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Student Test Grades in College: A Study of Possible Predictors

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Research on variables related to test performance has produced mixed results. Typically, research of this type involves only a few variables. In an attempt to obtain a more complete picture, we investigated how test grades might be related to variables such as classification, student seating location, test completion time, predicted grade, time spent studying, and perceived test difficulty. Undergraduate students in five courses completed their regularly scheduled tests and responded to demographic questions as well as questions about test difficulty, time spent studying and predicted grade. The results revealed that test grades were positively correlated with students' predicted grade. Test grades were negatively correlated with test completion time and with perceived test difficulty. Test grades were not correlated with students' reported study times. Other relationships among the variables are discussed.

University instructors and researchers alike continually search for variables to help predict student test scores. This is an important area to investigate because understanding which variables are correlated with student test scores can help with instructional decision-making. Variables such as time taken to complete a test, student seating location and perception of test difficulty have all been discussed as possible predictors for test scores (e. g., Feinberg, 2004; Hong & Karstensson, 2002; Perkins & Wieman, 2005). Studies have been conducted with students ranging from elementary school to college settings (e.g. Tagliacollo, Volpato, & Pereira, 2010; Zomorodian et al. 2012).

Literature Review

Time Taken to Complete Tests

Over the past decade, several studies have investigated the time taken by college students to complete tests. Feinberg (2004) studied the connection between test completion times and test scores and found that college students who spent more time taking a test made higher grades. The difference was most notable with lower performing students. Basturk (2009) studied test completion time, test scores, and gender among college students. For multiple-choice tests, females who took longer on tests had higher scores.

In a study involving undergraduate students, Landrum (2009) found that test completion time was sometimes, but not always, negatively correlated with grades. Tadayon, Nyman, and Barker (n.d.) explored test time, score, gender, class type (online or in-person) and classification among college students. They found that overall, students who spent more time on the test had slightly higher grades. Further, gender differences were mixed in that on the first test females took longer to take the test and earned higher scores, while on the second test females again took longer but scored lower than males. Overall, seniors spent the most time on the tests and had the lowest scores, and juniors spent the least time and had the highest scores. Online students took longer to take the test and had slightly lower scores than the in-person class. Bridgeman, Cline, and Hessinger (2004) studied adults taking the GRE exam and found no gender differences, but did they find that giving students extra time on exams had a small positive effect on test scores. Other studies have found that test completion time and grade were not related. For example, Nevo and Spector (1979) standardized and combined data from eight college freshman and sophomore classes and found that time taken to complete the tests was not correlated with test scores. As the authors pointed out, the relations between test completion times and test grades had not been studied often in classroom settings.

We were particularly interested in one aspect of the relationship between test completion time and test grades. Anecdotal evidence indicates that often, both the first few and last few students to complete a test have some of the highest and lowest grades. Perhaps some students finish quickly because they are well-prepared and know the answers. Others may finish quickly because they are not well-prepared and do not know the answers and simply turn in their tests. Similarly, some students may take a long time to complete tests because they are being very careful and checking their work, while others take a long time because they do not know the answers and are either writing as much as they can with the hope that some of it will be relevant or they are writing very little but are waiting to see if they can remember something. If these patterns are occurring, we would expect to see greater variability in the test scores among the earliest and latest finishers than among students who finish in between these groups. If this is the case, this could obfuscate the relationship between test completion time and grades by making the two variables appear to be uncorrelated when a class is analyzed as a whole. That is, the mean scores of the students finishing early and

late could be similar to the mean scores of those finishing in between even though the range and standard deviations of the scores could be significantly different. It is worth noting that Paul and Rosenkoetter (1980) found no significant relationship between the order in which students completed a test and the scores the students received. Tests were divided into quartiles based on the order in which they were completed. These quartiles were then compared in terms of mean scores and variability among the scores. The quartile variances were not significantly different.

