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COLLEGE STUDENTS' STUDY TIME: COURSE LEVEL, TIME OF SEMESTER, AND GRADE EARNED[1]

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Summary.—The association of total study time, number of events, time per event ratio, study strategies, and course grades across the semester were examined by linking students' study logs to course performance. There were 37 upper-division and 109 lower-division participants. Students earning As and Bs studied more frequently at the end of the semester but for shorter periods of time than students earning lower grades. Results are discussed in terms of providing college students and faculty with recommendations about learning strategies and time spent studying.

"All learning, whether done in school or elsewhere, requires time" (Bloom, 1974, p. 682). This seemingly simple statement belies the complexity of the issues in understanding college student study time and the subsequent outcomes. Faculty commonly assign papers, quizzes, labs, group projects, and other types of homework. Examination of the literature on college students' study time yielded three categories of studies: those that focused on predicting grade point average (GPA) and course grade (e.g., Allen, Lerner, & Hinrichsen, 1972; Chissom & Iran-Nejad, 1992; Gortner Lahmers & Zulauf, 2000); those examining differences between successful and not-so-successful students (e.g., Bloom, 1974; DeVito, Tryon, & Carlson, 1983; Macan, Shahani, Dipboye, & Phillips, 1990); and those broadly addressing theoretical issues in strategies for improving study (e.g., Gijselaers & Schmidt, 1992; Zimmerman, Greenberg, & Weinstein, 1994; Kember, Jamieson, Pomfret, & Wong, 1995). For example, Allen, *et al.* (1972) reported high school grade rank was the best predictor of college GPA, but the number of study days in college improved predictions of GPA. Gortner Lahmers and Zulauf (2000) found that time-management skills and study time were positively correlated with GPA, and overall GPA increased only .03 points per additional study hour per week. Given these results, substantial increases in study time would be required for noticeable change in GPA. Although increasing study time was beneficial, examining the particular strategies of students may be more fruitful (see also Cappella, Wagner, & Kusmierz, 1982).

Michaels and Miethe (1989) stated freshmen and sophomores benefited

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more from increased study time than juniors and seniors. Examining college students' time management, Macan, *et al.* (1990) noted students with greater perceived control over time reported higher work and life satisfaction, fewer feelings of overload, and less stress. Understanding such perceptions might be as important as understanding their use of time. No investigations directly addressed the issue of how much study time college students should expend on assignments to achieve a particular grade in a class. In this study, total time studied, number of study events, and time per study event were examined in relation to course outcome, final grade.

College students are likely to modify their strategies and study time as they approach various deadlines and test dates with knowledge of results from previous tests. For example, as students become more familiar with instructors, course complexities, semester schedules, and as they receive feedback on performance, strategies may shift. Study strategies can also be course-dependent. For example, lower-division general education courses do not place the same demands on students as upper-division special emphasis courses. Here, study time was measured in relation to course grade, time in the semester, and course level. It was hypothesized that (a) students receiving higher grades would report more study time (e.g., Gortner Lahmers & Zulauf, 2000); (b) those receiving higher grades would have more efficient study time, requiring fewer study sessions, especially as the semester progressed; and (c) students receiving higher grades would report less study time per study event, given greater efficiency and better use of study strategies.

Method

Participants

Participants were 37 upper-division students enrolled in a Psychological Measurements course and 109 lower-division students enrolled in a General Psychology course. Students completed study logs or other activities for extra credit. Only data from 37 of 42 upper-division students (88.0%) and 109 of 200 lower-division students (54.5%) who completed both the early and late set of study logs were analyzed.

Materials and Procedure

To complete the study logs, students were instructed to use a code indicating what activity or activities they performed during a particular day and the approximate amount of time in minutes. On a given day, students reported one or more of three activities: studied for a test, worked on paper, and earned research credit. The logs showed adequate reliability over 2 wk. ($r = .89$; Huskinson, Arellanes, Turrisi, & Landrum, 1998).

Students completed a study log early in the semester (2 wk. prior to the

first examination) and again late in the semester (8 wk. later and 2 wk. prior to an examination). This design allowed a check on changes not only in the 2 wk. prior to a test, by comparing the week prior to the test with the week of the test but also examined change in study strategies from early to late in the semester. The three dependent variables were the number of minutes studied per week (total time), the number of study events per week (number of events), and the mean number of minutes studied per study event (time per event ratio).

Students were also asked to write their names and social security numbers on the study logs to receive course credit. Although this feature might have prompted a socially desirable response, this issue was addressed in several ways by emphasizing the importance of honest answers and having students informed about the procedures of collecting and storing data, which ensured confidentiality. Students also were informed that the envelope would remain sealed until the end of the semester and after grades were assigned. They could check security of the data at any time during the semester. Finally, the present study used other procedures (Turrisi & Landrum, 1997; Huskinson, Turrisi, & Landrum, 1998) in which random spot-checks on log entries indicated accurate estimating. This procedure was used for self-report methods assessing study time (Everwijn & Willemsen, 1984; Reed, Puchalski, Denham, & Michael, 1984). At the completion of the semester, students' final course grades were matched with data from their study logs. This study was initiated as a class demonstration by the professors. When it was realized that these data might be published, the Institutional Review Board was approached and gave project approval.

