WORKING PAPER

The Effects of Extended Time on Exams for College Students Without Learning Disabilities: A Classroom Experiment

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Abstract:

Does the accommodation of students with learning disabilities raise concerns about fairness in grading? Previous studies (e.g., Runyan 1991) suggest that extended time on exams holds no benefit for students without learning disabilities. Consequently, it is not possible to "overcompensate" via the remedy of extended time. The purpose of this study is to re-examine whether extended time improves the performance of students without learning disabilities. We exploit the occurrence of a classroom exercise in which 103 undergraduate students were administered a test in an economics course. Forty-two students received 25% more time to work on their exam; those students scored about thirteen percentage points higher (or 17% higher than the mean score of other students) than students without extended time, after controlling for other measures of subject mastery.

The Effects of Extended Time on Exams for College Students Without Learning Disabilities: A Classroom Experiment

Jeffrey Milyo and Brian Gran[1]

Survey evidence indicates that one of the most common forms of accommodation for students with learning disabilities in higher education is the provision of extended time on exams (Parks et al, 1987 and Ganschow et al, 1999). However, some faculty balk at this remedy; their primary concern is that extended time may provide an unfair advantage to students with learning disabilities (Satcher, 1992, Nelson et al, 1990 and Houck et al, 1992).

There are several reasons for why faculty may be uncomfortable with the accommodation of extended time. First, many faculty may not have prior experience with students diagnosed with learning disabilities. Second, university faculty do not typically receive much formal training in education or legal issues in education. Third, faculty are often not a party to decisions about the provision of extended time for students with learning disabilities. Since faculty are accustomed to a great deal autonomy in determining classroom requirements, any requirement for an accommodation from without may be greeted with some degree of suspicion. Further, extended time may be applied uniformly across assignments (e.g., quizzes and exams), again without formal faculty input. Consequently, some faculty may perceive the accommodation of extended time to be arbitrary.[2] Finally, recent critical accounts of accommodations for students with learning disabilities (Kelman and Lester, 1997, Shalit 1997, and Westling, 1997) may serve to reinforce

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[1]We are grateful for financial support from the Robert Wood Johnson Foundation's Scholars in Health Policy Research Program.

[2]It is worth noting that an arbitrary remedy of extended time may constitute either an over-compensation or an under-compensation for any particular student on any particular exam. However, it is our experience that faculty are primarily concerned with over-compensation.

negative stereotypes and fuel concerns regarding fairness and academic standards.

One constructive response is to provide faculty with appropriate information and training (Houck et al, 1992). Another is to encourage faculty involvement in the university process which determines accommodations for students with learning disabilities. Yet another response is to address directly whether there really does exist a tradeoff between accommodation of students with learning disabilities and academic fairness.

Runyan and Smith (1991) argue that extended time should not raise any concerns about fairness; the reason is simple: students with learning disabilities perform better with extended time on exams, but students without disabilities do not.[3] Several studies of student performance on timed exams demonstrate that extended time significantly improves the scores of students with learning disabilities but has little or no effect on the performance other students (Hill, 1984, Halla 1988, Runyan, 1991 and Alster, 1997). Further, to the extent that there is some stigma that deters students from seeking or accepting special accommodations, it is quite likely that too few students are being accommodated, not too many. The perception of a "fairness problem" resulting from over-compensation may then be merely a result of ignorance on the part of faculty.

It is our experience that when faculty are presented with Runyan and Smith's argument, they respond with some skepticism. This reaction is not entirely without merit; there are several shortcomings in previous studies of the differential effects of extended time on the relative performance of students with and without learning disabilities. First, previous studies have been conducted using standardized exams (e.g., the GRE), which may not be comparable to the types

[3]Alster (1997) and Kelman and Lester (1997) characterize this claim as a conventional wisdom; this is also supported by the authors' communications with university administrators.

of exams actually employed in university classes. Second, by necessity, these studies are conducted as formal human subject experiments; it is not apparent that similar results would obtain in an actual classroom setting. Finally, some of these studies employ exams for which students without learning disabilities are not severely time-constrained (e.g., Runyan, 1991).[4]

We address these criticisms by presenting the results of a classroom experiment that occurred under actual exam conditions (see below). Our results demonstrate that extended time can improve the scores of students without learning disabilities; this supports the concerns of some faculty about a tradeoff between accommodations and academic fairness. However, we also present evidence that may make faculty more amenable to easing time constraints on all students. More empirical research is needed to determine the extent to which university exams are severely time-constrained, and the extent to which there is a legitimate need for them to be so.

