

The Use of Supervised Study in High School Biology

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The study of life is essentially interesting to all adolescent children and it is no credit to the biology teacher who can make the biology class interesting. However, it is a tragedy for the biology class to be uninteresting because there is nothing like a boring class to kill all the native interest that all children have in living things.

Biology must be the study of life, with living materials in the hands of the children wherever this is possible. If living material is to be used, then the course must be planned so that living material may be obtained easily at the time when it is to be presented. This means that the course is to be a seasonal one that can be easily adapted to the local and seasonal needs of the community.

It means, moreover, that books are to be used for reference wherever information can not be obtained from the materials. This demands that there should be a great many kinds of texts and other reference books available for the pupils to use when they need more information than it is possible for them to get from the materials in their hands. There needs to be no basic text. No child should be allowed to read about the material before he has studied the material because the child should be trained to *know* rather than to *know about* the object or experiment that he is studying.

From the stand point of the teaching value, materials may be arranged in the following order. Material for study should be:

1. alive, if possible,
2. or freshly killed,
3. or carefully preserved,
4. or museum material,
5. or demonstrations and experiments set up by the pupils,
6. or slides made by the class,
7. or demonstrations set up by the teacher,
8. or chalk drawings on the board,
9. or models made by pupils or teacher,
10. or good movies,
11. or prepared slides,
12. or commercial models,
13. or lantern slides,
14. or pictures on the bulletin board,
15. or commercial charts,
16. or reading material from many texts rather than from one text.

From this list it can be seen that pupil activity is to be stressed and teacher and commercial activities are to be used only as a last resort. A movie may be excellent and in fact invaluable in some types of teaching, but in biology it is always best to use actual material if possible.

If our philosophy says that we are to teach children to know rather than to know about biological materials, then we must carefully supervise the study of the children if we are to accomplish the most in the shortest time.

This can be done best without any home assignments. The results and conclusions of all work are recorded in a loose leaf notebook and these notebooks should not be allowed to go out of the class room until the work has been completed and graded. The reason for this is that by having all work done in the class room under the direction of the teacher, independent thinking may be stimulated and honest individual results may be insured.

It is needless to say that this type of teaching requires the greatest of care in the long time and in the daily planning. This type of teaching requires the creation of fine morale because without excellent morale and excellent cooperation from the pupils the necessary freedom that must exist in a thoroughly socialized class would not be possible. All the freedom that is consistent with good work must be allowed.

The methods that are used in supervised study in biology are many. The method used must depend on the class, the material studied, and the teacher who is teaching the class.

One way is for the class to be provided with material; for instance, grasshoppers, and with a sheet of directions. In this type of study the pupils are told in carefully prepared sheets what to do and how to look for the parts that are to be seen. Here the pupils should be taught to follow directions. Wherever there is anything that is hard to see or understand the teacher should be available to give individual help. In the study of the grasshopper, there is so much of interest in the external anatomy and in the life cycle that no internal dissection need to be done.

Another type of supervised study is used in a lesson where the class sets up cultures of bacteria in order to find out about the relative values of some of the commonest means of controlling the growth of bacteria. In such a lesson the pupils take turns in pouring the agar and inoculating the plates with a spreader. The plates are marked and treated in different ways, such as being treated with alcohol, kept on ice, treated with steam under pressure, etc. The next day the results are discussed and the conclusions are formulated in a class discussion. From the lesson the values of physical and chemical controls for the growth of bacteria are listed. The lesson is then written up in the notebook.

Sometimes the lesson is one in which no materials can be handled but the lesson must be learned out of a book. If such a lesson is very difficult as is the lesson on the way living bodies control the growth of bacteria, then the pupils take turns at reading and discussing the printed material. Then outlines of the material are worked out by the class and put in the notebooks.

Sometimes a lesson involves the silent reading of material and the giving of individual reports. The lives of Pasteur, Walter Reed, etc. may be handled in this way. No work is done outside the classroom, however.

Another type of lesson consists of the cutting and staining of cross sections of the twigs of the linden. After the slides have been made they are studied and discussed with diagrams on the board by members of the class. These diagrams are erased before the class begins to make records in the notebooks from the microscopic study of their slides.

When we are studying the way fish get their air we may use the heads of freshly killed fish that we obtain from the fish store. With these we can examine the gills carefully and with a class discussion get a very clear understanding of the way oxygen enters the blood of the fish.

Birds are studied on field trips. Trees are also learned in the field.

Human physiology is always tied up with the structural study of organs. Hearts, kidneys, etc. may be obtained at local meat shops or from farmers who have butchered.

The action of saliva on starch may be shown with saliva that some of the pupils obtain and filter and bring in.

A study of the local milk supply may be made with the curd test. When many samples of milk have soured the curd may be studied and the results recorded on the board. The conclusions as to the causes of gas in the curd and bad odors in the milk are applied to the everyday use of milk in the home.

Before a written examination or test is given, there is a thorough review in which work is organized and all points cleared up.

This type of teaching keeps a teacher very busy because material must be kept up to date. Of course, the pupils will bring in much that can be used and if group morale be good, the class can be guided in the care of the room.

Of course if all classes in a high school were taught with supervised study, there would be little value of study halls and without study halls the program would be inflexible. However, in some courses where much reading is necessary as in English literature and in history, the study hall time can always be used. But the pupils are generally glad to have one or two courses where no outside assignments are made.