Seating Location

Researchers have also investigated student seating location in relation to test performance and classroom behavior. Marx, Fuhrer, and Hartig (2000) explored seating location and how frequently fourth-grade students asked questions. The classroom design alternated between a semicircle and row-and-column seating in two-week periods over eight weeks. Seating was randomly assigned during both arrangements. The data revealed that students asked questions more frequently when the classroom used a semicircle design. Central positions, which were in close proximity to the teacher, were associated with asking more questions. Perkins and Wieman (2005) studied college students in a large introductory class and randomly assigned them to sit in the front or back of the room. The seating assignments were changed midsemester so that students in the front were moved to the back and students in the back were moved to the front. It was found that the number of students who received A's decreased the further their original seating was from the front of the room. Students who were doing well in the front of the room continued to do well when moved to the back of the room. Kalinowski and Taper (2007) found that while students who sat in the front rows had higher overall GPA's, test grades and attitudes were unaffected by seat location. All of the participants were biology majors, and the classes were smaller than those used in the Perkins and Wieman (2005) study. These factors could be related to the discrepant findings. Tagliacollo et al. (2010) found that elementary school students who chose to sit further away from the board had lower test scores, more absences and lower grades than students who sat closer to the board. They also found motivation for learning was a factor in determining both seat position and performance. Students sitting in the front row had more motivation for learning, and this affected their seating choice. Similarly, Holliman and Anderson (1986) allowed students to choose their seats and found that students sitting in the front rows received higher grades than those sitting farther back. Cinar (2010) studied seating preferences among university students in Turkey. Female students preferred to sit in the front rows, and students sitting in the front rows cared more about the lesson and were more willing to participate. Zomorodian et al. (2012) found that medical school students who changed their seats frequently, possibly due to frequent absences or coming to class late and taking any available seat, received lower grades. No significant gender differences were found.

Perception of Test Difficulty

Student perception of test difficulty has also been studied. For example, Hong (1999) found that perceived difficulty of undergraduate statistics tests affected scores indirectly by causing the students to worry. Similarly, Hong and Karstensson (2002) found that students who perceived an undergraduate statistics course to be difficult experienced greater test anxiety and that this may have been related to lower test scores.

Summary of Previous Findings

The literature on time taken to complete tests is inconclusive. Of the studies reviewed here, four found positive correlations between test time and grades, one found a negative correlation in some but not all cases, and two found no correlation. The relationship between seating location and grades is more consistent, with students sitting near the front of the room performing better regardless of whether seating was assigned or chosen by the students. Similarly, and perhaps not surprisingly, the literature indicates that students perform better on tests that they perceive as being less difficult.

Research Aims

The goal of the present study was to investigate several possible correlates of test grades simultaneously in an attempt to clarify the relationships between these variables and further our understanding of how each is related to test grades. Overall, the literature regarding variables related to test scores is inconclusive. Some studies indicate that these variables are associated with differences in test scores, and other studies found no such relationships. The current study differs from past research in that it looks at a larger number of potentially relevant variables in one study. The results of this study may help us better understand learning environments so that elements of classroom design, instructional design and test preparation can be used to help increase student learning. The hypothesis for this study was that seating location, test completion time,

perception of test difficulty, study time, predictions about grades, classification (freshman, sophomore, junior, senior) and gender would be correlated with test grades.

Methods

Participants

All participants were students enrolled in one of five undergraduate psychology classes. These courses included general psychology, developmental psychology, adolescence psychology and basic statistics. The participants included 42 male and 114 female students and one student who did not answer the gender question. The participants ranged in age from 19 to 54 years old with a mean age of 20.5 years. This included 104 Caucasians, 42 African Americans, eight Asians, and one Native American. By classification, the sample included 22 freshmen, 76 sophomores, 43 juniors and 15 seniors. Class size ranged from 30 - 75 students. All classrooms featured typical seating arrangements with tables arranged in rows. Students chose their own seats at the beginning of the semester. The classes included multiple-choice, short answer and calculation problem exams. Data were collected on five tests in each course throughout the semester. Response rates to the questions concerning study time, perceived difficulty, and predicted grade ranged from 85%-90% for test 1, 87%-92% for test 2, 68%-73% for test 3, 50%-52% for test 4 and 68%-70% for the final.

Procedure

Prior to the first test in each course, we collected demographic information from participants including gender, age, ethnicity and classification. As participants completed the demographic information sheet, we also asked them to indicate whether they sat in the front or back of the classroom. To assist with answering this question, the instructor indicated the front/back dividing line in each room by standing in the middle of the room and instructing everyone behind that point to choose "back" and everyone in front of that point to choose "front." The following 3-item questionnaire was attached to each of the five tests.

