
Procrastination in Online Courses: Performance and Attitudinal Differences

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This study investigated the relation between dilatory behaviors and performance in students whom we randomly assigned to either an online or a traditional, lecture introductory psychology class. Both sections had full access to a class Web site. There were no reliable differences between the 2 sections of the class on the measures of procrastination, exam performance, or attitudes toward the class. Yet, procrastination was negatively related with exam scores and with attitudes toward the class for the online students, but not for the lecture students. This difference may partially explain why online courses designed to increase the educational efficacy of a course often show no difference in performance when compared to lecture classes.

Online courses are becoming increasingly common; Newman and Scurry (2001) stated that more than 1,100 institutions of higher education in the United States offer courses online. They further claimed that enrollment in such courses is increasing. Given the number of students taking online classes, it becomes important to explore the possible impact that these classes have on the students. Although many studies have found no statistically reliable difference in the performance of students in online and traditional classes (Russell, 1999), these studies do not necessarily address whether the learning experience in online classes is different from that of traditional classes. One difference may be that online classes that have no strict study schedule provide more opportunities for procrastination than their traditional counterparts.

Why might the effects of procrastination be a greater problem in online classes than traditional lectures? One possible reason is that although students in traditional lecture classes may procrastinate, going to class exposes them to the material on a regular basis. Thus, at least part of their study time (e.g., time spent listening to the lectures) is distributed across time. Students in an online class may not access any of the class material until the day before the exam. Thus, online students may mass a larger part of their study time compared to those students in lecture classes. In our introductory psychology online course, we found that the number of Web pages accessed per day peaked either the day before or the day of each exam. Leasure, Davis, and Thievon (2000) reported that one of the reasons that nursing students preferred classroom instruction over Web-based instruction was the decreased potential for procrastination in the classroom. Wilkinson and Sherman (1990) queried eight educators who

taught telecommunication-based distance education classes about student procrastination. The courses were offered in a variety of disciplines, including architecture, business, economics, history, and psychology. The opinion of nearly all of the educators was that the distance education classes needed more structure and those students who began work early and paced themselves were more likely to complete the course than those who did not.

Tice and Baumeister (1997) found negative correlations between self-reported tendencies to procrastinate and grades on exams and papers. Tice and Baumeister found negative correlations between procrastination and symptoms of illness and stress when measured early in the semester. When measured late in the semester, positive correlations were found between procrastination and symptoms of illness, stress, and visits to health-care professionals. Tice and Baumeister concluded that the health problems procrastinators tend to face later in the semester outweigh the health benefits enjoyed by the procrastinators early in the semester.

Melton (1970) reviewed the large body of experimental literature on massed versus distributed practice and concluded that cramming, or massing all of the study time into a single session, has deleterious effects on retention of material. Thus, procrastination, which forces learning into a shorter period, should also have a negative effect on long-term retention of material. Procrastinators do not distribute their learning over a long period; instead, they tend to "cram" or have a long duration study session just prior to the exam (assuming that they do study for the exam).

If procrastination is a problem in online classes, it would be desirable to know which students are most at risk for procrastination. Instructors could then offer the at-risk students interventions designed to reduce dilatory behaviors. Watson (2001) and Schouwenburg and Lay (1995) correlated self-reported procrastination with five factors of personality. Both found a reliable relation between self-reported procrastination and low conscientiousness. Watson found a reliable relation between procrastination and neuroticism. Schouwenburg and Lay also found some, but not all, facets of neuroticism to be related to procrastination.

This study examined the relation between dilatory behaviors and exam performance in both a traditional and an online section of an introductory psychology class. We randomly assigned students to a Web-based class or to a traditional, lecture-oriented class. Students in the traditional class also had

full access to the course Web site. A Web server measured who visited the Web pages and when they visited. We were interested in whether there were differences in the amount of dilatory behaviors between the two classes, the relation between procrastination and performance on exams, student attitudes toward the class, and the relation between the personality traits of neuroticism and conscientiousness to procrastination.

Method

Participants

Fifty-four students initially enrolled in the two classes. The final class enrollment consisted of 25 students in the lecture condition and the 22 students in the online condition. Two students from the lecture class and 5 students from the online class did not complete the course; we did not use their data in any of the analyses. There were 14 women and 8 men in the online class. There were 17 women and 8 men in the lecture class. The mean age was 18.6 years with a range from 18 to 21 years. The students volunteered to participate. We treated the students in compliance with the ethical standards of the American Psychological Association (1992).

Design

We randomly assigned students either to the lecture or to the online class. The students in the online class came to class only to take tests. They had access to an extensive class Web site, which contained audio lectures, graphics, videos, and activities. The lecture class met twice a week for 75 min. The lecture students also had full access to the class Web site.

