching that

goes on within it. It reflects evidence of organization and unity of purpose on the part of the teacher, and objective proof of interest and activity on the part of the students. Neatness, cleanliness and order usually imply organization in the classroom and respect among the students. The amount and kind of individual and group projects is a criterion of the amount of interest and the extent of activity among the classes. Projects are objective proof of work successfully completed.

The great difference between the response obtained from objective teaching in contrast with subjective teaching is much the same as a public response to a style show and a book review. Three hundred people may turn out to see a style show, while only fifty turn out to

hear a book review. The great difference in interest lies in the fact that most people are objective-minded.

Few students comprehend a long, involved printed page of directions. Most typewritten or mimeographed work sheets are objectionable from this standpoint. In addition work sheets usually cover such a wide range that young students are inclined to do all the easy work first, and honestly hypnotize themselves into believing that the rest of the work is finished. The size of the task is magnified by the size of the sheet and the psychological effect at the start may be to avoid the situation at hand, if possible.

BALANCED ASSIGNMENTS

Our modern systems of mass education allow very little time for individual instruction during a supervised study period. As a result, assignments must be not only definite but also arranged in a way that will provide the maximum application by the student himself without the help of the teacher. To accomplish this end a teacher must make a wise choice of the "tools" of learning for each assignment. Each assignment must have movement to prevent fatigue and maintain interest. In addition it should be organized in such a way as to make use of repetition through the various channels of learning. Applicable notebook illustrations of actual specimens or materials provide an objective means of self-imposed application in large groups through which exploration and discovery may take place. Correlated references on the subject matter will help to enlarge and explain the original discoveries through repetition, and train in the exercise of judgment in the selection of important points to be recorded in the notebooks. Further, the training provided by the constant use of an index

will provide a tool by which a student may carry his investigations to the extent of his interests. Well-planned group discussions may be used to bring all angles of the work to a focus, and help to point the way to the generalizations or conclusions involved as a result of the work covered in the classroom. In short, a balanced assignment will attempt to find an optimum relationship among the "tools" of drawing, reading, writing and discussion that will provide enough variety in activities to prevent fatigue and at the same time maintain interest and movement. It will also provide enough repetition through the different channels of learning to insure maximum learning with a minimum of teacher help.

OBJECTIVE NOTEBOOKS

A notebook successfully completed represents an accurate record of work covered in the laboratory during some definite period during the term. It is a project carried to a logical conclusion by the student himself. He has done the whole job in which it has been necessary for him to exercise a great deal of self-imposed application. He has used certain skills which have helped to train his co-ordination; he has used judgment in the selection of his materials, and he has exercised initiative in the arrangement of his work to turn out a worth-while, finished product. The sacrifices made through the training involved make him justly proud of his accomplishment because his results are objective.

It is not likely that the same training nor the same psychological results are accomplished among high school students by the use of the so-called prepared "work-book." These books are often an expedient among teachers for a lack of definite procedure in the laboratory or as a substitute for the original source of

material which is Nature herself. "Work-books" enable a teacher to cover a large amount of work in a relatively short space of time by supplementing with partially completed outline drawings and completion sentences. Among high school students such a procedure becomes a "streamlined" method of getting through a lesson so that the next one may arrive as quickly as possible. It discourages adequate application and initiative and encourages slipshod work through lazy method. In the end the work-book represents work that the student has covered by the aid of "props" and help of one kind and another. It is not a project in the real sense of the word and consequently not entirely objective to him. It is much better for a student to cover a few things well in a well-organized class procedure.

OBJECTIVE DRAWINGS

Since the time of the Cro-Magnon Man drawing has been used as a substitute for reality. It still remains as one of the chief methods of making man's thoughts objective. It furnishes the plan by which a giant skyscraper or a small home may be erected, and it furnishes the beautiful picture by which the meandering stream with its autumnal colorations may be brought into the most crowded parts of our large cities.

Under the proper direction and guidance of the teacher drawing is removed from the category of mere "busy work" and becomes a very valuable, even necessary, part of any high school procedure in Biology. Drawing makes a student actively interested in the material at hand and focuses his attention on an objective problem to be solved through accurate observation and analysis. When his attention tends to wander temporarily from the situation at hand he can

always find it again because it is objective.

OBJECTIVE MATERIALS

The out of doors is Nature's Laboratory. It is the place where all real teaching takes place because there living things can be appreciated and interpreted in relation to their environment. Although a great deal of excellent teaching can be done by the use of parks and back lots in our large cities, the usual school organization makes it necessary that most of the teaching be done in the classroom.

The ideal Biology Laboratory, therefore, should be a substitute for the out of doors as nearly as possible; a place where a student may come into direct contact with an abundance of natural objects and their relationships. An interesting laboratory is dynamic. It stimulates students to take long walks in the city, and hikes to the country to collect and bring back specimens. It makes students "Biology conscious" when they are on trips with their parents or relatives. They are always on the alert for that unusual specimen that they may contribute to the classroom, or for that unusual phenomenon that was discussed in last week's lesson.

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