

Student Prediction of Examination Questions

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Final examinations cause much discussion and no little concern among students generally. The cultivation of good study habits ought to begin with the earliest school years. Lack of such frequently accompanies test worries. Only too often parents and teachers alike fail to direct youth into proper disciplines for learning. Occasionally a student tells someone he has chosen to room in a private home because he wishes to concentrate where it is quieter than in dormitory or fraternity house.

How to encourage an advisee or a college group to begin the formulation of systematic, orderly preparation of assignments in language, history, science or any other course is a real problem for one who likes to see good minds do more than passing work. The teacher of biology can scarcely take several weeks of precious time in trying to orient and train classes in the techniques that have proved effective for himself in mastering facts and principles. He must throw out hints and suggestions as side-issues.

In college work there is little opportunity for old-fashioned drill. Yet for many people this is the proved way of making facts stick. Usage alone creates the groove that results in retention. But it must be the hearer, not the lecturer, who does the using. Phrases such as "transition from water to land" become meaningful only when they are put into expression by the individual himself. Advanced teaching begins properly with exposure. It should not end there. Whoever haunts ivied halls is expected to assimilate and store the knowledge stream which tumbles so turbulently onward from period to period. There's not much chance to impound it. He

comes in contact with so much concrete information continuously bubbling forth from the fountain head that he does not distinguish clearly between what is important and what is not. Modern textbooks in science are increasingly encyclopedic as well as technical. If the book is to become a useful tool considerable attention must now be paid toward making it intelligible.

Occasionally it is well to do a little investigating. What a student thinks about this or that topic, procedure, or aim may be very revealing. Everything is so crystal clear to the instructor as he looks ahead, or back upon, familiar vistas already seen repeatedly. It may not prove so for the beginner.

One institution has provided "Review Days" for instructional benefit. The professor could use this time in formal summary, for answering questions, or in conference. Class attendance was not compulsory. It was expected that it be used constructively in preparation for the inevitable tests. As high as fifty per cent in biology came as usual. Of course, some asked "what they should study". In answer a topical outline has often been issued covering major points. Nearly always the kind of survey was held which exposed student ideas of important principles.

At one time on the last day of formal classes before the first semester finals all those in General Biology were asked to write and return, signed or unsigned, the special question of merit which it was felt would very likely be asked because worthy of remembering. It was hoped that a check would result on (a) how well the instructor had been followed in what had been emphasized; (b)

what the student himself considered personally most valuable (c) how class opinion might coincide with a set of questions already prepared (d) what the class as a whole considered it should review (e) how uniform group opinion might be with regard to the subject matter covered.

Forty-two replies were collected. Thirty-four signed. Why eight did not is anybody's guess but if they felt easier in not doing so it was ample justification. Material was generally good, well phrased, significant. Broadly general topics were few. Specific ones treated structure, function, reproduction and life cycles, classification, ecology, definitions,—a generous spread.

Possibly two thirds of the work had been introductory, then botanical. Several hour writings had been given. From Christmas on Human Biology had been treated. The final third of the year was to be devoted to animal phyla exclusive of man. The frog served as the vertebrate laboratory type. Functional exercises were sprinkled over the basic morphological pattern.

Nearly all the questions, therefore, were on botany. They involved photosynthesis, moss and fern life cycles, comparison between algae and fungi, classification of the Thallophyta, comparison of a monocotyledon and dicotyledonous stem, sexual reproduction in plants, wheat rust cycle, especially applicable to plants. Some had to do with the framework of frog and man. A few were basic to all of biology.

The examination consisted of two parts; (a) appreciation and comprehension, general in nature, requiring careful thinking, perspective, summarization, and appraisal of values; (b) fact mastery and recall was composed of specific principles and information. Seven questions comprised the first part. The second had six. There were some alternatives for the three-hour period.

There was essentially no anticipation on appreciation and comprehension, an expected outcome because of its general nature. Approximating generalities were two which touched upon critical thinking and the purpose of a course in General Biology. Fifth on this test list was "What five broad, outstanding features, phenomena, or problems of plant biology do you feel warrant remembering and rather thorough understanding by the student of general biology? Why?" The following table shows that botanical principles were grasped.

Topic	Used by Different Members
Life Cycles	8
Photosynthesis	7
Osmosis	4
Respiration	3
Adaptation	3
Forest Habitat	
Interrelations	3
Metabolism	1
Sexual Reproduction	1

The seven questions of this portion of the examination were so constructed as to measure abilities other than straight memorization. They dealt with a criticism of the laboratory and experimental methods; the scope of Biology; protoplasmic components; cell types; individual exploration into Biology; the importance of plants.

Fact mastery and recall was very specific. There were a number of possible choices permitted. The osmotic process is the only idea in the above table which did not occur, directly or indirectly, in this part of the examination. Four had thought it would appear. Other topics which students expected but did not find when examined were:

Topic	Used by Different Members
Mono- and Dicotyledons	1
Plant Tissue Structure	1
Algae and Fungi-	

Comparison	2
Algae and Fungi- Classification	2

Ten of the forty-two enrolled, therefore, were disappointed in their prognosis.

Ideas incorporated by the instructor which no one predicted concerned corn grain and bean seed; fruit types; methods of cross pollination. A single question referred to that small segment of Human Biology which had been under discussion before the semester ended. This was centered around the skeleton. Six class members expected something of the sort would be included.

Questions were surprisingly well chosen and formulated as has been mentioned. A few were unacceptable for various reasons. A girl of good mentality, doing *B* work, called for the life cycles of molds and liverworts when it had been expressly stated that they would not be stressed. A male, pre-medical student asked "What is the

function of the pelvic girdle?" Some time had been devoted to its stability, importance, strength as compared to the pectoral region, evolution and homology. Therefore the impression made on one individual to some extent was evinced by his query.

It is seen that the exercise did provide a check on instruction. One question per person was not as large a sample as would be required for complete establishment of the points raised. This was sensed by those who participated for in a number of instances two questions instead of one were returned. Faithful attention to discussion is indicated but by no means were results unanimous. Very clearly difference of opinion existed as to what would for certainty be required. It is concluded that more reliance should be placed by the students themselves on their own ability to diagnose important ideas and forecast their inclusion in tests of fact retention.

Demonstrating Circulation in a Frog

Colin described in this journal, Feb., 1940, V. 2, pp. 128-129, a technique for using goldfish anesthetized with chlore-tone for demonstrating circulation in the tail.

Another method involves stretching the web of a frog's foot over a slide, or a hole in a frog board, so that it can be viewed through the microscope. Usually this involved tying the frog down securely or clipping him to a board. If the animal struggles, which is common, a readjustment may have to be made. This latter problem is avoided if the frog is first anesthetized by injecting into the dorsal lymph sac 1 cc. of 10% urethane (ethyl carbamate) for every fifty grams of frog, or .02 cc. for each gram of frog. Tuberculin syringes graduated in 0.01 cc. are excellent for injection. An overdosage of 20% is

recommended. The frog will usually lie quiescent, without being tied. The foot is stretched over a slide and held there with a string or by a rubber band. If the leg is stretched out too far or too suddenly the frog will withdraw it reflexly. If it is found necessary to tie the frog down it can be done in the anaesthetized frog with little effort or care. Anaesthesia will last at least an hour, and we have kept demonstrations set up for two hours when the frog was wrapped in wet cotton. After the demonstration the frog will recover, especially if washed several times in cool water, and may be used later for any other laboratory purpose.

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