The class Web site was password protected and a Web server kept a log of when students accessed the site. We computed a measure of procrastination for each student based on the first date of access for each Web page on the class Web site. We then calculated the difference between the date of first access and the date of the exam that contained the material covered on that page. As a measure of procrastination, we calculated the mean of these values for each student, with two exceptions. The first exception was if the date of first access occurred before the test for the previous section. For example, if a student accessed material for Exam 2 before we gave Exam 1, we did not enter this value into the procrastination measure. This exception assumes that students will not study material for a given exam until they have taken the previous exams. The second exception was if the date of first access occurred after the test for that material because it could not help a student on the test. Procrastination measure values near 0 indicate much procrastination (i.e., there is little time between the test and when the material was accessed) and larger values indicate less procrastination.

Procedure

Before enrolling in the class, the students completed an informed consent form that stated we would randomly assign them either to come to class or to take a Web-based course.

All of the students met with the instructor on the first day of class. After some introductory comments, the students took the NEO-Five Factor Inventory personality inventory (Juni, 1995). We then informed the students about the section of the class to which we assigned them.

Both the lecture and online students met at the same time and in the same room to take the five multiple-choice exams. The instructor evenly dispersed the first four exams across the semester. The first four exams were noncomprehensive and consisted of an average of 76 multiple-choice questions. The final exam was comprehensive and consisted of 101 multiple-choice questions. After completing the final exam, the students answered an end-of-semester attitude questionnaire about the class.

Results

The lecture class had a mean procrastination measure of 7.24 ($SD = 7.38$), and the online class had a mean of 6.30 ($SD = 4.61$; recall that smaller values indicate more procrastination). A two-tailed independent samples t test for unequal variances failed to reveal a statistically significant difference in the procrastination measure between the two classes, $t(37.35) = -0.51, p = .61$. We computed Pearson's product-moment correlation coefficient between the procrastination measure and the score on each of the five exams and the total number of points in the class for each class. Table 1 shows the correlation coefficients between dilatory behaviors and exam scores. All of the significant correlations were positive, which indicates that greater dilatory behavior was related to lower scores on exams (the larger the value of the dilatory measure, the less dilatory behavior the person showed). As shown in the last column of Table 1, the correlation coefficient was significantly larger for the online class than for the lecture class for Exams 1 and 3. The relation was in the same direction, but not statistically reliable, for the other three exams. The correlation coefficient was significantly larger for the online class than for the lecture class for the total number of points. Although not all the correlations are reliably greater in the lecture than in the online classes, a meta-analysis, using the binomial test, showed that it is unlikely ($p < .05$) that all six pairs of correlations would be in the same direction. Note that two-tailed t tests failed to reveal any significant differences between the mean exam performances between the two classes (all p s $> .40$).

One question asked in the end-of-semester questionnaire was whether the student disliked the class because it was easy to get behind in the class. In the online class, 19 of 21 students reported that they disliked the class because it was easy to get behind. Only 13 of 23 students in the lecture class reported that they disliked the class because it was easy to get behind. A chi-square test of independence revealed a reliable difference between the responses to this question for the two classes, $\chi^2(1, N = 44) = 6.38, p = .01$.

It is possible that there is a relation between procrastination and how much the student liked the class. We calculated Pearson's r separately for each class to determine the relation between procrastination and the students' satisfaction with the class as measured by a question on the end-of-semester questionnaire. The response to each ques-

Table 1. Relationship Between Dilatory Behaviors in Accessing the Class Web Site and Performance on Each Exam

		$r_{\text{dilatory behaviors, exam scores}}$	p for $H_0: \rho = 0$	Exam Score		p for $H_0: \rho_{\text{online}} \leq \rho_{\text{lecture}}$
				M	SD	
Exam 1	Online	.52*	.02	71.86	14.03	.02*
	Lecture	-.08	.72	71.54	12.71	
Exam 2	Online	.50*	.02	76.05	10.04	.14
	Lecture	.20	.36	73.63	12.39	
Exam 3	Online	.57*	.01	74.00	11.05	.03*
	Lecture	.06	.78	74.79	9.87	
Exam 4	Online	.48*	.03	74.48	12.88	.17
	Lecture	.22	.31	77.33	10.03	
Final Exam	Online	.51*	.02	76.33	12.87	.12
	Lecture	.19	.40	74.13	10.10	
Sum	Online	.58*	.01	372.71	53.90	.05*
	Lecture	.14	.53	371.42	45.36	

* $p < .05$.