Method

Participants

The 103 students who participated in this study were all enrolled in an introductory microeconomics course at Tufts University in Massachusetts. None of the participants was known to be diagnosed with a specific learning disability. Because this experiment was conducted as a classroom exercise, and not (originally) as a research endeavor, demographic information on the students was not collected.

Instrument

We exploit the occurrence of a classroom exercise that was conducted to help students understand the concept of basing grades on relative performance (i.e., “grading on a curve”).

[4]For an extensive critique of Runyan’s evidence, see Kellman and Lester (1997).

Approximately half of the students were allowed twenty minutes to complete their exam (control group), while the remaining students were permitted twenty-five minutes (treatment group). The original purpose of this exercise was to demonstrate to students how grades are based on performance relative to the mean; the instructional goal of this exercise was to teach students that their nominal exam scores were less reliable indicators of performance than their relative (to the appropriate mean) exam scores.

This exercise also offers a "natural experiment" for determining the effects of extra time on a complex exam for students without learning disabilities. The exam administered in this experiment was the fifth of six exams given to students over the course of the semester. The exam consisted of several short answer questions, some of which required students to illustrate their responses in a diagram. All exams were graded by the course instructor, without knowledge of which exams were in the treatment group and which were in the control group. An inherent strength of this natural experiment is that students were performing under live exam conditions. An inherent weakness is that the exam, while representative of exams offered in this course, is not necessarily comparable to exams offered in other courses in economics, other academic subjects or other universities. Consequently, the results of this exercise should be interpreted with great caution.

Procedure

Students were fully informed about the original purpose of the classroom exercise; most importantly, they were instructed that their exam scores would be adjusted for the time difference

(by scoring relative to the mean) and would be counted as one of their regular exam grades.[5] Consequently, students were not only taking a complex exam under live conditions, but they were motivated to perform well. This distinguishes our experiment from previous studies of the effects of extra time on student performance.

The experimental exam was the fifth exam taken by these students; three weeks later, these same students were administered a comprehensive final exam.[6] This permits us to employ previous exam scores and the subsequent final exam score as control variables in our analysis.

Students were randomly assigned to the treatment and control groups according to their seating location in the classroom (rows of seats were assigned randomly to the treatment or control group). Prior to the start of the experiment, students were permitted to switch groups; nine students left the control group (20 minutes) and entered the treatment group (25 minutes). The identities of theses students were not recorded, but this deviation from random assignment did not produce any significant differences in the observable characteristics of our two groups. The treatment and control groups have similar averages on previous exams and performed similarly on the final exam (see Table 1).

Results

Our dependent variable is the percent answered correctly on the experimental exam. The independent variables are an indicator for whether the student received extra time to complete the

[5]After the exercise, students were informed that their exam score would be counted only if it raised their average exam score in the course.

[6]One student dropped the course after the experimental quiz and before the final exam; three students were not present for the experimental quiz. These students are included in our analysis.

exam and one of two measures of subject mastery: the student's average percent answered correctly on the previous four exams or the percent answered correctly by the student of the comprehensive final exam. The means and standard deviations for these variables are listed in Table 1.

Seven of the students answered all of the exam questions correctly (four of these students received extra time). To account for the fact that exam scores are truncated at 100%, we use an upper-limit tobit to derive our estimates; results are reported in Table 2. We obtain similar results when we ignore the limited dependent variable and employ ordinary least squares regression analysis (see Table 3).

Absent any other controls, students without extra time receive an average score of 73.2%, while those with extra time receive average scores of 86.7%; the treatment effect from extra time is then 13.5 percentage points ($p<.01$). These results are reported in column (1) of Table 2. The treatment effect is unchanged when the previous exam average is included as an independent variable (2), but it falls to 11 percentage points ($p<.01$) when the final exam score is included as a control variable (3).

