
The Exam-A-Day Procedure Improves Performance in Psychology Classes

Frank C. Leeming
University of Memphis

Students in 4 classes had a short exam at the start of every class. Grades were significantly better than in previous classes where the same material was taught but with only 4 exams, and there were fewer withdrawals from the exam-a-day classes. Students taught with the exam-a-day procedure also performed better on a retention test than did students from classes taught using less frequent exams. Responses to anonymous questionnaires administered in all 4 classes indicated that most students believed having an exam every day led to more studying and better learning than in their other classes and that they liked the procedure.

My teaching style for many years included four scheduled exams per semester with an optional final exam for students who wished to drop one grade. Exams consisted primarily of short-essay questions taken from about 75 study questions included in the course syllabus. Each exam also included several fill-in-the-blank or definition questions intended to ensure that students read the textbook.

Although many students in my classes have generally made high grades, I have been unhappy with the number of Ds and Fs. My impression has been that poor performance has most often been the result of simply not enough studying rather than students' lack of ability. Regarding study time, Michael (1991) discussed what he called the "procrastination scallop." He argued that the college environment provides many activities that compete with studying and lead to procrastination until an exam is imminent. Of course, the resulting last minute cramming is often insufficient. Michael proposed more frequent exams as a remedy for the procrastination scallop.

Bangert-Drowns, Kulik, and Kulik (1991) conducted a meta-analysis of 35 studies of the effects of frequency of classroom testing. All studies that measured student attitudes found more frequent tests related to more positive attitudes

about the class, and 29 showed a positive effect on final-exam performance. The average effect size (ES) of the 35 studies was .23. Twelve of the studies used psychology classes and 8 of these found a positive effect, although the average ES was only .10. However, no one gave exams more often than once per week, and the average was an exam only every 10.01 days. Furthermore, performance on a scheduled final exam was the only outcome measure analyzed. In these circumstances, any effect of frequent exams might be masked by the tendency of most students, regardless of number of previous exams, to study hard for a final exam.

Michael's (1991) rationale and the data reviewed by Bangert-Drowns et al. (1991) convinced me to use more frequent testing. I chose to give an exam every day, although I had never heard of anyone using this strategy. Results from my first class were such that I have continued to use the technique in subsequent undergraduate classes. The following sections provide a brief description of my class format with an exam-a-day and a description of the outcome in four classes, including both attitudes of the students and data comparing performance of these students to those in my previous classes.

Method

Participants

I originally used the exam-a-day procedure in a Learning and Memory course taught in a 5-week summer term ($n = 21$). I subsequently used the technique in two sections of Introductory Psychology ($n = 143$) and again in Learning and Memory the following summer ($n = 28$). In all apparent respects, students in exam-a-day classes were indistinguishable

from my students in comparison classes from previous years (i.e., gender, major, year in school).

Class Format

Learning and Memory met 5 days per week with each class lasting 100 min. Introductory Psychology met 2 days per week with classes lasting 75 min. Teaching style and class format were the same as in previous classes in almost every respect. I used the same study questions (with minor alterations each term) and syllabi for each course, the same grading procedure and grade scale (90% = A, 80% = B, etc.), and the lecture mode of teaching. The main difference was that I gave an exam during the first 10 to 15 min of each class, beginning with the second class meeting, rather than only four times during the course.

Most exams had two short-essay questions, taken from the pool of study questions provided in the syllabus, and about five short-answer questions based on material from the text or lecture. After the exam, I spent 2 to 3 min discussing the correct answers and then devoted the remaining time to normal teaching activities.

The syllabus stated that students could drop the three lowest exam scores with no penalty. I adopted this procedure to allow for any accident, illness, or situation preventing attendance. Thus, in a typical class with 22 to 24 exams, the semester grade for students choosing not to take the optional final exam was based on their best 19 to 21 exam scores. Students could choose to take a comprehensive final exam to drop an additional three exam grades, but few students took this option.

Retention Test

Volunteer students from three sections of Introductory Psychology, taught during the same semester by three different instructors, completed a 2 hr retention test near the end of the semester. Participation satisfied the departmental requirement for research participation. Forty-eight participants were from the exam-a-day section, and the other 30 were from sections that had only three exams during the semester. All sections used the same textbook and covered the same chapters in the same order. The retention test contained questions cover-

ing the first four chapters of the textbook and associated lecture material. This material had constituted a single test block in two sections, whereas students in the exam-a-day section had taken 13 short tests over the material. At least 6 weeks had passed since any of the three instructors had covered this material and, to minimize rehearsal, participants were not informed of the nature of the experiment. Thus, the test clearly measured long-term retention.

Considerable care was taken to construct a fair test (details of the procedure are available on request). The test contained randomly selected short-essay, multiple-choice, and fill-in-the-blank questions from the class exams previously administered by each of the three instructors. There were six separate test sessions and each included students from all of the classes. Instructions on the exam booklet encouraged students to do their best but also stated that scores would be confidential and would have no influence on course grades. Individuals unaware of student identification scored all tests.

Results

Student Reactions

Students in each class completed an anonymous questionnaire about the exam-a-day procedure near the end of the term. Students indicated whether they agreed, disagreed, or were unsure about statements concerning the procedure. Table 1 summarizes responses with data presented separately for the different courses.

Responses consistently showed a positive evaluation of the exam-a-day procedure, and there were no systematic differences between courses. The vast majority of students reported that the procedure had led to more studying, they kept up with the material better, they learned more than in most of their other classes, and they liked the procedure.

Attendance and punctuality improved dramatically over previous classes. This result, of course, was not surprising given that every class began with a timed exam.

