Many of us have experienced the national trend of lower SAT scores but higher grade indicies for undergraduate students. In many schools the average grade has become a "B" rather than the "traditional C." This trend has created a problem of conscience, if nothing else, for many teachers. Those of us teaching beginning biology courses are faced with specific problems. Our students are going through the adjustment period that occurs between being an upperclass high school student and being a beginning college student. We are expected to expose the student to a wide range of biological materials, and more than that, to hold him or her accountable for the mastering of the materials so that he or she is prepared for the advanced biology classes. We are also in competition with many other areas of the college and, in some cases, some or many of these areas offer rather easy grades. As a consequence, it often seems expedient and perhaps even prudent to drop our expectancy level on tests so that we also have a "B" or at least a "C+" class average. The sad aspects of this transaction are mainly two-fold: both the student and the instructor know that the grade is a "gift" and is not indicative of the accomplishment of the student; and even worse, the student probably was capable of doing a much better job. The question then comes down to, "how can an instructor provide a learning situation such that it allows for the adjustment of learning to become a student, offers the opportunity for the students to earn a decent grade and, most important, turns out a decent biology student?"

We have put together a package learning situation which we hope will succeed in doing the above. As we are only into our second semester on this system, we can only give a preliminary report of results and draw rather cursory conclusions as to the long-term outcome. Our biology course for majors and minors is a two semester course with four hours credit for each semester. The lecture is three hours and meets for four 50-minute periods per week (MTTF), with the Tuesday session devoted to films and briefing for the laboratory exercise. Lab receives one hour credit and meets for two hours each week. Three faculty members participate in lectures each semester and the lab sections are directed by a faculty member and a junior graduate assistant or two senior graduate assistants, with at least one of them having experience in the course.

At the first lecture meeting, the students were given a mimeographed sheet indicating the topics to be covered in lecture and lab and the grading system to be employed in both. Without going into detail about the mechanics of the system, the student's grade in lecture was determined as follows:

1. Three lecture exams, each worth 50 points
2. Final comprehensive exam worth 100 points
3. Opportunity to take a repeat exam over material covered in first or second lecture exam
4. Each student was assigned both a plant and animal as his or her literature research organisms. At the beginning of some of the lecture periods, the student is given two minutes to answer a question concerning his or her organism. Each correct answer is worth one point.
5. Students may turn in summations of biological articles. The article must come from one of the journals in the science library and have been written within the last three years. A maximum of ten summations, worth one point each, may be turned in.
6. Students may present a ten minute seminar on a biological subject. Material for the seminar must be taken from recent articles (within the last ten years). A minimum of five articles must be used and a bibliography is turned in prior to the seminar. A maximum of three seminars, worth five points each, may be given.
7. Total points possible for the course:
   a. lecture tests - three at 50 pts  150
   b. final exam  100
   c. seminars  15
   d. summations  10
   e. bonus questions  10

                       /  total 285

8. Points equated to grades
   a. 90% of 250 test points  225 = A
   b. 80%  200 = B
   c. 70%  175 = C
   d. 60%  150 = D
   e. below 60%  = F

The grading system for lab was as follows:

1. There are 14 lab exercises, and there will be a ten point quiz given over
   exercises 4 through 14; a total of 11 quizzes.
2. Three repeat quizzes can be taken, one from 4-7, one from 8-11, and one from
   12-14.
3. The lowest quiz grade will be dropped.
4. A special two-hour research lab can be completed for three points. These
   labs are given once a week and a student can take three of these labs.
5. Total points possible:
   a. 10 lab quizzes at 10 points each  100
   b. Research lab exercises  9

                       /  total 109

6. Points equated to grades
   a. 90% of 100 test points  90 = A
   b. 80%  80 = B
   c. 70%  70 = C
   d. 60%  60 = D
   e. below 60%  = F

The results of the students' response to the opportunities to improve their grades in
lecture are summed up in Table 1. The same type of data are presented for the
laboratory in Table 2. The fact that 18% did not take a repeat exam in lecture and
44% did not take at least one repeat exam in lab can be partially explained by the
reason that some of the students had "A" grades on the original tests and felt there
was little chance or reason to try and improve their grade. But a certain percentage
had grades of such a quality that they could well have taken a repeat and did not.
A reason for the lower percentage of makeups in lab may be explained by the higher
grade average in lab as compared to lecture (Table 4). It is quite obvious that the
seminar presented a greater challenge than any of the other opportunities either in
lecture or lab, as only 32.4% presented one or more seminars. It also appears that
giving one seminar did not automatically lead to giving two or more seminars. In the
case of summaries, however, if a student prepared any summaries, he or she tended to
prepare all ten summaries as can be seen by the large percentage (25.57%) of students
turning in ten summaries. A similar response is seen in laboratory research exercise
participation where 36.6% attended three labs and only 12.8% and 15.1% attended one
and two exercises respectively. In the case of bonus point questions, the mean
number correct is about 5 for 94.8% of the students. The students were given a lab
exercise on the use of the library which may account for this high participation rate.
Table 1. Percentage of students (170) taking advantage of the various opportunities to improve their lecture grade.

<table>
<thead>
<tr>
<th>Number completed</th>
<th>Seminars</th>
<th>Summaries</th>
<th>Bonus questions</th>
<th>Makeup exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14.2</td>
<td>0.6</td>
<td>4.0</td>
<td>82.2</td>
</tr>
<tr>
<td>2</td>
<td>8.5</td>
<td>2.8</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9.7</td>
<td>2.3</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>4.6</td>
<td>12.1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>4.0</td>
<td>13.3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>2.3</td>
<td>17.3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>2.8</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>4.0</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>3.4</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>25.6</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>32.4</td>
<td>52.3</td>
<td>94.8</td>
<td>82.2</td>
</tr>
</tbody>
</table>

* One question was discarded because data were lacking for some of the organisms.