Table 2. Relationship Between Dilatory Behaviors in Accessing the Class Web Site and Attitudes Toward the Class

		$r_{\text{dilatory behavior, attitude}}$	p for $H_0: \rho = 0$	M	SD	p for $H_0: \rho_{\text{online}} = \rho_{\text{lecture}}$
I would take another class that was presented in this format if I had the opportunity.	Online	.51*	.02	2.43	1.47	.07*
	Lecture	.10	.66	2.55	1.34	
I would recommend the distance learning section of this class to my friends.	Online	.58*	.01	2.48	1.40	.01*
	Lecture	-.15	.52	2.45	1.14	
Everything considered, I have learned a great deal from this class so far.	Online	.54*	.01	3.38	1.12	.04*
	Lecture	.05	.82	3.68	0.78	
Everything considered, I really like this class so far.	Online	.55*	.01	2.86	1.24	.04*
	Lecture	.06	.06	2.86	1.08	

Note. The response to each question was based on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).
* $p < .05$.

tion was a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Large values of the procrastination measure indicated little procrastination. Table 2 summarizes these results. We found a strong relation between student satisfaction in the course and the procrastination measure, but only for students in the online class. The results indicate that for the online class, the greater the dilatory behaviors, the less satisfied the student was with the class. Table 2 also shows the results of z score tests for determining if the correlation between dilatory behaviors and attitudes was greater for online students than for the lecture students. None of the ratings listed in the table were reliably different between the online and lecture classes (for the two-tailed t tests all $ps > .75$ except for "I would recommend the distance learning section of this class to my friends," which had $p = .29$).

We investigated the relation between procrastination, neuroticism, and conscientiousness. Pearson's r failed to reveal a reliable relation between procrastination and neuroticism, $r(42) = .02, p = .91$. Pearson's r approached significance for the relation between procrastination and con-

scientiousness, $r(42) = .27, p = .07$. When we considered the online and lecture students separately, both neuroticism, $r(19) = -.38, p = .09$, and conscientiousness, $r(19) = .41, p = .06$, approached statistical significance for the online students. Neither neuroticism, $r(21) = .27, p = .21$, nor conscientiousness, $r(21) = .20, p = .35$, approached statistical significance for the lecture students.

The instructor took class attendance for the lecture class. The lecture students attended, on average, 24.5 of 29 classes (84.4%, $SD = 4.3$).

Discussion

The results of this study indicate that, at least in our online class, dilatory behaviors for accessing the class Web site were no more common than in our lecture class. However, the magnitude of the relation between procrastination and class performance and attitudes seemed to be larger for the online class than for the traditional class. Procrastination was a good

predictor of performance for each of the five tests in the class for the online students, but not a good predictor of performance for any of the five tests for the lecture students. This finding is consistent with the possibility that lecture students may distribute their practice with the material across time as they attend the lectures. Although lecture students may delay their studying until just before exams, just as online students do, the lecture students had the advantage of distributed practice that came from listening to lectures twice a week, every week. This finding is also consistent with Ross and Nisbett's (1991) theory that personality variables, such as procrastination, are more likely to have an effect in situations that do not demand particular behaviors, such as online classes, than in situations that demand particular behaviors, such as those found in traditional lecture classes.

Pedagogy suggests that activities such as online discussions, group writing projects, and immediate feedback on performance should lead to better performance. Thus, students in online classes, which often contain these activities, should have better performance in the class compared to traditional lecture classes, which often lack these activities. However, this is rarely the case. Russell (1999) cited more than 300 studies that failed to find any reliable difference in performance between traditional classes and classes at a distance (including correspondence courses, online courses, and telecourses). The observation that the magnitude of the relation between procrastination and exam scores was larger in this online class than in the lecture class could be a possible explanation for these null results. The additional activities in online classes that should increase performance may do just that. However, the decrements associated with dilatory behaviors in online classes may attenuate the increments associated with the additional activities. By reducing dilatory behaviors, the benefits of online classes may become more apparent.

Procrastination also was related to satisfaction in the class for the online students, but not for the lecture students. One possible explanation is that satisfaction with a course may depend, at least partially, on performance in the course. Procrastinators in the online class tended to perform more poorly, and the poor performance may have led them to be dissatisfied with the course. Differences in course satisfaction between the online and lecture classes probably also depend on many other variables such as being comfortable with the lecture format because it is what the students typically experience, the charisma of a live instructor, and so on.

Efforts to reduce or eliminate dilatory behaviors may improve student performance, satisfaction, and possibly even health in online classes. The literature offers several suggestions for reducing academic procrastination in general. Many of these suggestions are congruent with Ross and Nisbett's (1991) theory that making the situation more structured could lessen the detrimental effects of personality variables such as procrastination. Giving frequent tests (Tuckman, 1998), setting subgoals (Loebenstein, 1996), signing contracts and setting deadlines (Lamwers & Jazwinski, 1989), and requiring course involvement (Wesp, 1986) may make the online learning environment more structured. Other possibilities include weekly e-mail reports that compare each student's progress in the class to an ideal schedule or simply informing the students of the dangers of academic procrastination.

Our results suggest that personality inventories may be able to discriminate between students who will procrastinate in online classes and those who will not. In particular, the correlation between dilatory behaviors and the measures of neuroticism and conscientiousness approached statistical significance. If this relation is more firmly established, instructors could use this information to target interventions to students who are most at risk of suffering the negative consequences of dilatory behaviors in online classes.

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Note

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