Semester Grades

I compared the final semester grades of students in the exam-a-day classes with those of students in the most recent

Table 1. Responses to Survey by Students in Two Courses

Statement	Learning and Memory ^a		Introductory Psychology ^b	
	Agree	Disagree	Agree	Disagree
1. I was skeptical when the procedure was first described.	48	36	62	28
2. I studied more for this class than for most.	70	9	65	23
3. I learned more than I would have with just a few exams.	79	9	85	9
4. I kept up better than in most classes.	91	3	85	10
5. Given a choice, I would choose this procedure over just a few exams.	67	12	80	12
6. Having this course will help me manage study time in the future.	74	6	65	9
7. I like the test-a-day procedure better than just a few tests.	77	6	78	15
8. Test-a-day has been an awful experience.	6	90	10	81
9. I recommend using the test-a-day procedure next semester.	81	0	83	8

Note. The values represent mean percentages of responses over two classes within each course. Percentages do not sum to 100 because responses to the option "unsure" have been omitted.

^a*n* = 33. ^b*n* = 99.

sections of the same classes that I had previously taught with only four exams. In Learning and Memory, the respective means were 89% ($SD = 8.13$) versus 81% ($SD = 17.61$). This difference, corrected for unequal variances, was significant, $t(81) = 2.88, p = .005$. The ES, calculated using the method of Shadish, Robinson, and Lu (1997), was .64. In Introductory Psychology, the respective means were 80% ($SD = 22.92$) versus 74% ($SD = 22.11$). This difference was also significant, $t(232) = 2.03, p = .04, ES = .27$.

In Learning and Memory, the percentage of Ds and Fs dropped from 21% in two previous classes to 2% in the two classes with an exam every day, whereas the percentage of As and Bs increased from 67% to 81%. In Introductory Psychology, the percentage of Fs dropped from 27% in two previous classes to 12% in the two classes with an exam every day, whereas the percentage of As increased from 22% to 43%. Percentage of withdrawals remained at 11% in Introductory Psychology but dropped from 21% to 13% in Learning and Memory.

Retention Test

Class exam scores were higher for students in the exam-a-day class than for students in the two traditional classes, but analyses found no evidence that the retention test involved a biased sample of students. On the retention test, students from the exam-a-day class scored significantly higher ($M = 54%, SD = 13.26$) than did those from the traditional classes ($M = 48%, SD = 13.34$), $t(77) = 2.05, p = .04, ES = .47$. An ANCOVA on the retention scores, correcting for differences on the in-class scores, failed to show a significant difference. Thus, the better retention scores of the exam-a-day students was the result of better initial learning rather than any effect on memory processes.

Discussion

Despite the work of authors such as Bangert-Drowns et al. (1991) and Michael (1991), I am not aware of anyone in psychology testing students very frequently. However, after repeatedly using the exam-a-day procedure in two different courses, I am convinced that this is a better teaching technique than giving infrequent exams over large amounts of material. Average semester percentages in two courses were more than half a letter grade higher than when I taught the same courses with only four exams. Furthermore, the number of high grades was substantially increased and the number of low grades was substantially decreased in all classes with an exam-a-day. The ESs of all comparisons were well above the average of the 12 studies with psychology classes with an average of an exam every 10 days reviewed by Bangert-Drowns et al. Finally, most students reported that the exam-a-day technique increased studying, increased learning, forced them to keep up with the material, and that they liked the procedure.

I have encountered several objections to the exam-a-day procedure. Most serious is the possibility that the procedure results in superficial learning and little retention. I believe that answering the essay and short-answer questions that

constitute my exams requires understanding of concepts and principles at an appropriate level. For example, a question from Introductory Psychology asked "Explain how a nerve impulse (action potential) occurs and how it is an all-or-nothing event." A question from Learning and Memory asked "Describe Rescorla's objections to commonly used controls in classical conditioning, and the control that he advocates. Thoroughly explain the rationale for his position." Students given daily exams have performed better than those tested infrequently on such questions, convincing me that level of conceptual understanding of the material is, if anything, improved by more frequent testing. Regarding retention, students from the exam-a-day class had higher absolute scores than students from the traditional classes on the retention test. Although this difference is due to better original learning, the fact remains that these students knew more of the material than students from traditional classes well after class coverage of that material.

Another objection to the exam-a-day format is that it leaves less time for teaching. In fact, it was necessary for me to eliminate some material from my usual lectures the first time the procedure was used in both courses, but the major effect was to reduce redundancy rather than to omit basic material. I believe that, if anything, my lectures are now better and more focused than they were when exams were widely spaced. In fact, I suspect that many instructors show the same procrastination scallop for covering large amounts of material as students do for studying. The bottom line, however, is amount learned, and all of the evidence that I see indicates better learning by more students with the exam-a-day procedure.

A final objection that deserves mention is workload for the instructor. My two Learning and Memory classes met every weekday for 5 weeks and had an average enrollment of 24 students. I spent about an hour grading papers every day and did not find the time to be onerous, especially given the unusually high quality of the student work. However, if grading should become too time consuming, I would probably try more objective and fewer essay questions. I would be extremely reluctant to reduce exam frequency.

References

- Bangert-Drowns, R. L., Kulik, J. A., & Kulik, C. C. (1991). Effects of frequent classroom testing. *Journal of Educational Research, 85*, 89-99.
- Michael, J. (1991). A behavioral perspective on college teaching. *The Behavior Analyst, 14*, 229-239.
- Shadish, W., Robinson, L., & Lu, C. (1997). Effect size (ES) analysis software (Version 1.0) [Computer software]. Memphis, TN: University of Memphis.

Notes

1. I thank Beverly Schaeffgen for her help with the conduct of the retention test.
2. Send correspondence to Frank C. Leeming, Department of Psychology, University of Memphis, Memphis, TN 38152; e-mail: f.leeming@mail.psy.memphis.edu.