

The "Practical" Test

PHILIP GOLDSTEIN

Walton High School, New York City

I should like to begin with a quotation from an article previously published dealing with another subject in which I stated, "I myself spent 5 years teaching in an annex equipped with only two microscopes. Naturally, it was necessary for me to depend entirely on the demonstration method for microscope work. In spite of the fact that I used any number of devices to try to make the students see those things I wanted them to see, *I never felt confident that what was so clear to me was at all apparent to them.*"¹

That was putting it mildly. I really felt pretty certain that they saw very little of what the demonstration was supposed to show them. One day, I decided to do what many poor scientists (and some good ones) do when they have an opinion but no objective evidence to support it. I set out to *prove* that students who were subjected to demonstration microscope work really saw little and remembered less.

So without warning, I "sprang" a new kind of test on one class of innocent victims. I set out five microscopes with materials which had been demonstrated at some time during the term. Each microscope had attached to it a paper with two questions pertaining to the material visible. The students were sent up in turn, and they answered the questions in writing while peering through the ocular.

The class as a whole had an open book

¹"A Simple Micro-Viewer," Philip Goldstein, *The American Biology Teacher*, Vol. I, No. 6, March, 1939, p. 122. (Italics were not used in the original article.)

lesson since only five girls² could take the test at once. This left me plenty of time to watch the "victims" at the microscopes. As I watched, I became more and more convinced that my opinion would be supported by the "experiment" which I had set up to prove it.

Then I marked the papers. Since that time, I have a healthier respect for the powers of observation of my students. The results gave me a shock, but they were very gratifying. About 80% of the class got between 8 and 10 on the test. Only two or three girls got less than 6.

The experiment was a total failure in so far as substantiating my preconceived opinion was concerned. But it was a great success in every other respect. It gave me an idea. Since then, I have tried to include with each full-period test a few questions of this type, under the title of the "Practical Part" of the test.³ I extended the practical part of the test to include materials other than those used with the microscope, and I worked out a fairly adequate technique which runs somewhat as follows—

1. A mimeographed test, calculated to require 30 minutes of answering time, is prepared.

2. The materials to be used in the "Practical" part of the test are carefully culled from among all the materials which were used during the teaching of

² Walton High School is an all-girls school.

³This name was evolved from the "Practicum," the imposing title bestowed upon a similar (but more elaborate) test given as part of the work in many of my college biology courses.

the topic. Generally five objects were used with two questions on each.

3. Questions based on these materials are prepared and typed out on separate slips. If there are two questions about one object, they are both put on the same slip. Care is taken to word the questions in such a way, that no more than one short sentence need be written to answer each.

4. On the day of the test, the students are set to work on the mimeographed part of the test, immediately upon their arrival.

5. The materials previously prepared, are set out, each object with its appropriate questions.

6. One student is sent up to the first object. As she answers the questions, and moves to the second object, another girl goes to the first object.

7. As each student completes the "Practical" part of the test, she hands in her answers, and returns to work on her mimeographed test. Thus, each student has approximately 10 minutes to spend on the "Practical" part of the test, and 30 minutes to spend on the written questions.

8. If time permits, when all have completed the practical part of the test, any student may return for a second look at any of the objects.

The following "Practical Test" was actually used in the manner described above, in connection with a test on reproduction. There were two questions on each item.

OBJECT SET UP

- A. Microscope with prepared slide of *Paramecium* in process of dividing.
- B. Dissecting microscope with a budding hydra.
- C. Male frog dissected to show testes.
- D. Two test tubes containing broth, both marked "boiled." One is corked, and the broth is cloudy. Other is sealed by melting the glass, and the broth is clear.
- E. Microscope showing *spirogyra* in conjugation. Pointer in ocular _____ indicates a zygospore.

QUESTIONS ASKED

- A. The organism under the microscope is _____

The process of reproduction illustrated is _____.

- B. The organism under the microscope is _____.

The process of reproduction illustrated is _____.

- C. Is this a male or female frog?
How do you know?
- D. Name a scientist who did an experiment similar to this one.
What conclusion do you draw from this experiment.
- E. The process of reproduction illustrated is called _____.
The structure indicated by the pointer is _____.

In this particular test, a bottleneck developed at questions 6 and 8 since each required a sentence as an answer, whereas none of the other questions required more than a single word. In subsequent tests I found it advisable to avoid this. When it was impossible to have all the answers run about the same in length, a somewhat different arrangement or spacing of the objects was indicated. Thus, if I were repeating the test just described, I would arrange an extra space after C, and another after D, so that when the first girl is ready to answer question 6, she can move over to the space provided for the writing, making room at object C for the next girl.

Other members of our biology department have adopted the idea of "The Practical Test" for use in their own classes. This term it was made departmental policy in at least one grade of work. Part of the work of Biology III, deals with the "roll call of the plant and animal kingdoms." When this topic was completed, a full period was devoted to a "Practical Test" covering the subject matter. This test was more or less uniform for all classes.

Furthermore, in two grades of biology (special courses for low I.Q. students with low reading and vocabulary levels), a 40 minute "Practical Test" was incorporated as part of the midterm

examination. When the entire period is to be used for this form of test, the procedure is somewhat altered. Care is taken to provide at least as many objects as there are students in the class. Each student begins at a certain object, and proceeds to every other object in turn, until she returns to the one from which she started. To avoid confusion, every girl moves at the same time, on a signal given by the teacher.

Certainly a test of this type means work. It requires work on the part of the teacher who must spend hours planning the questions. It requires work on the part of the laboratory assistant who must dig out set-ups which were used weeks before, or perhaps even set them up again. It means work on the part of the head of the department who must arrange for special shifting of classes so that the test may be set up in the room best suited for the purpose. Is it worth all this effort?

Personally, I like this type of test, and before concluding, I should like to point out why.

1. *The students like this form of test.* It is different from the regular run of tests.

2. *The test is really diagnostic.* It can show the teacher where reteaching is needed.

3. *The test is really a teaching device.* Pupils frequently ask questions concerning an object after the test, whereas they failed to ask when the same object was presented as part of the class work.

4. *The test really measures how consistently a student has done his work.* It is next to impossible to "cram" for a test of this sort. A student who has conscientiously and carefully considered all the materials presented to the class, will have no difficulty with such a test. A student, no matter how bright, who has been negligent with the expectation of

reading his textbook just before the exam, will not do well.

5. *This type of test presents a means of measuring the biological knowledge of girls and boys who have difficulty in understanding written questions.* Students who read poorly, frequently fail on tests as a result of lack of comprehension, rather than lack of knowledge. (To illustrate, take the case of a girl in the special low I.Q. group previously mentioned. Her oral answers in class are generally satisfactory if the question is made clear, yet she has never gotten more than 45% on any of the four written tests she had so far during the term. On the "Practical Test" which was part of the mid-term examination, her score was 32 correct out of 40.)

6. *This type of test may, in its highest form, measure objectively the student's ability to observe, his reasoning power, and his understanding of scientific method, far more adequately than any written test.*

In conclusion, I should like to ask the reader not to pass judgment upon this type of test without trying it once or twice. The idea is not new. It has been used in the colleges for a long time. We in the high schools have not taken advantage of the opportunities it presents.

THE USE OF LABELLED DRAWINGS IN THE TEACH- ING OF COMPARATIVE ANATOMY

It is high time that teachers of comparative anatomy and similar courses decide just what it is that they are trying to teach—art or anatomical detail and relationship. It seems to me that under the observe-and-draw method far too much time is spent in completing a presentable drawing and far too little is