1) On a scale of 1 – 10 (1=very easy, 10=very difficult) how difficult was this test?
2) What grade (0-100) do you think you will make on this test?
3) How much time (number of hours) did you spend studying for this test?

After each student turned in a test, the instructor recorded the time taken to complete the test. This procedure was followed for all tests. These data were later compared to test grades, classification and seating location.

Results

As stated earlier, we were interested in whether seating location, test completion time, student perception of test difficulty, study time, student predictions about grades, grades on previous tests and classification were correlated with test grades.

The data were standardized to allow for combination of data across tests and classes. Correlations between test grade, predicted grade, test completion time, predicted grade and study time are shown in Table 1.

A t-test revealed that test grades of students sitting in the back vs. front of the room were not significantly different $t(588) = .87$, $p = .385$. Seating location and classification were not found to be significantly related to grades, perceived difficulty, study time, predicted grade nor time taken to complete the tests.

Finally, we separated the data into five groups based on the order in which students turned in the tests. So Group 1 included the first 20% of students to hand in their test, Group 2 included the next 20% of students, and so on. We did not find evidence of significant differences in variability among these groups.

Discussion

The data revealed several interesting relationships between variables and test grades. Perhaps most surprisingly, test grade was not correlated with reported study time. It is possible that this was due to students inaccurately reporting the amount of time they studied for each test. Mean study times across tests varied from 2.1 to 2.8 hours. The data were highly variable with a range from zero study time to 15 or 16 hours for some tests. Study time was positively correlated with time taken to complete the tests. If students' reported study times are accurate or at least correlated with their actual study times, this would indicate that students who spent more time studying also spent more time taking the tests. Other significant correlations revealed that students who made higher grades on the tests predicted higher grades and rated the tests as being less difficult. These results were consistent with previous findings. Additionally, the correlation between perceived difficulty and predicted grade was significant, with students who predicted higher grades rating the tests as being less difficult. Students who completed the tests more quickly made higher grades and predicted higher grades. Previous research indicated an inconsistent relationship between test completion time and grades. The fact that students were able to predict their grades may mean that they feel that their tests are being graded

Table 1
Correlations Between Test Grades and Other Variables

	Test Grade	Difficulty	Test Time	Predicted Grade	Study Time
Test grade	—				
Difficulty	-.144***	—			
Test time	-.082*	.048	—		
Predicted **G**rade	.422***	-.294***	-.141**	—	
Study time	-.042	-.034	.231***	-.029	—

Note. *p < .05, **p < .01, ***p < .001

fairly. Even if this is not the case, knowing approximately how well one has done may be a type of immediate feedback that could impact future study habits. If so, instructors should strive to test in ways that lead to accurate predictions by students. Student seating location (front vs back) was not found to be related to test grades. Past research has shown mixed results with some studies finding that seat location was a predictor of test grades.

Our findings were consistent with those by Paul and Rosenkoetter (1980) in that the variability in test grades was not significantly different across the five groups based on the order in which the students turned in their tests.

Looking at these results as a whole, the strongest correlations were positive correlations between predicted grade and actual test grade, between test completion time and study time, and the negative correlation between perceived difficulty and predicted grade. There were no correlations between study time and either perceived difficulty or predicted grade.

Some limitations of this study include student self-reporting study time. It may have been difficult for student to recall the amount of time they spent studying for a test. It may be beneficial in the future to ask students to monitor and report their studying throughout the week so they can provide more accurate information regarding their study time. It may also be helpful to ask students not only to indicate the perceived difficulty about a test, but also explain what factors account for this perceived difficulty so these factors can be investigated.

More research is needed to investigate the relationships between test grades and variables such as test completion time, seating location, study time and perceived test difficulty. In particular, the relationship between test completion time and grades is unclear. It may be the case that the relationship depends on the other variables mentioned here or perhaps others that have not been investigated. Further analysis may allow researchers to determine which variables are most closely and most consistently related to test scores. This could help instructors make decisions regarding classroom design, test preparation and instructional design. These factors have the potential to influence student test scores as well as student perceptions of tests.

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