Results

Analyses are reported for examination of total time, number of events, and the time per event ratio. A mixed measures analysis of variance was applied with two between-group factors of course level (Lower-division, Upper-division) and course grade (A, B, C, D), and two repeated factors, time (Early Semester, Late Semester) and week (1, 2). Effects were considered meaningful only if η^2 had a value indicative of a medium effect size, greater than or equal to .05 (Turrisi & Jaccard, 1991). Finally, follow-up pairwise comparisons were evaluated using a Tukey *HSD* test based on suggestions by Jaccard, Becker, and Wood (1984).

Total Time

A 2 (course level: lower-division, upper-division) × 4 (course grade: A, B, C, D) × 2 (time: early, late semester) × 2 (week: 1, 2) mixed model analysis of variance applied to the total number of study minutes per week gave a significant main effect for course level ($F_{1,136} = 23.82$, $p < .001$, $\eta^2 = .15$). Examination of the means indicated upper-division students studied more than

twice the number of minutes per week ($M = 529.5$ min., $SE = 54.0$) as lower-division students ($M = 252.5$ min., $SE = 17.4$). There was also a main effect for time ($F_{1,136} = 11.36$, $p < .005$, $\eta^2 = .08$). Students studied more later ($M = 441.4$ min., $SE = 37.0$) than earlier in the semester ($M = 340.7$ min., $SE = 26.2$).

Number of Events

A $2 \times 4 \times 2 \times 2$ (course level by course grade by time by week) mixed model analysis of variance was conducted on the number of study events, i.e., the frequency of all study events for the entire week. There was a significant main effect of course grade ($F_{3,138} = 10.97$, $p < .001$, $\eta^2 = .19$). Means indicated students who received As ($M = 9.6$, $SE = .9$) reported studying significantly more often than students who received Bs ($M = 3.8$, $SE = .8$), Cs ($M = 4.5$, $SE = .3$) or Ds ($M = 4.5$, $SE = .2$). There was also a significant main effect of time ($F_{1,136} = 31.64$, $p < .001$, $\eta^2 = .19$). These means showed students studied more frequently later ($M = 6.4$, $SE = .4$) than earlier in the semester ($M = 4.8$, $SE = .3$). There was a signficant interaction of time and course grade ($F_{3,138} = 11.30$, $p < .001$, $\eta^2 = .19$); the actual means and standard errors for this interaction are presented in the top portion of Table 1. A similar mean number of study events early and late in the semester was noted for C and D students, but those earning a B grade increased an average of 1 event later in the semester and A students increased by a mean of 4 or more events later. Finally, there was also a significant interaction between time, course grade, and course level ($F_{3,138} = 11.24$, $p < .001$, $\eta^2 = .19$); the actual means and standard errors for this interaction are presented in the bottom portion of

TABLE 1

MEANS AND STANDARD ERRORS OF NUMBER OF STUDY EVENTS: INTERACTIONS FOR GRADE × TIME IN SEMESTER AND GRADE × TIME IN SEMESTER × COURSE LEVEL

Grade	Time in Semester			
	Early		Late	
	M	*SE*	*M*	*SE*
A	7.34	.87	11.90	1.05
B	3.23	.84	4.38	1.01
C	4.20	.30	4.76	.36
D	4.53	.23	4.55	.28
Lower Division				
A	4.68	.58	5.31	.70
B	2.96	.30	3.77	.36
C	3.85	.25	4.74	.30
D	3.92	.33	4.58	.40
Upper Division				
A	10.00	1.64	18.50	1.99
B	3.50	1.64	5.00	1.99
C	4.55	.55	4.77	.66
D	5.15	.32	4.53	.39

Table 1. For the lower-division students, a number of study events from early to late in the semester showed a slight increase for all grades. For the upper-division students, however, there was no significant increase in study events for B students but a significant increase in study events for A students.

Time Per Event Ratio

A $2 \times 4 \times 2 \times 2$ (course level by course grade by time by week) mixed-model analysis of variance was applied to mean number of minutes per study event. The interaction between time and course grade was significant ($F_{3,136} = 4.61$, $p < .01$, $\eta^2 = .09$); the actual means and standard errors for this interaction are presented in the top portion of Table 2. Mean minutes per study event increased from early to late for C and D students but decreased for A and B students. The interaction between time, course grade, and course level was significant ($F_{3,136} = 3.79$, $p < .01$, $\eta^2 = .08$); the actual means and standard errors for this interaction are presented in the bottom portion of Table 2. For the lower-division students, increases in time per event from early to late in the semester for all grades were not significant, but for the upper-division students this increase was statistically significant for C and D students and A and B students showed a decrease in time per study event.

