

The Pre-Lab as an Instructional Aid in Introductory College Zoology

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Many smaller colleges and universities face the problem of how to allow faculty members adequate time for scholarly activity and still maintain high-quality classroom instruction. This dilemma is particularly acute in undergraduate science departments that operate laboratories with minimal help from advanced students or in institutions where the philosophy prevails that a Ph.D. should be actively teaching in the labs. The problem may also confront schools that cannot expand their teaching staffs because of steady or slightly declining enrollments.

Our department decided to take another look at our large, introductory courses with labs to determine if there was some way to save time and still ensure quality education. Our introductory zoology course required three hours of lecture and three hours of lab per week. We had as many as five lab sections serving up to 150 students. Because of the three-hour lab format, we were required to offer labs on more than one day each week. If we could reduce the lab from three to two hours per week, we would not only reduce faculty contact time, but also significantly reduce the lab preparation time because all five lab sections could be offered on the same day.

In the three-hour lab format, we found that as much as thirty minutes were required to introduce the lab exercise and allow students time to read their lab manuals and become familiar with equipment and procedures. Three hours is too long to work continuously; and,

consequently, breaks tended to consume another twenty minutes. Based on these observations, we concluded that one hour of lab could be omitted if the students began the lab work immediately and that the two-hour format would require little break time.

To get students to prepare in advance for labs, we prepared an audio visual exercise they were to complete before coming to the laboratory. This pre-lab exercise was incorporated into our lab manual as a brief outline of topics discussed. It served as a guide for taking notes during the pre-lab session. The information in the pre-lab was only available from the tapes and slides. The purpose of the pre-lab was to bring each student up to the same level of knowledge and preparation before the lab started.

We designed all of our own pre-lab exercises. Each consisted of an audio-tape and slides. The audio-tapes were from 10 to 30 minutes long. A pre-lab introduced each exercise. Some background material was included, but the major part of the tape focused on introducing the use of instruments or techniques. For example, use of the microscope and the Spectronic 20 were in the pre-lab exercise and techniques for dissection were also covered. With the use of these pre-lab exercises five minutes or less were required for introducing the laboratory; this introduction largely dealt with the location of various materials to be used during that lab session.

The pre-lab is administered by our Learning Resource Center. We have two sets of tapes and 2 x 2 slides;

each tape player has four headsets so that a total of eight students can work simultaneously.

We did not require students to attend the pre-lab exercises, but they were encouraged to do so because some questions from the pre-labs were included on tests.

Evaluation

To evaluate use of the pre-labs we distributed a questionnaire to the students for two consecutive semesters. The results reported are the mean values for both semesters. We consider attendance to be quite good. Sixty-seven percent of the students attended ten or more of the thirteen pre-labs offered. At least three-fourths of the time, 54% of the students felt they had a good understanding of what to do when they entered the laboratory.

Perhaps the best preparation for laboratory work is to read the laboratory manual before the lab in addition to attending the pre-lab. Before attending the pre-lab sessions 29% of the students read their lab manuals at least three-fourths of the time. After attending the sessions 43% read their lab manual at least 75% of the time. Thus, as many as 72% were being motivated to study the lab manual before coming to the laboratory.

In all the above categories about half the class was participating in activities that prepared them to successfully complete laboratory exercises. With this level of participation, we observed that most laboratory activities proceeded
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work independently. In the process, we added objectives and lists of materials. The data and questions directed the students' attention toward particular events during their experimentation and also provided criteria for grading the study guides.

Question 3 asked students to respond to the statement, "The labs were stimulating." The auto-tutorial students gave the laboratory exercises higher ratings than did the conventional students. This indicated that the students may prefer to be in charge of their own educational experiences. Seventy-seven percent of the auto-tutorial students, as compared to 42% of the conventional students, agreed with the statement in Question 4, "Labs were relevant to my interests." Because the laboratory exercises were identical for both groups, this suggests that students respond favorably to individualized instruction.

We also asked students to respond to two statements regarding the minicourse, "Ecological Adaptations of Tracheophytes." These statements were:

"I found this minicourse stimulating."

"This minicourse was relevant to my interests."

Only 40% of the students said that the study of plants was relevant to their interests; however, 70% found the minicourse on plants stimulating. These results indicate that the students were more stimulated by the teaching method than by the content.

A course for non-science majors should provide the necessary tools for interpreting genetic regulation, nutrition needs, and population growth (Dodge 1976). A laboratory course provides students with experiences that facilitate learning. However, the course must be accessible to students. Conventional courses require students to commit a three-hour block of time. With the added flexibility in scheduling it provides, the auto-tutorial approach to laboratory instruction may enable

students who might otherwise not have time to enroll in a laboratory science course.

Students reacted positively toward auto-tutorial instruction. They enjoyed their learning experiences and felt they were achieving. Auto-tutorial instruction does not have to be used for an entire course, but can instead be incorporated into selected segments of a course when appropriate (Postlethwait, Novak, and Murray 1972). It is a viable alternative method of laboratory instruction for students attending conventional lectures.

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Pre-Labs

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rapidly and smoothly. When half the students were prepared, they also served as instructors. These students explained procedures or demonstrated techniques to their partners or others at their lab tables.

Mandatory attendance at the pre-lab exercises would probably enhance student performance. Our

observations of the increased preparedness when half the class was participating suggests that serious consideration should be given to requiring attendance at the pre-labs. We plan to incorporate a written exercise over the pre-lab material for the students to complete and hand in when they come to lab.

We feel that the above measures have contributed to meeting the lab requirements of our course in two hours per week. The pre-lab exercises offer the advantage of uniform instruction for all students and increase use of in-lab time for the study of important concepts.

Drugs

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clause, as students will discover if they write to their Congressional representatives regarding the issue.

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