Research Study Profile Sheet

Title: **Do Weekly Quizzes Improve Student Performance on General Biology Exams?**
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Summary/Abstract:

Encouraging students to study on a regular basis is one of the great challenges of large lecture courses, yet keeping abreast is essential if a student is to avoid feeling overwhelmed at exam time. One solution may be to motivate students to study smaller units of knowledge on a more frequent basis, e.g., for weekly quizzes. In addition, if the quiz format is different from exam format, students may feel less disadvantaged than in a multiple-choice-only course."

To assess the impact of quizzes, I added a quiz component to two college-level General Biology classes. I hypothesized that weekly quizzes would improve student performance on regular hourly exams.

Research Design/Methods:

In the fall of 1998, I taught two sections of college- level General Biology (Bio 102), using only four exams to determine student grades. Exams consisted of 50 multiple-choice questions, except the final exam that included 12 additional comprehensive questions based on material from the entire course. Section 98-03 met for 50 minutes at noon on Mondays, Wednesdays, and Fridays, while Section 98-05 met for 75 minutes at 2 p.m. on Tuesdays and Thursdays.

Two years later, in the fall term of 2000, I re-used the same exams for two additional sections (Sections 00-03 and 00-05) which met at precisely the same time as their sister sections in 1998. Sections 98-03 and 00-03 were given one identical set of exams, while Sections 98-05 and 00-05 were given a different, but internally identical, set. In addition, the first exam and the final exam were identical for all four sections, to detect any intrinsic differences in the abilities of the sections.

The experimental sections (in 2000) experienced weekly quizzes beginning the week after the first exam, whereas the control sections (in 1998) experienced no quizzes. On scheduled days, quizzes were given at the beginning of class, and consisted of five to seven fill-in-the-blank questions, based on lecture material since the last quiz or exam, as well questions from assigned readings (from previous lectures, or for that day's lecture). Quizzes for the two sections were distinct, and students were allowed to drop the worst grade from their eight quizzes. For students with legitimate excuses for missing a quiz (e.g., excuse from physician, dean, or coach), missing quiz grades were replaced with their average of all remaining quizzes.

Each section was specifically given the identical lecture sequence, overheads, study material, and textbook, etc., to minimize inconsistencies. In addition, the companion labs were

taught in the same sequence in both years, and attendance policy was identical and equally applied (I take attendance on days when it seems low, and alternate between +1 and -1 adjustments to the total course grade). The major difference between 1998 and 2000 sections was the method of delivery: In 1998, standard dry-erase boards were used, but in 2000 material was presented as a document camera display of my master notes. In both cases material was presented in outline format and was virtually identical.

A journal was also kept for the experimental classes, which were surveyed on their experience in December of 2000. The survey questions addressed how much time students spent studying for exams and for quizzes, and whether students felt that studying for quizzes helped on the exams. A final question asked if the students would have preferred the same course without quizzes

Analytical Methods:

For statistical analysis, I excluded all grades of students who missed one or more exams, leaving 54 to 59 students in each section. Only raw student grades were included. Averages of student grades were compared using students' t-tests, with p=0.05 and n + n-1 degrees of freedom."

Results:

Comparison of sections:

General Biology is primarily composed of non-majors. Freshmen were the most numerous academic class in one of the four sections (00-05), but sophomores were the most numerous group in the remaining three sections. The Composite ACT scores for these sections varied little, based on a large subsample (82 to 100% of the class). However, performance on the first exam, which was identical for all four sections, varied markedly (from 64.6% to 68.9%), but no significant difference was found between any sister sections (i.e., between 98-03 and 00-03, or between 98-05 and 00-05). These data suggest that the sections were composed of students of comparable abilities.

Exam scores:

Average exam scores for Exams 2 to 4 varied from 59.62 to 68.15. In general on these exams, the quizzed sections in 2000 tended to do somewhat better (except for 00-03 on Exam 2) than their sister sections in 1998, by up to 4%. None of the averages for the exams from the experimental (quizzed) sections was significantly (p=0.05) higher than the same exam from the control (unquizzed) sections.

Quiz scores:

Although irrelevant to the research hypothesis, students performed poorly on the first four quizzes (average of the first four quizzes was 54% and 45% for 00-03 and 00-05, respectively). Subsequent quizzes were less difficult and grades improved (average of the last four quizzes was 77% and 73%, respectively). Overall, the scores averaged 69% and 64% for quizzes in Sections 00-03 and 00-05, respectively.

Journal & survey:

Little unusual activity was noted in the experimental sections, except for one event in 00-05. On October 26, this section expressed displeasure at its low grades on quizzes and on exams, so we discussed the issue for half of the class period. Subsequent quizzes for both experimental sections were considerably easier, although exams remained identical to their sister section from 1998. During the first meeting in November, I polled the experimental sections to gauge their study time relative to the basic University expectation of one hour of study each week for each hour in class (aside from specific study prior to an exam). In 00-03, only 2 students (of about 50 present) indicated they study at least this much; in 00-05, only 4 of the 50 did. The end-of-term survey revealed that students averaged about 4 to 5 hours of study for each exam, and about 1 hour for each quiz (Table 3).

Table 3.

Results of the survey administered to the quizzed sections in 2000, excluding "no opinion" responses. The number of respondents varied from 40 to 47 for each item.

Section	Hours Studied for Each Exam	Hours Studied for Each Quiz	Felt Quiz Study Helped on Exams	Preferred Quizzes
00-03	4.81 ± 3.70	0.96 ± 0.87	67%	67%
00-05	3.59 ± 2.45	0.95 ± 0.78	57%	58%