TABLE 2
MEANS AND STANDARD ERRORS OF TIME PER STUDY EVENT: INTERACTIONS FOR GRADE × TIME IN SEMESTER AND GRADE × TIME IN SEMESTER × COURSE LEVEL

Grade	Time in Semester			
	Early		Late	
	M	*SE*	*M*	*SE*
A	50.94	15.92	48.25	22.05
B	105.56	15.27	66.72	21.15
C	65.95	5.48	95.25	7.59
D	73.84	4.21	105.17	5.82
Lower Division				
A	40.32	10.61	45.28	14.70
B	54.86	5.58	61.35	7.72
C	59.73	4.48	67.64	6.20
D	68.40	6.00	83.29	8.32
Upper Division				
A	61.56	30.02	51.22	41.58
B	156.25	30.02	72.08	41.58
C	72.16	10.00	122.85	13.86
D	79.28	5.89	127.04	8.15

DISCUSSION

Despite the variety of ways in which investigators have examined study time, to our knowledge no investigations directly address the issue of how

much study time is spent by college students on an assignment to achieve a given outcome, e.g., an A versus a C. The present study examined study time variables (total time, number of events, and the time per event ratio), study time allocations in relation to course outcomes across a semester.

Total Time

Students receiving higher grades (As and Bs) were hypothesized to report more total time studying than students receiving lower grades (Cs and Ds) (cf. Gortner Lahmers & Zulauf, 2000), but this hypothesis was not supported. However, some interesting patterns in total time emerged. Students in upper-division courses reported more time studying than those in lower-division courses. Also, students reported more time studying as the semester progressed. Upper-division students were more adaptive than lower-division students. The latter tended to keep a constant strategy throughout the semester.

Number of Events

Students with higher grades were expected to report fewer study events in general, given their more efficient study strategies such as generally suggested (Cappella, *et al.*, 1982; Zimmerman, *et al.*, 1994). This hypothesis was not supported. Overall, students receiving A grades studied twice as much as those receiving Bs, Cs, and Ds. Whereas all students seemed to increase the frequency of study later in the semester, A students were particularly adaptive in increasing the number of study events late in the semester. Upper-division students seemed to adapt more than the lower-division students, perhaps given increased difficulty of the course or past experiences; upper-division A students more than lower-division increased frequency of study toward the end of the semester relative to their grade. Students with higher grades reported studying more often, which was moderated by coure level.

Time Per Event Ratio

Students receiving higher grades were hypothesized to report less study time per event, being more efficient (e.g., DeVito, *et al.*, 1983; Macan, *et al.*, 1990). In general, this hypothesis was supported. Overall, A and B students had different strategies of studying than C and D students. A and B students actually decreased time spent studying per study event as the semester progressed, whereas C and D students increased that time. The patterns of change over time differed for lower- and upper-division students, however. Lower-division students, regardless of grade, increased time per study event across the semester, but upper-division A and B students decreased time per study event, while C and D students showed an increase from early to late in the semester.

Conclusions

These findings indicate that A and B students in this sample had different adaptive strategies over the course of the semester than the C and D students. Moreover, these patterns varied for those in lower- and upper-division courses. A and B students tended to increase their frequency of studying as the semester progressed, but they decreased the actual time spent studying per study event—this finding expands upon the outcomes of previous studies (e.g., Gortner Lahmers & Zulauf, 2000). This may allow students to minimize forgetting and interference. Repetition of study events appears to be a successful strategy for these students. Conversely, C and D students did not study much more often at the end of the semester, but they increased the amount of time spent studying per study session, i.e., cramming. This strategy may be inefficient if students study past spans of concentration. These findings are congruent with suggestions by Cappella, *et al.* (1982) in an examination of college students' strategies of study.

Perhaps important suggestions for students are that: (a) students earning good grades, i.e., As and Bs, study more often toward the end of the semester; (b) students earning good grades study for shorter periods of time later in the semester; and (c) as course difficulty increases, the effort to receive an A vs B increases disproportionally. Self-monitoring course grades and willingness to make adaptive changes appear desirable. Students receiving Cs and Ds do not change their frequency of studying but increase study time per event later in the semester. Faculty could make such proactive suggestions in their syllabus. Use of a study log could provide baseline information useful as information on types of study strategies best suited for a course.

Although the present findings illustrated the merit of the methodological approach, the research has limitations. The variables measured are not independent of one another. Another is the issue of the generalizability of the findings, as this study was conducted at a single institution and in one department. The instructors differed for upper- and lower-division courses. Previous research has shown a small relationship between the instructor's style and course performance (e.g., Delucchi, Rohwer, & Thomas, 1987), so instructors' style of teaching was not evaluated. Third, students' effort in these classes was examined without consideration of outside pressures such as work, course load, etc. Examining how students organize their study activities around other time demands is worth assessment.

In sum, the present study yielded information relevant to how much time students should study. Students must take into consideration the type of course, the time periods before tests, the time during the semester, and their desired grade. Self-monitoring performance and adaptation to the demands of the course are relevant activities.

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