Both proxies for subject mastery are significant predictors of performance on the fifth exam, but the final exam score is a better predictor of the experimental exam score. A one percentage point on the final exam raises the predicted score on the fifth exam by 0.6 percentage points; however, a one percentage point increase in the previous exam average has only two-thirds as large of an effect. This difference is somewhat to be expected since the final exam included material that was covered by the fifth exam, while the previous four exams did not; further the final exam occurred less than three weeks after fifth exam, while the previous four

exams were spread over a twelve week period. However, it is also the case that students were more severely time-constrained on the previous exams than on the final exam.

We therefore test whether performance on the four time-constrained exams is an equally good predictor of student performance for both the treatment and control groups. We interact the previous exam average with the dummy indicator for whether a student received extra time. The results are reported in column (4) of Table 2.

We now find that previous exam average is a significant predictor of performance only for the control group; scores for the treatment group are unrelated to prior performance on time constrained exams. This finding is repeated, albeit in a less pronounced fashion, even when we use the final exam score as a control variable (column 5). This strongly suggests that students who do not perform well on a time constrained exam can improve their relative performance when time constraints are relaxed. This raises a new fairness concern: how much of observed differences in exam scores are attributable to true differences in academic achievement, rather than differences in students' abilities to cope with exam stress?

Discussion

Our experiment, conducted under actual exam conditions, supports the contention that extended time can significantly improve the performance of students without learning disabilities. This in no way reduces the need for accommodating students with learning disabilities, but it does suggest that faculty concerns about fairness should not be dismissed out of hand. Faculty concerns may be addressed constructively through additional training or increased involvement. Further, many faculty may not be aware of the extent to which their exams reflect not students' mastery of the subject matter, but instead students' ability to perform under sever time

constraints. If faculty find it appropriate to provide additional time for all students, then concerns about the accommodation of extra time may be mitigated.

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Table 1. Means and Standard Deviations

	All Students (n = 103)	Students with 25% Extra Time (n = 42)
Experimental Exam Score	77.9% (21.2)	85.4% (10.6)
Previous Exam Average	74.8 (11.3)	74.9 (11.0)
Final Exam Score	63.1 (11.9)	65.5 (12.5)

Note: Seven students received perfect scores on the experimental exam; four of these students were in the treatment (extra time) group.

Table 2: Tobit Estimates
Percent Answered Correctly on Experimental Exam

Independent Variables	(1)	(2)	(3)	(4)	(5)
Constant	73.2 (9.80)	42.0 (4.15)	26.1 (5.83)	24.4 (4.43)	19.0 (5.68)
25% Extra Time	13.5 (3.13)	13.5 (3.20)	11.1 (2.69)	62.0 (2.20)	50.8 (2.31)
Previous Exam Average		0.42 (2.28)			
Final Exam Score			0.60 (3.48)		
Previous Exam Average X No Extra Time				0.65 (2.89)	
Final Exam Score X No Extra Time					0.88 (3.86)
Previous Exam Average X 25% Extra Time				0.00 (0.01)	
Final Exam Score X 25% Extra Time					0.26 (1.02)
Log(L)	-436.86	-434.31	-431.05	-432.82	-429.4

Note: T-statistics in parentheses.

Table 3: OLS Estimates
Percent Answered Correctly on Experimental Exam

Independent Variables	(1)	(2)	(3)	(4)	(5)
Constant	72.7 (23.00)	44.7 (2.95)	40.2 (3.73)	25.9 (1.18)	20.6 (1.42)
25% Extra Time	12.7 (3.59)	12.7 (3.51)	10.6 (3.11)	64.0 (2.73)	54.8 (3.21)
Previous Exam Average		0.37 (1.92)			
Final Exam Score			0.53 (3.47)		
Previous Exam Average X No Extra Time				0.63 (2.20)	
Final Exam Score X No Extra Time					0.85 (4.03)
Previous Exam Average X 25% Extra Time				-0.06 (-0.52)	
Final Exam Score X 25% Extra Time					0.15 (1.18)
R-Squared	.09	.13	.17	.16	.21

Note: T-statistics in parentheses derived from heteroscedastic-consistent estimates of the standard errors.

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