Table 2. Percentage of students (170) taking advantage of the various opportunities to improve their lab grade.

<table>
<thead>
<tr>
<th>Number completed</th>
<th>Research exercise</th>
<th>Repeat quiz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12.8</td>
<td>35.6</td>
</tr>
<tr>
<td>2</td>
<td>15.1</td>
<td>16.3</td>
</tr>
<tr>
<td>3</td>
<td>36.6</td>
<td>3.0</td>
</tr>
<tr>
<td>1-3</td>
<td>64.5</td>
<td>55.8</td>
</tr>
</tbody>
</table>

An examination of Table 3 gives some insight into the time factor in the students' participation in research labs and seminars. There was an attempt made to restrict the number of participants in seminar to 18 per session and in research lab to 30 per session. Only the first three and the last research sessions had less than 25 participants. The last session was given during final exam week which would account for the low number of participants; the low number in the first three sessions is due partially to inertia on the students' part and partially to the fact that they had not had any quizzes in lab at that time and did not feel the necessity for improving their grades. In seminars, it was not until the tenth session that at least 66% of the possible seminar limit was realized, and there was not a single session in which every available spot was filled. The first two seminars of the second semester have had two and five participants respectively, which, although this is a considerable improvement over the first semester, suggests that students continue to consider the seminar as the most difficult way to improve their grade. In comparison, the first lab session this semester had 27 students and several students have already turned in all ten of their summaries.
Table 3. Number of students participating each week in seminars and research lab exercises.

<table>
<thead>
<tr>
<th># of session</th>
<th>Seminar</th>
<th>Research exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th># of session</th>
<th>Seminar</th>
<th>Research exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>26</td>
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<td>10</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>11</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td>12</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>13</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Now to re-examine the original proposal of a learning situation which will do the following: allows for adjustment of learning to become a student, offers the opportunity to earn a decent grade, and turns out a decent biology student. It is our opinion that often an exam is a real eye opener to a student, particularly a freshman. And if one uses it as a learning experience, both the instructor and the student get some idea of the areas that require more work either on the part of the student and/or the teacher. That at least the students were able to use the exams in this manner is evident from the number taking repeat exams and the results of the exams. In lecture, 82.22% took a repeat exam and 77% improved their grades, 18% received a lower grade on the repeat exam, and 5% received the same grade. It should be noted that the repeat exams, while over the same material, were made up of new questions. In the lab repeat quizzes, the percentage improving their grades was slightly higher than in lecture. If one is chiefly concerned with the student mastering the material and not the time or effort that must be put in to accomplish this, then there is no major objection to repeat exams and it does accomplish the purpose of helping the student to adjust.

As to the accomplishment of the second point, "present the opportunity to earn a decent grade," this can be evaluated by examination of Table 4. Whereas the lecture grade distribution is a typical bell-shaped curve, the lab grades are much higher with the average grade being a "C+." The percentage of "D's" and "F's" are pretty much the same in lecture and lab but the average grade is skewed toward the "A" in

Table 4. Grade distribution by percentage for lecture and laboratory.

<table>
<thead>
<tr>
<th>Grade</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>10.7</td>
<td>18.9</td>
<td>37.9</td>
<td>22.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Laboratory</td>
<td>32.0</td>
<td>22.7</td>
<td>18.6</td>
<td>14.5</td>
<td>12.2</td>
</tr>
</tbody>
</table>
lab rather than to the "C" as in lecture. This could be due to any of several things: the lab tests are easier, the student is more apt to take advantage of the opportunities to improve his or her lab grade, or the student finds lab work more interesting than lecture material. At this time we are not able to say which one or combination of these factors is most important. Actually the first semester's grades are somewhat lower than the grades given for the same course in the previous year. Having participated in both the lectures and grade determination in the previous year, I know that it was necessary to drop the test point percentage considerably to enable the awarding of grades somewhat comparable to the ones the students received this year. It is our opinion that the student did not fare any better gradewise under this system, but did come closer to earning the grade he or she received.

As to whether the end product of this type of system will be a better biology student, only time will tell. It is our hope that introducing the freshman student to research labs, presenting seminars, and preparing summaries of scientific articles will stand him or her in good stead throughout his or her biological career. We also hope that it will get the student more deeply involved in the many facets of a professional biologist. We do know that this method gives the student a little more control over the grade that he or she receives and that so far most of the students seem to approve of and even enjoy many of the opportunities for grade improvement.

(The author expresses his thanks to Belinda Shenk for much of the mathematical analysis of the data and for the typing of the manuscript.)

* * * * *

LINGERINGS IN THOUGHT

Snow
is the stuff
that taunts
and teases
man's creative
patience.

What is life
but an apple bud
that can hardly taste of Spring
before becoming the commodity
that ends in someone's pies!

Spring
is a good friend
who comes bounding
from afar
to joust you from your doldrums.

Not every flower
in any garden
can provide
honey
for every bee.

=================================================================

TAKE TIME OUT NOW TO PUT IN YOUR INPUT

Committees solicit input and assistance from the membership.

USE THE ENCLOSED PINK INFORMATION BLANK

Make such suggestions and volunteer such assistance as you wish. Return to the Central Office for collation and forwarding to the appropriate chairperson.